

COON CREEK WATERSHED DISTRICT
POLICY & PROCEDURES MANUAL

Policy # 4.3
Program: Operations & Maintenance
Policy Name: Bank Restoration

POLICY

The Coon Creek Watershed District may fund Creek and ditch bank stabilization at the following levels:

Level 1: When the property owner is a District Cooperator, the Coon Creek Watershed District may fund 100% for landowner buy-in of the repair cost of an eroded or failed streambank with the implementation of on site preventive practices adjacent to the creek/ditch.

Level 2: The Coon Creek Watershed District may fund 80% of the repair cost of an eroded or failed streambank if an appropriate best management practice adjacent to the creek/ditch is not desired by the property owner.

Level 3: If the property owner desires a bank stabilization remedy that is different from the bank protection method determined by staff, and approved by the Board, the District may cost share on the bank stabilization project up to 100% of the cost of the method recommended to the Board, provided the landowner applies for a permit, the permit application is approved by the Board based on compliance with the District rules and the ability to maintain access to the ditch for future maintenance. In such cases the cost sharing will be on a reimbursement basis upon request of the property owner, a copy of the contractors invoice for the project, and a final inspection by the District.

INTENT

To identify effective low cost methods of streambank protection as an alternate to more expensive, traditional means of erosion control.

To solve local streambank erosion problems in a manner that minimizes the effect on stream behavior and impacts on affected property owners.

To understand the cause of streambank erosion problems, and to match the problem with a suitable bank protection method and to provide an organized, well planned approach to addressing and resolving streambank protection, restoration, maintenance and repair.

DEFINITIONS

Best Management Practice: Any of the recognized practices and techniques to prevent soil erosion or maintain or increase water quality.

Erosion is the removal of soil particles from a bank surface primarily due to water action.

Failure is the collapse or slippage of a large mass of bank material into the creek or ditch

SOURCE

1997 Budget

1991. Bentley, C., G. Parker, D. Leuthe, "Streambank Erosion: Gaining a Greater Understanding". Minnesota Department of Natural Resources, Division of Waters, August, 1991

GENERAL INFORMATION & BACKGROUND

1. Creek and Ditch Behavior: It is important and valuable to understand the nature of the creek and ditches in the District. The Creek and ditches are subject to the natural laws of physics and such can be considered a delicately balanced mechanism that is constantly changing and evolving. The Creek and ditches must constantly adjust to changes, either natural or those caused by human activity, in order to maintain its balance. The most common compensating actions are streambank erosion and bed scour or sedimentation.

All streams and creeks naturally erode their beds and banks and deposit the resulting sediments. However, over time, natural systems tend to reach an equilibrium state where erosion at one location is roughly balanced by deposition at another. However, if events occur which alter the streamflow or sediment supply/characteristics, then accelerated or unexpected erosion may occur.

The principal factors affecting streambank/bed erosion are:

1. Flow Characteristics

- Discharge magnitude & duration
- Velocity (speed & location/distribution)
- Shear stress on bank
- Force (drag/resistance & momentum of water)

2. Bank & Bed Material

- Size
- Graduation/Texture
- Shape
- Specific weight
- Cohesion

3. Bank Vegetation

- Type
- Root mat density
- Protective slump growth form

The streambed acts as a foundation for its banks. If streamflow or maintenance activities scour out the bed, and in the process erodes the bank toe, then the upper bank may no longer have any support and failure can follow. Alternatively, when a stream can no longer carry its sediment load, material will be deposited on the streambed. As a result the streambed will rise, reducing the capacity of the stream channel. When the next high flow occurs, the stream will seek to create sufficient area to convey the needed volume of water. As the water rises bed loads will be transported and the banks may be eroded.

Streambank failure is the result of several physical processes working singly or in combination. In general, these processes may be classified as either surface phenomena (the removal of soil particles from the bank by streamflow), or as subsurface phenomena (collapse of a saturated bank following a rapid drop in water level). The two are usually interrelated.

Streambank erosion is a continually occurring natural phenomenon that may be accelerated or decelerated by human activity. For most streams the majority of streambank erosion occurs during and just after high flows. Erosive forces during high flows may be 10 to 100 times greater than during normal flows.

2. Bank Erosion and Bank Failure:

Causes of Bank Erosion:

- Streamflow
- Rainfall
- Seepage
- Overbank Drainage
- Obstacles in Stream
- Wet-Dry and Freeze-Thaw Cycle
- Ice & debris
- Changes in Land Use

Cause of Bank Failure: A streambank is in a stable state when the forces acting on the bank that may cause failure do not exceed the ability of the bank to resist these forces. When a bank fails, it “sloughs off”, either in a thin layer or as a large mass of soil material sliding down the bank. The cause of the failure can be either:

1. A reduction in the shear strength of the bank. These reductions in shear strength can be caused by:

- Absorption of Water
- Increased internal Pressure due to Groundwater within the Bank
- Movement of the Soil

2. An increase in the shear strength acting on the bank. Increases in shear stress can be caused by:

- Changes in Channel Shape
- Increased Loadings on the top of the bank
- Rapid Drawdown of water on the face of the bank

3. A combination of both.

PROCEDURES

1. Identify Creek or Ditch Bank Erosion/Failure Situation: This will be done either through citizen/landowner contact of the District office or routine inspections by Watershed District, city or county staffs. In all cases the situation will be recorded in the issues/complaints log and reported to the Board in the monthly staff report. The situation will be identified as bank erosion.

