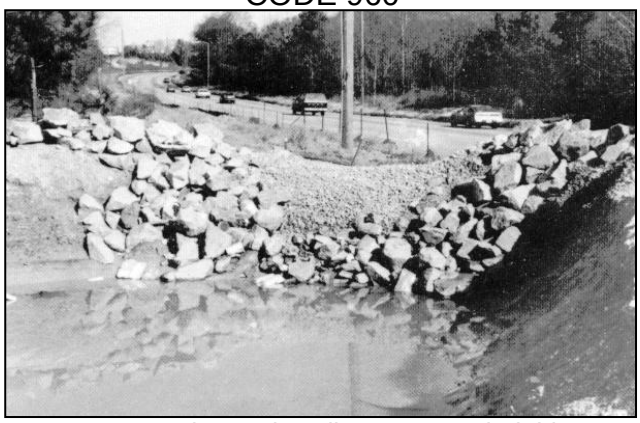
NATURAL RESOURCES CONSERVATION SERVICE
ILLINOIS URBAN MANUAL
PRACTICE STANDARD

TEMPORARY SEDIMENT TRAP

(no.)
CODE 960



(Source: NC Erosion and Sediment Control Field Manual)

DEFINITION

A small, temporary ponding basin formed by construction of an embankment or excavated basin.

PURPOSE

The purpose of this practice is to detain sediment-laden runoff from small-disturbed areas for a sufficient period of time to allow the majority of sediment and other water-based debris to settle out.

CONDITIONS WHERE PRACTICE APPLIES

1. At the outlets of diversions, channels, slope drains, or other runoff conveyances that discharge sediment-laden water.
2. Below areas that are 5 acres or less.
3. Where access can be maintained for sediment removal and proper disposal.
4. In the approach to a storm water inlet located below a disturbed area as part of an inlet protection system.
5. Structure life should be limited to 18 months.
6. Where failure of the structure 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.

CRITERIA

Storage capacity - Designs shall provide for both sediment storage and detention storage.

The sediment storage shall be sized to store the estimated sediment load generated from the site over the duration of the construction period with a minimum storage equivalent to the volume of sediment generated in one year. For construction periods exceeding one year, the one-year sediment load and a sediment removal schedule may be substituted.

The detention storage shall be composed of equal volumes of "wet" and "dry" detention storage. Each shall be sized for the runoff from either a 2-

year, 24-hour storm from the area draining into the basin under maximum runoff conditions during construction, or 134 cubic yards/acre based on the area draining into the basin, whichever is greater. Half of the detention storage shall be below the permeable fill.

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. Additional freeboard may be added to the embankment height to allow flow through a designed bypass location. Construct embankments with a minimum top width of 5 feet and side slopes of 2:1 or flatter. Machine compact embankments according to the requirements in construction specification 23 EARTHFILL.

The design height of the embankment shall be increased by the amount needed to insure that after settlement the height of the dam equals or exceeds the design height. The height of the embankment shall be increased by 5% where the fill material is placed in lifts of 8" or less and compacted by heavy equipment traversing the fill. The height shall be increased by 10% when fill material is pushed up and compacted by a bulldozer.

The original ground under the embankment shall be scarified to a depth of 6" or more prior to placement of the fill material. Fill material shall not be placed over frozen ground. The earthen embankment shall be seeded with temporary or permanent vegetation in accordance with methods outlined in the practice standards PERMANENT VEGETATION 880 or TEMPORARY SEEDING 965.

Excavation - Where sediment pools are formed or enlarged by excavation, keep side slopes at 2:1 or flatter for safety.

Outlet section - Construct the sediment trap outlet using a stone section of embankment located at the low point in the basin. The stone section serves two purposes: 1) the top section serves as a nonerosive spillway outlet for flood flow, and 2) the bottom section provides a means of dewatering the basin between 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 well-graded stones with a d50 size of 9 inches and a maximum stone size of 14 inches (IDOT RR-4). A 1-foot thick layer of 1/2-inch rock (IDOT CA-2) should be placed on the inside face to reduce drainage flow rate.

