

**MINNEHAHA CREEK WATERSHED DISTRICT  
BOARD OF MANAGERS**

**8. SHORELINE & STREAMBANK STABILIZATION RULE**

**PURSUANT TO MINNESOTA STATUTES §103D.341**

**Adopted XXXX**

**Effective XXXX**

**1. POLICY.** It is the policy of the Board of Managers to:

- a. Limit disturbance to the natural shoreline or streambank;
- b. Where stabilization is needed, promote use of bioengineering and similar naturalized methods;
- c. Require that stabilization methods follow sound engineering principles and limit impact on water quality and the ecological integrity of the riparian environment.

**2. APPLICABILITY.**

- a. A permit is required to disturb the bank of a waterbasin or watercourse, below the ordinary high water level, for the purpose of stabilization, or to serve an amenity or other beneficial purpose. Improvements subject to this requirement include, but are not limited to, bioengineering practices, riprap, retaining walls, boat ramps and sandblankets.
- b. Notwithstanding subsection 2.a, a permit is not required to:
  1. Maintain a functioning improvement, if no material is added and the bed or bank is not disturbed; or
  2. Plant vegetation not intended to provide deep soil structure stability.
  3. Place riprap below a culvert or outfall for energy dissipation purposes if the riprap complies with [MnDOT Standard Plates 3133, 3134, and 3139](#) and appropriate erosion and sedimental controls are utilized.
- c. A Fast Track permit may be issued for shoreline stabilization projects that conform to the following requirements:
  1. An application for shoreline stabilization that conforms to subsection 3.a and section 4;

2. An application for a sandblanket that conforms to section 7.

### **3. EROSION INTENSITY STANDARD.**

- a. An applicant must perform an erosion intensity calculation to support an application for a stabilization practice other than a biological practice: (i) where a bioengineering or structural practice does not exist, has degraded to a natural condition, or is proposed to be extended to additional shoreline or streambank; or (ii) where an existing practice is proposed to be upgraded to a bioengineering or structural practice. A shoreline or streambank stabilization design must conform to erosion intensity as follows:
  1. Low erosion intensity: must use a biological stabilization practice;
  2. Medium erosion intensity: may use a biological or bioengineering stabilization practice;
  3. High erosion intensity: may use a biological, bioengineering or structural stabilization practice.

Erosion intensity is determined in accordance with subsection 5.a, below.

- b. An applicant may deviate from the requirement of subsection 3.a on demonstrating that the intensity calculation does not accurately capture the erosion potential of the shoreline or streambank because of site-specific conditions. In this case, the applicant must use a design adequate for the erosion potential that best fulfills the policies of section 1, above.

### **4. STANDARDS FOR STABILIZATION DESIGNS.**

- a. All stabilization designs other than retaining walls must conform to the following:
  1. The site condition must show that a stabilization practice is needed to prevent erosion or restore shoreline or streambank.
  2. The slope must not exceed 3:1 (horizontal: vertical), unless impractical due to site-specific conditions.
    - a. Encroachment of a shoreline design lakeward must be minimized, should not exceed five feet, and may not exceed 10 feet.
    - b. Encroachment of a streambank design into the channel must be minimized, may not reduce channel cross-section, and must meet the No-Rise standard.

