



**Natural Resources Conservation Service  
CONSERVATION PRACTICE STANDARD  
CHANNEL BED STABILIZATION**

**Code 584**

**(Ft.)**

**DEFINITION**

Measure(s) used to stabilize the bed or bottom of a channel.

**PURPOSE**

This practice may support one or more of the following:

- Maintain or alter channel bed elevation or gradient
- Modify sediment transport or deposition
- Manage surface water and groundwater levels in floodplains, riparian areas, and wetlands

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies to the beds of existing or newly constructed alluvial or threshold channels undergoing damaging aggradation or degradation that cannot be feasibly controlled by clearing or snagging, establishment of vegetative protection, installation of bank protection, or installation of upstream water control measures.

This practice also applies to channels where the removal of barriers to aquatic organism passage would result in destabilization of the channel bed.

**CRITERIA**

Design and install measures according to a site-specific plan in accordance with all local, State, Tribal, and Federal laws and regulations. Apply measures that are compatible with improvements planned or being carried out by others.

Evaluate effects of channel work on existing structures such as culverts, bridges, buried cables, pipelines, and irrigation flumes to determine impact on their intended functions. Analyze the quantity and character of sediments entering the channel reach under consideration on the basis of both present and projected conditions caused by changes in land use or land treatment and upstream improvements or structural measures. Select measures that are compatible with the bank or shoreline materials, water chemistry, channel hydraulics, and slope characteristics, both above and below the waterline.

Design measures to—

- Withstand flow duration, depth of inundation, buoyancy, uplift, scour, angle of attack, stream velocity, and higher-flow conditions, based on acceptable risk.
- Maintain sufficient depth to provide adequate outlets for subsurface drains, tributary streams,

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service [State office](#) or visit the [Field Office Technical Guide](#).

- ditches, or other channels.
- Maintain the appropriate sediment transport regime in order to avoid detrimental erosion or sedimentation upstream and downstream.
- Anticipate ice action, debris impact, and fluctuating water levels.
- Avoid adverse effects on endangered, threatened, proposed, and candidate species and their habitats.
- Avoid adverse effects on archaeological, historical, structural, and traditional cultural properties.
- Minimize safety hazards to boaters, swimmers, kayakers, anglers, or people using the channel. In areas with frequent recreational use, carefully evaluate how the design could impact stream usage.

Measures must not—

- Impair the floodway or floodplain functions.
- Cause detrimental changes in water surface elevations when water surface elevations are a concern.
- Impede the upstream or downstream passage of aquatic organisms, unless the objective is to restrict invasive species access.

Dispose of spoil material from clearing, grubbing, and channel excavation in a manner that will not interfere with the function of the channel. Protect all disturbed areas around measures from erosion. Select vegetation or other measures that are best suited for the anticipated site conditions.

Clear the channel to remove stumps, fallen trees, debris, and sediment bars only when they are causing, or could cause, detrimental bank erosion, structural failure, or reduction of channel capacity that results in above-average overflows on adjacent floodplains. Retain or replace habitat-forming elements that provide cover, food, pools, and water turbulence to the extent possible.

To assist with developing a broader assessment of the stream corridor, the NRCS Stream Visual Assessment Protocol, Version 2 (SVAP2) shall be implemented during the planning process for this conservation practice. Multiple SVAP scenarios should be developed, for existing and proposed conditions. The scores should be compared to assist with selecting the preferred alternative.

All work shall comply with federal, State, and local laws, and regulations. Laws and regulations of particular concern include those involving water rights, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

The owner or operator is responsible for securing all permits or approvals and for performing in accordance with such laws and regulations. NRCS employees do not procure permits, rights, or approvals, or enforce laws and regulations. NRCS may provide the landowner or operator with technical information needed to obtain the required rights (or approvals) to construct, operate, and maintain the practice.

Obtain all required permits before starting construction.

