

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

STREAMBANK AND SHORELINE PROTECTION

(Ft)

CODE 580

DEFINITION

Treatment(s) used to stabilize and protect banks of streams or constructed channels, and shorelines of lakes, reservoirs or estuaries.

PURPOSE

- To prevent the loss of land or damage to land uses or facilities adjacent to the banks of streams or constructed channels, shoreline of lakes, reservoirs, or estuaries including the protection of known historical, archeological and traditional cultural properties.
- To maintain the flow capacity of streams or channels
- Reduce the offsite or downstream effects of sediment resulting from bank erosion.
- To improve or enhance the stream corridor for fish and wildlife habitat, aesthetics or recreation.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to streambanks of natural or constructed channels and shorelines of lakes, reservoirs, or estuaries where they are susceptible to erosion. It does not apply to erosion problems on main ocean fronts, beaches or similar areas of complexity. It does not apply to areas where failure of structural measures would create a hazard to life or results in serious damage to property.

CRITERIA

General Criteria Applicable to All Purposes

Treatments shall be in accordance with all applicable local, state and federal laws and regulations. All required permits shall be obtained before the measure is installed.

Treatments applied shall seek to avoid adverse effects to endangered, threatened and candidate species and their habitats whenever possible.

Treatments applied shall seek to avoid adverse effects to archaeological, historic, structural and traditional cultural properties whenever possible.

An assessment of unstable streambank or shoreline sites shall be conducted in sufficient detail to identify the causes contributing to the instability (e.g. livestock access, watershed alterations resulting in significant modifications of discharge or sediment production, in channel modifications such as gravel mining, head cutting, water level fluctuations, boat generated waves, etc.).

Proposed protective treatments to be applied shall be compatible with improvements being planned or installed by others.

Protective treatments shall be compatible with the bank or shoreline materials, water chemistry, channel or lake hydraulics and slope characteristics above and below the water line.

End sections of treatment areas shall be adequately anchored to existing treatments, terminate in stable areas or be otherwise stabilized to prevent flanking of the treatment.

Protective treatments shall be installed that result in stable slopes. Design limitations of the bank or shoreline materials and type of measure installed shall determine steepest permissible slopes.

Designs will provide for protection of installed treatments from overbank flows resulting from upslope runoff and flood return flows.

Internal drainage for bank seepage shall be provided when needed. Geotextiles or properly designed filter bedding shall be incorporated with structural measures where potential exists for migration of material from behind the measure.

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Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact the MN Natural Resources Conservation Service in your area, or download it from the electronic Field Office Technical Guide for Minnesota.

Treatments shall be designed to account for any anticipated ice action, wave action and fluctuating water levels.

All disturbed areas around protective treatments shall be protected from erosion. Disturbed areas that are not to be cultivated shall be protected as soon as practical after construction.

Vegetation shall be selected that is best suited for the site conditions and achieves the intended purpose(s).

In order to ensure plant community establishment and integrity, a vegetative management plan shall be prepared in accordance with MN conservation practice standards Channel Bank Vegetation, 322 and/or Critical Area Planting, 342.

Additional Criteria for Streambanks

Stream segments to be protected shall be classified according to a system deemed appropriate by the state. Segments that are incised or contain the 5-year return period (20 percent probability) or greater flows shall be evaluated for further degradation or aggradation.

A site assessment shall be performed to determine if the causes of instability are local (e.g. poor soils, high water table in banks, alignment, obstructions deflecting flows into bank, etc.) or systemic in nature (e.g. aggradation due to increased sediment from the watershed, increased runoff due to urban development in the watershed, degradation due to channel modifications, etc.). The assessment need only be of the extent and detail necessary to provide a basis for design of the bank treatments and reasonable confidence that the treatments will perform adequately for the design life of the measure.

Changes in channel alignment shall not be made without an assessment of both upstream and downstream fluvial geomorphology that evaluates the affects of the proposed alignment. The current and future discharge-sediment regime shall be based on an assessment of the watershed above the proposed channel alignment.

Bank protection treatment shall not be installed in channel systems undergoing rapid and extensive changes in bottom grade and/or alignment unless the treatments are designed to control or accommodate the changes. Bank treatment shall be constructed to a depth at or below the anticipated lowest depth of streambed scour.

If the failure mechanism is a result of the degradation or removal of riparian vegetation, stream corridor restoration shall be implemented, where feasible (see Additional Criteria for Stream Corridor Improvement) as well as treating the banks.

Toe erosion shall be stabilized by treatments that redirect the stream flow away from the toe or by structural treatments that armor the toe. Additional design guidance is found in the NEH Part 650, Chapter 16, Streambank and Shoreline Protection.

Where toe protection alone is inadequate to stabilize the bank, the upper bank shall be shaped to a stable slope and vegetated, or shall be stabilized with structural or soil-bioengineering treatments.

Channel clearing to remove stumps, fallen trees, debris and sediment bars shall only be performed when they are causing or could cause unacceptable bank erosion, flow restriction or damage to structures. Habitat forming elements that provide cover, food, pools and water turbulence shall be retained or replaced to the extent possible.

Treatments shall not induce an increase in natural erosion.

Treatments shall not limit stream flow access to the floodplain.

Where flooding is a concern, the effects of protective treatments shall not increase flow levels above those that existed prior to installation.

Where agricultural land is being protected, the minimum design flow is a 5-year frequency flow. For other property, the minimum design flow is a 10-year frequency flow. Larger design flows shall be used where appropriate.