3. The design must reflect the engineering properties of the underlying soils and any soil corrections or reinforcements. For a shoreline, the design must conform to engineering principles for dispersion of wave energy and resistance to deformation from ice pressures and movement. For a streambank, design must conform to engineering principles for the hydraulic behavior of open channel flow;"
  4. The design of a new installation must follow the natural shape of the shoreline or streambank and justify native vegetation disturbance within the stabilization zone.
  5. Work below top of bank must use a flotation sediment curtain installed and maintained in accordance with best practices. The curtain must be removed on the completion of such work after sediment has settled.
- b. In addition to the standards of subsection 4.a, biological and bioengineering designs also must conform to the following:
1. Incorporated live plantings must be aquatic or upland species native to Minnesota.
  2. Planting must follow sound practice to limit soil disturbance and provide for successful establishment.
  3. Wave barriers, if used, may not be placed beyond a water depth of three feet, may not obstruct navigation, and must be removed within two years.
  4. Structural elements within an approved bioengineering designs must conform to subsection 4.c, paragraphs 1 and 2, below.
- c. In addition to the standards of subsection 4.a, structural designs also must conform to the following:
1. Riprap may not exceed the top of bank, or two feet above the 100-year high water elevation, whichever lower.
  2. Riprap must be durable stone that meets size and gradation standards of MnDOT Class III or IV riprap. Toe boulders may be up to 30 inches in diameter but must be at least 50 percent buried.
  3. A transitional granular filter must be placed between the native shoreline and riprap to prevent erosion of fine-grained soils. A nonwoven geotextile filter fabric must be placed beneath the granular filter.

4. A practice should include plantings between boulders and native upland plantings where feasible, to slow runoff and limit erosion. Deviation from paragraph 4.c.3 is acceptable as indicated for proper plant establishment.
  - d. A structural design with a slope of 2:1 (horizontal: vertical) or steeper is considered a retaining wall and must conform to the following:
    1. A new retaining wall, or a retaining wall repair/reconstruction that increases floodplain encroachment beyond what is needed for structural soundness, is permitted only under the Variances and Exceptions Rule. The applicant must demonstrate that there is no adequate alternative.
    2. The design must be supported by a structural analysis, prepared by a professional engineer licensed in the State of Minnesota to practice civil engineering, that shows the wall will withstand expected ice and wave action and earth pressures, and otherwise must conform to sound engineering principles.
    3. The permit will require that an as-built survey, prepared by a registered land surveyor, be filed with the District.
  - e. Neither riprap conforming to paragraph 2.b.3, above, nor a stabilization design conforming to section 4, constitutes floodplain fill for the purpose of the Floodplain Alteration rule.
5. SUBMITTALS FOR STABILIZATION DESIGNS. The following items must be submitted with an application for shoreline or streambank stabilization.
- a. If required by subsection 3.a, an erosion intensity calculation prepared on a form maintained by the District Board of Managers. The calculations are as follows:
    1. For shoreline designs, the applicant must calculate erosion intensity as outlined on the District form which is available on the District's website.
    2. For streambank designs, the applicant must calculate bank-full stream velocity and shear stress by the following equations and the higher of the two intensity scores will be used:
      - i. Bankful stream velocity

Manning's equation: 
$$v = \frac{Q}{A} = \left( \frac{1.49}{n} \right) R^{2/3} S^{1/2}$$

v = Average velocity of flow (feet/sec)

Q = Bankful flow (cubic feet/sec)

A = Area of flow (square feet)  
n = Manning's number  
R = Hydraulic radius (feet)  
S = Slope of channel bottom (rise/run)

Velocity corresponds to erosion intensity as follows:

Below 2 fps	Low erosion intensity
2-6 fps	Medium erosion intensity
Above 6 fps	High erosion intensity

ii. Shear stress on the streambank

$$\tau = d \times \mu \times S$$

$\tau$  = Shear stress (pounds / square feet)

d = Bankful flow depth (feet)

$\mu$  = Unit weight of water (62.4 pounds / cubic feet)

S = Slope of channel bottom (rise/run)

Shear stress corresponds to erosion intensity as follows:

Below 2.5 lb/sq ft	Low erosion intensity
2.5 to 5 lb/sq ft	Medium erosion intensity
Above 5 lb/sq ft	High erosion intensity

b. Photographs documenting existing site condition and need for stabilization. Images must be during growing season and must depict, in profile, bank vegetation and slope condition of the subject and adjacent properties, and the existence of emergent or floating vegetation adjacent to the subject property.

c. Site plan including:

1. Surveyed locations of ordinary high water level, 100-year high water elevation, and property lines in plan view.
2. Landward edge of the stabilization zone and elevation contours within the zone, of no more than two-foot resolution, referenced to NGVD 29 datum.
3. Location of the proposed installation and proposed lineal dimensions in plan view.
4. Proposed method of access.

