

Natural Channel Restoration Techniques for River Bank Stabilization



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Stabilizing Stream Banks with Vegetation





1996

2014

Interesting fact: unconsolidated soil may erode when the shear stress exceeds 2 N/m² while soil incorporating a dense root network is stable at up to $80 \text{ N/m^2}!$



Hierarchy of Stream Bank Stabilization Techniques

- 1. Installation of toe protection on eroding bank.
- 2. Grading eroding bank.
- 3. Excavating a floodplain opposite eroding bank.
- 4. Re-aligning channel.





Before

After





Before

After







CROSS-SECTION C-C'







before





Plan View

Cross-section



Considerations in Selecting Tree Revetments as a Bank Stabilization Approach

Works best:

- in flat streams with sand or gravel bottoms
- where there is a heavy sand bedload to fill trees (e.g. <u>not</u> downstream from dams and head ponds which trap sediment)
- at work sites where the available sunlight is sufficient to support new vegetation growth in the revetments
- where the radius of curvature on the outside bank is flat or moderate
- when applied to graded "rooting shelves" or opposite well connected floodplain
- when on-site fill and sod with roots can be incorporated
- when completed in concert with an aggressive re-vegetation plan
- using materials that incorporate finer branches and leaves for sediment trapping with coarse branches capable of withstanding ice shear.



2. Grading Eroding Bank - Excavation of a Rooting Shelf





before



2. Grading Eroding Bank - Excavation of a Rooting Shelf



Cross-section



2. Grading Eroding Bank – Stabilization with On-site Natural Sod







2. Grading Eroding Bank – Stabilization with On-site Natural Sod



before



3. Excavating a Floodplain







3. Excavating a Floodplain

Cross-section





3. Excavating a Floodplain: Fill Removal and Site Stabilization



before



3 – Excavating a Floodplain: Project Included Toe Protection and Rooting Shelf





after



4. Re-aligning Channel: Dealing with Extreme Meander Bends



before



4. Re-aligning Channel: Dealing with Extreme Meander Bends







4. Re-aligning Channel: Dealing with Extreme Meander Bends





after



Natural Channel Features as Green Water Quality Improvement Infrastructure





The End Thank You