Preliminary information collected using the issue/complaint intake form. The essential information will be:

1. Date Received
2. Form of Complaint: Phone, letter, public official
3. Location: Address & Section
4. Property Owner Name & Phone
5. Description of problem
6. A date for an inspection should be determined at this time

2. Inspect site and determine nature, scope & cause of the bank erosion/failure: The purpose of the site inspection will be to determine the nature, scope and cause of the bank erosion/failure. A site inspection form may be used (appendix 1), as well as photos of the site. The following information will be collected:

A. Nature of the problem: 1.Erosion 2. Failure

B. Scope of the problem area:

- B.1. Length (horizontal distance along the stream course)
- B.2. Width (Horizontal distance from the normal water level to the top of the bank)
- B.3. Height (vertical distance from the normal water level to the top of the bank)

C. Contributing Conditions

C.1. Location:

- 1a. Channel bend
- 1b. Straight channel
- 1c. Stream order

C.2. Flow Characteristics:

- 2a. Estimated discharge magnitude & duration
- 2b. Estimated velocity

C.3. Bank Characteristics

- 3a. Soil material

soil type
texture
cohesion

3b. Original bank shape & height (est. weight)

3c. Adjacent land use

3d. Adjacent flow characteristics

C.4. Original Bank Vegetation

4a. Type (spp)

4b. Root mat

D. Diagnose cause(s)

Streamflow

Rainfall

Seepage

Overbank Drainage

Obstacles in Stream

Wet-Dry and Freeze-Thaw Cycle

Ice & debris

Changes in Land Use

Bank saturation (Absorption of Water)

Increased internal Pressure due to Groundwater within the Bank

Movement of the Soil

Changes in Channel Shape

Increased Loadings on the top of the bank

Rapid Drawdown of water on the face of the bank

3. Determine a bank repair/protection method: This determination will be initially based on:

3.1 The need for additional watershed management, and any practices that can reduce the runoff, and soil loss from the watershed to make the streambank erosion less severe.

3.2 The ability to maintain access to the ditch for future maintenance.

3.3 The ability to establish and maintain a vegetative buffer strip between the stream bank and the adjacent land use activity.

3.4 The feasibility and suitability of bank reconstruction and re-establishment using plants and/or other material to form a protective cover. Plants are considered here to be the least cost and most effective method a stabilizing the streambank while providing continued access for maintenance and maximizing future options for water management.

3.5 The least cost recognized best management practice for bank protection.

4. Significance/Priority: Determine if the bank is worth protecting: This determination will take the form of a recommendation to the Board of managers. The determination will be made according to

- **Current availability of funds (availability will be determined on a first-in, first-out basis, unless there is competition and/or funds are scarce)**

If funds become scarce and a competitive environment develops; Severity/Priority will be determined by weighing the following considerations:

1. Significance/Severity of the problem relative to the property and the ability of the creek/ditch to convey and drain water. (Significance will be assessed by size)
2. Stream order (higher stream orders and occurrences lower in the system will be given greater consideration)
3. Fate of the eroded material (eroded material constitutes a contribution to the bed load/ sedimentation of the creek/ditch). Occurrence downstream and within the effective reach of a drainage sensitive use will be given the highest priority.
4. The resulting impacts of localized protection on the future behavior of the creek (This is intended to determine and anticipate potential adverse affects on adjacent upstream and downstream property owners)

5. Review the findings and recommended protection method with the property owner: This review may occur in writing or over the phone, at the time of the inspection or within a relevant time period. The review shall cover and include:

1. Streambank Protection and Repair Pamphlet.
2. The findings relative to the nature, scope & cause of the bank erosion/failure.
3. The recommended practice(s)/remedy
4. The preliminary findings on the significance.
5. Funding options: (reviewed in pamphlet)
6. Application for Bank Stabilization Funds
7. Funding, liability and inspection policy

6. Present proposal to the Board: The application for funding and the findings will be presented to the Board for review and, action, as a policy item at the next regularly scheduled meeting of the Board. To be considered at a Board meeting, the application must be received by the District 12 and 1/2 days prior to the Board meeting.

7. Implement/Construct the bank protection method: For approved projects, the District will:

Level 1: Obtain a work agreement from the property owner and hire and supervise the contractor.

Level 2: Coordinate the search for the contractor for the property owner, scope the size and cost of the project, and arrange for the contractor to bill the District.

Level 3: For permitted projects where the property owner is seeking another remedy, the District will make payment to the property owner upon certification, in writing of project completion, final project cost and final project inspection by the District. In these cases the permit will identify the estimated cost of the project and the percent of the District cost share.

AUTHORIZATION

Reviews: 11/12/96
11/25/96
2/6/97 CAC & TAC
2/10/97

Adopted: 2/24/97

Amended:

- 1 - Pre-Project Meeting
- 2 - Inform Board
- 3 - Inspect Site
- 4 - Determine BMP
- 5 - Determine Significance
- 6 - Meet w/ Home Owners
- 7 - Present Proposal to Board
- 8 - Seek Bids
- 9 - Award Work
- 10 -Construction Begin
- 11 -Final Inspect/meet with property Owner & Cert Payment
- 12 -Payment