5. Upland baseline parallel to the shoreline/streambank showing distances to the OHW line at 20-foot stations. The baseline endpoints must be referenced to three fixed features, with measurements shown and described. The baseline must be staked, and stakes maintained to project completion.
- d. Cross-section with horizontal and vertical scales, depicting or describing:
    1. The bank to be stabilized, with OHW level and 100-year high water elevation of the associated waterbody.
    2. Description of underlying soils.
    3. The proposed stabilization technique, finished slope and distance lakeward from OHW line.
    4. Specification of all structural, bioengineered, plant and seed material to be installed.
  - e. Erosion and sedimentation control and site stabilization plans incorporating best practices.
- 6. ADDITIONAL SUBMITTALS.** In addition to the items in section 5, the following items must be submitted with the application for shoreline or streambank stabilization, as applicable.
- a. In addition to the items in section 5, a streambank stabilization design submittal also must include:
    1. Cross-sectional, longitudinal and plan views of channel in existing and proposed conditions.
    2. Identification of bank-full indicators and in-stream features such as woody debris, riffles and pools.
    3. Description of existing slope, bank, channel and adjacent wetland soils and vegetation.
  - b. A biological or bioengineering design also must include a vegetation establishment plan that includes:
    1. A plant list with common and scientific names, seed mix specifications, quantities and origin of all material.
    2. Methods, schedule and parties responsible to establish and maintain vegetation for three years after installation, including invasive species control and vegetation replacement.

- c. A bioengineering design also must detail the location of all armoring or inert material and describe how the use of such material has been minimized to the extent practical.
- d. A design involving aquatic planting or plant removal must include a copy of the Minnesota Department of Natural Resources plant management permit application, if applicable.

## **7. STANDARDS FOR SANDBLANKETS.**

- a. An application for a sandblanket must include the following:
  - 1. Site plan showing ordinary high water line, 100-year high water line (if available), property lines, and elevation contours of upland adjacent to application area, referenced to NGVD (1929 datum).
  - 2. Existing and proposed cross-sections and topographic contours, at intervals no greater than 1.0 foot, within application area.
- b. The application must conform to the following standards:
  - 1. Sand or gravel, before being spread, must be clean excavated or properly washed material, free of any hazardous or petroleum substance, and of any noxious or regulated invasive species of plant or animal, and any seed or larva thereof.
  - 2. The sand or gravel may not exceed a depth of six inches; may not exceed 50 feet parallel to the shoreline or one-half of lot width, whichever less; and may not extend more than 10 feet waterward of the ordinary high water mark.
  - 3. A site may not receive two District permits within four years. The District will permit only two sandblanket applications at a given site.
  - 4. Beaches operated by units of government for public use are exempt from paragraphs 7.b.2 and 3, but must be maintained to limit environmental impact to the extent reasonable.

## **8. STANDARDS FOR OTHER INSTALLATIONS.**

- a. A boat ramp or other boating access structure is permitted on the applicant's demonstration that there is no feasible alternative for access, and that impacts on aquatic habitat and water quality are minimized.

- b. The width of disturbance for a boat ramp or other boating access structure is limited to 15 feet, and the volume of material limited to 80 cubic yards below the ordinary high water level, except for a commercial marina or public launch facility when it is demonstrated that a larger dimension is necessary. Any material above the ordinary high water level is considered floodplain fill.
- c. If pouring a boat ramp in place, the permittee must conform to containment, dewatering, and other measures as the District requires to protect water quality.
- d. The material to construct an installation must be clean, inert and create no risk of adverse environmental impact. The design must be sound and pose no safety or navigational hazard.

**9. FINANCIAL ASSURANCE.**

A bond, letter of credit or cash escrow in accordance with the District's Financial Assurances rule is a condition of permit issuance.