

NATURAL RESOURCES CONSERVATION SERVICE
ILLINOIS URBAN MANUAL
PRACTICE STANDARD

Structural Streambank Stabilization

(feet)

Code 940



Source: NC Erosion and Sediment Control Field Manual

Definition

Stabilization of eroding streambanks by use of designed structural measures.

Purpose

The purpose of this practice is to protect streambanks from the erosive forces of flowing water.

Conditions Where Practice Applies

Sections of streambanks that are subject to erosion due to excessive runoff from construction activities. Generally applicable where flow velocities exceed 5 ft/sec or where vegetative streambank protection is inappropriate.

Criteria

Since each reach of channel requiring protection is unique, measures for structural streambank protection should be installed according to a plan based on specific site conditions.

Develop designs according to the following principles:

1. Make protective measures compatible with other channel modifications planned or being carried out in other channel reaches.
2. Use the minimum design velocity of the peak discharge of the 10-year storm. Structural measures must be effective for this design flow and must be capable of withstanding greater flows without serious damage.
3. Ensure that the channel bottom is stable or stabilized by structural means before installing any permanent bank protection.
4. Ensure that streambank protection extends between stabilized or controlled points along the stream.
5. Do not change channel alignment without a complete evaluation of the anticipated effect on the rest of the stream channel, especially downstream.
6. Give special attention to maintaining and improving habitat for fish and wildlife.
7. Ensure that all requirements of state law and all permit requirements of local, state, and federal agencies are met.

Riprap – Riprap is the most commonly used structural material for stabilizing streambanks. When possible, slope banks to 2:1 or flatter, and place a gravel filter or filter fabric on the smoothed slopes before installing riprap. Place the toe of the riprap at least 1 foot below the stream channel bottom or below the anticipated depth of channel degradation. Where necessary, riprap the entire length between well-stabilized points of the stream channel.

Riprap shall be installed according to the requirements in Construction Specification [ROCK RIPRAP 61](#).

Gabions – These rectangular, rock-filled wire baskets are pervious, semi-flexible building blocks that can be used to armor the bed and/or banks of channels or act as deflectors to divert flow away

from eroding channel sections. Gabions shall be installed according to the requirements in Construction Specification [WIRE MESH GABIONS AND MATTRESSES TWISTED \(WOVEN\) OR WELDED MESH 64](#).

Reinforced Concrete – May be used to armor eroding sections of the streambank by constructing retaining walls or bulkheads. Provide positive drainage behind these structures. Reinforced concrete may also be used as a channel lining for stream stabilization.

Grid Pavers – Modular concrete units with interspersed void areas that can be used to armor the streambank while maintaining porosity and allowing the establishment of vegetation. These structures may be obtained in precast blocks or mats that come in a variety of shapes, or they may be formed and poured in place. Keep design and installation in accordance with manufacturer's instructions.

Revetment – Structural support or armoring to protect an embankment from erosion. Riprap or gabions are commonly used. Gabions may be either stacked or placed as a mattress. Install revetment to a depth below the anticipated channel degradation and into the channel bed as necessary to provide stability. Stabilize all areas disturbed by construction as soon as the structural measures are complete.

Considerations

Stream channel erosion problems vary widely in type and scale, and there is no one measure that works in all cases. Stabilization structures should be planned and designed by an engineer with experience in this field. Many of the practices discussed here involve the use of manufactured products and should be installed in accordance with the manufacturer's specifications. Where long reaches of stream channels require stabilization, make detailed stream studies.

Before selecting a structural stabilization technique, the designer should carefully evaluate the possibility of using vegetative stabilization in conjunction with structural measures to achieve the desired protection. Vegetative techniques are generally less costly and more compatible with natural stream characteristics.

Plans and Specifications

A detail of the streambank stabilization shall be shown on the plan, and contain the following minimum requirements.

1. Location and extent of streambank to be stabilized
2. A detail of the protective layer
3. Thickness and gradation of riprap, if used
4. Specifications for the materials used including the filter or filter fabric

Standard Drawing [STRUCTURAL STREAMBANK STABILIZATION – RIPRAP IL-640](#) may be used as the plan sheet for riprap and Standard Drawings [Structural Streambank Stabilization – Gabions 2 Baskets High without Mat IL-641](#), [Structural Streambank Stabilization – Gabions 2 Baskets High with Mat IL-642](#), [Structural Streambank Stabilization – Gabions 3 Baskets High without Mat IL-643](#), [Structural Streambank Stabilization – Gabions 3 Baskets High with Mat IL-644](#), or [Structural Streambank Stabilization – Gabions Assembly and Lacing Details IL-645](#) may be used as the plan sheet for gabions.

Operation and Maintenance

Check stabilized streambank sections after every high-water event, and make any needed repairs immediately to prevent further damage.

NRCS IL
August 1994

Code 940 – Structural Streambank Stabilization.doc