Side slopes stone layer thickness - Keep the side slopes of the spillway at least 21 inches thick.

Depth - Keep the crest of the spillway outlet a minimum of 1.5 feet below the settled top of the embankment.

Protection from piping - Place filter cloth, according to the requirements in material specification 592 GEOTEXTILE Table 1 or 2, Class I, II or IV with an AOS of 30 for nonwoven and 50 for woven, between the soil and the riprap to prevent piping. An alternative would be to excavate a keyway trench across the riprap foundation and up the sides to the height of the dam.

Weir length and depth - Keep the spillway weir at least 4 feet long 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 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 table below:

Drainage Area (acres)	Weir Length (ft.)
1	4.0
2	6.0
3	8.0
4	10.0
5	12.0

Dimensions shown are minimum.

The release rate of the basin shall be that rate required to achieve minimum detention times of at least 10 hours. The elevation of the permeable fill outlet shall be placed such that it only drains the dry detention storage.

Direct spillway bypass to natural, stable areas. Locate bypass outlets so that flow will not damage the embankment.

Discharges from both the principal and emergency spillways of a sediment trap must be conveyed to a natural waterway in a channel of adequate capacity and stability. Where this channel intersects with the natural waterway, the discharge shall be less than 1 1/2 feet per second or otherwise below the velocity which will initiate erosion or scour within the receiving waterway. Outlets to stormwater facilities must have adequate capacity to receive the discharge from the sediment trap.

Where an emergency spillway is utilized, the spillway crest elevation should be at least 1.5 feet below the settled top of the embankment with the emergency spillway crest being 0.5 feet below the top of the embankment.

Rock placement - The rock will be placed according to construction specification 25 ROCKFILL. Placement will be by Method 1 and compaction of rockfill will be Class III.

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 diverted into the traps.

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

In preparing plans for sediment traps, it is important to consider provisions to protect the embankment from failure from storm runoff that exceeds the design capacity. Consider nonerosive emergency spillway bypass areas, particularly if there could be severe 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 permanent pool formed by excavation, or by a combination of excavation and embankment. Sediment-trapping efficiency is a function of surface area and inflow rate. Installations that provide pools with large length to width ratios reduce short-circuiting and allow more of the pool surface area for settling. This optimizes efficiency.

The minimum length of flow through the trap should be 10 feet and the minimum

length to width ratio should be 2:1. If site conditions permit a greater travel distance through the basin and greater length to width ratio the water quality benefit provided by the sediment trap will be enhanced. The average trap permanent pool depth should be a minimum of 3 feet to prevent resuspension of sediments.

Another method of improving the trapping efficiency is to place geotextile fabric between the riprap and coarse aggregate. If this is done, timely maintenance is needed to assure that the outlet does not clog with sediment.

Because well-planned sediment traps are key measures to preventing off-site sedimentation, they should be installed in the first stages of project development.

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 include the following items:

1. Location of the sediment traps.
2. Size of basin including width, length and depth.
3. Minimum cross section of embankment.
4. Minimum profile through spillway.
5. Location of emergency spillway, if used.
6. Gradation and quality of rock.

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

The standard drawing IL-660 TEMPORARY SEDIMENT TRAP 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 dimensions when the sediment has accumulated to one-half the design depth of the permanent pool. Place the sediment that is removed in the designated disposal area and replace the contaminated part of the gravel facing.

Check the structure for damage from erosion or piping. Periodically check the depth of the spillway to ensure 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 immediately.

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

REFERENCES

Illinois Department of Transportation, 1997. Standard Specifications for Road and Bridge Construction. IL

North Carolina Sedimentation Control Commission, 1988. Erosion and Sediment Control Planning and Design Manual. NC

Northeastern Illinois Planning Commission, 1991. Model Soil Erosion and Sediment Control Ordinance. IL

Northeastern Illinois Planning Commission, 1993. Urban Stormwater Best Management Practices for Northeastern Illinois. IL

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

NRCS IL October 2001

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