Additional Criteria for Shorelines

All revetments, bulkheads or groins are to be no higher than 3 feet (1 meter) above mean high tide, or mean high water in non-tidal areas.

Structural shoreline protective treatments shall be keyed to a depth to prevent scour during low water.

For the design of structural treatments, the site characteristics below the waterline shall be evaluated for a minimum of 50 feet (15 meters) horizontal distance from the shoreline measured at the design water surface.

The height of the protection shall be based on the design water surface plus the computed wave height

and freeboard. The design water surface in tidal areas shall be mean high tide.

When vegetation is selected as the protective treatment, a temporary breakwater shall be used during establishment when wave run up would damage the vegetation.

For revetments, the height of protection shall be determined by procedures outlined in Minnesota Technical Release No. 2, "Flexible Slope Protection for Dams and Lakeshores".

Vegetative protection measures shall be designed in accordance with SCS Technical Release No. 56 "A Guide for Design and Layout of Vegetative Wave Protection for Earth Embankment Dams" and MN conservation practice standards, Channel Bank Vegetation, 322 and/or Critical Area Planting, 342.

Additional Criteria for Stream Corridor Improvement

Stream corridor vegetative components shall be established as necessary for ecosystem functioning and stability. The appropriate composition of vegetative components is a key element in preventing excess long-term channel migration in re-established stream corridors. The establishment of vegetation on channel banks and associated areas shall also be in accordance with MN conservation practice standards Channel Bank Vegetation, 322 and/or Critical Area Planting, 342.

Treatments shall be designed to achieve habitat and population objectives for fish and wildlife species or communities of concern as determined by a site-specific assessment or management plan. Objectives shall be based on the survival and reproductive needs of populations and communities, which include habitat diversity, habitat linkages, daily and seasonal habitat ranges, limiting factors and native plant communities. The type, amount and distribution of vegetation shall be based on the requirements of the fish and wildlife species or communities of concern to the extent possible.

Treatments shall be designed to meet aesthetic objectives as determined by a site-specific assessment or management plan. Aesthetic objectives shall be based on human needs, including visual quality, noise control and microclimate control. Construction materials, grading practices, and other site development elements shall be selected and designed to be compatible with adjacent land uses.

Treatments shall be designed to achieve recreation objectives as determined by a site-specific assessment or management plan. Safety requirements shall be based on type of human use and recreation objectives.

CONSIDERATIONS

Changes may occur in the watershed hydrology and sedimentation over the design life of the treatments.

Debris removed from the channel or streambank may be utilized in the treatment design when it is compatible with the intended purposes.

Use construction materials, grading practices, vegetation and other site development elements that minimize visual impacts and maintain or complement existing landscape uses such as pedestrian paths, climate controls, buffers, etc. Avoid excessive disturbance and compaction of the site during installation.

Utilize vegetative species that are native and/or compatible with local ecosystems. Avoid introduced or exotic species that could become nuisances. Species that have multiple values are especially desirable such as those suited for biomass, nuts, fruit, browse, nesting, aesthetics and tolerance to locally used herbicides. Avoid species that may be alternate hosts to disease or undesirable pests. Species diversity should be considered to avoid loss of function due to species-specific pests.

Treatments that promote beneficial sediment deposition and the filtering of sediment, sediment attached, and dissolved substances should be considered.

Treatments that maintain or improve the habitat value for fish and wildlife are preferred. Include treatments that provide aquatic habitat in the treatment design and that may lower or moderate water temperature and improve water quality.

Stabilize side channel inlets and outlets and outlets of tributary streams from erosion.

The type of toe stabilization selected can improve aquatic habitat.

Maximize adjacent wetland functions and values with the project design and minimize adverse effects to existing wetland functions and values.

Livestock shall be excluded during establishment of vegetative treatments. Appropriate grazing practices shall be applied after establishment to maintain plant community integrity. Wildlife may

also need to be controlled during establishment of vegetative treatments. Temporary and local population control methods should be used with caution and within state and local regulations.

When appropriate, establish a buffer strip and/or diversion at the top of the bank or shoreline protection zone to help maintain and protect installed treatments, improve their function, filter out sediments, nutrients and pollutants from runoff, and provide additional wildlife habitat.

Conserve, protect and stabilize archeological, historic, structural and traditional cultural properties.

Design treatments to minimize or eliminate safety hazards to boaters, swimmers, or people using the shoreline or streambank.

Protective treatments should be self-sustaining or require minimum maintenance.

PLANS AND SPECIFICATIONS

Plans and specifications for streambank and shoreline protection shall be prepared for specific field sites based on this standard and shall describe the requirements for applying the practice to achieve its intended purpose. Plans shall include treatments to minimize erosion and sediment production during construction and provisions necessary to comply with conditions of any environmental agreements, biological opinions or other terms of applicable permits.

OPERATION AND MAINTENANCE

An operation and maintenance plan shall be prepared for use by the owner or others responsible for operating and maintaining the system. The plan shall provide specific instructions for operating and maintaining the system to insure that it functions properly. It shall also provide for periodic inspections and prompt repair or replacement of damaged components or erosion.

REFERENCES

NEH Part 650, Chapter 16, Streambank and Shoreline Protection

Minnesota NRCS Conservation Practice Standard Channel Bank Vegetation, 322.

Minnesota NRCS Conservation Practice Standard Critical Area Planting, 342.

Minnesota Technical Release No. 2, "Slope Protection for Dams and Lakeshores"

Minnesota Technical Release No. 3, "Loose Riprap Protection"

SCS Technical Release No. 56, "A Guide for Design and Layout of Vegetative Wave Protection for Earth Embankment Dams"