Bankfull flow shall be the design flow unless regulations dictate a greater design flow. Bankfull discharge is a substitute for theoretical effective discharge. It is the flow that fills a natural alluvial channel up to the elevation where water begins to flow on the active floodplain. The active floodplain is the flat area adjacent to the channel. Flows greater than bankfull discharge shall be designed to flow on the floodplain or on Bankfull benches.

If streambank stabilization is needed, refer to Conservation Practice Standard Streambank and Shoreline Protection, Code 580.

## CONSIDERATIONS

Assess channel stabilization needs in sufficient detail to identify the causes contributing to instability (e.g., watershed alterations resulting in significant modifications of discharge or sediment production). Due to the complexity of such an assessment, consider using an interdisciplinary team and watershed modeling.

When designing protective measures—

- Conduct area-wide planning efforts for proper design, function, and management of protective measures if the design reach involves multiple stakeholders.
- Consider the changes that may occur in the watershed hydrology and sedimentation over the design life of the measure.
- Use woody material removed during construction in the overall practice design.
- Maintain or improve the habitat value for fish and wildlife, which includes providing cover, lowering or moderating water temperature, and improving water quality.
- Improve habitat for threatened, endangered, and other species of concern, where applicable.
- Maximize adjacent wetland functions and values and minimize adverse effects to existing wetland functions and values.
- Protect side channel inlets and outlets from erosion or sedimentation.

Plan for the type of human use and social and safety aspects when designing protective measures. Use construction materials, grading practices, vegetation, and other site-development elements that enhance aesthetics, recreational use, and maintain or complement existing landscape uses such as pedestrian paths, climate controls, and buffers. Avoid excessive disturbance and compaction of the site during installation.

Unless otherwise specified, a protective cover of vegetation shall be established on all exposed surfaces on the channel banks as indicated on the drawings and shall conform to the requirements of Practice Specification 342, Critical Area Planting. An exception is where the bank materials are too rocky or will not support plant life.

A reach and/or watershed assessment shall be performed to determine if the causes of instability are local (e.g. poor soils, headcut, degradation, aggradation, alignment, obstructions to flow, 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 needs to be of the extent and detail necessary to provide a basis for design of the bed stabilization treatments and reasonable confidence that the treatments will perform adequately for the design life of the measure.

Related practices to consider during planning and design: Access Control (472), Aquatic Organism Passage (396), Critical Area Planting (342), Fence (382), Riparian Forest Buffer (391), Riparian Herbaceous Cover (390), Stormwater Runoff Control (570), Stream Crossing (578), Stream Habitat Improvement (395), and Streambank Protection (580).

## PLANS AND SPECIFICATIONS

Prepare plans and specifications for specific channel reaches and field sites that describe the requirements for applying the practice to achieve its intended purpose(s). At the minimum the plan will include:

- Topographic map
- Drainage area
- Velocities
- Safety
- Cross-sections (upstream, through structure, and downstream)

- Longitudinal profile with water surface slope and thalweg
- Bankfull discharge (cfs)

### **OPERATION AND MAINTENANCE**

Prepare an Operation and Maintenance plan that provides specific instructions for operating and maintaining the system to ensure it functions properly. Provide for periodic inspections and promptly repair or replacement of damaged components. The O&M Plan will recommend inspections after every major storm flow and after peak spring runoff. The O&M Plan is for use by the owner or others responsible for operating and maintaining the system.

### **REFERENCES**

USDA, NRCS, Conservation Engineering Division, National Engineering Handbook, Part 653, Stream Corridor Restoration.

USDA, NRCS, Conservation Engineering Division, National Engineering Handbook Part 654, Stream Restoration Design.

USDA, NRCS, Stream Restoration Planning and Design, Fluvial System Stabilization and Restoration Field Guide.

National Biology Handbook, Subpart B – Conservation Planning, Part 614, Stream Visual Assessment Protocol Version 2. Available from the following link under handbooks, Title 190:

<http://directives.sc.egov.usda.gov/>.

Dave Rosgen, PhD, Watershed Assessment of River Stability and Sediment Supply.