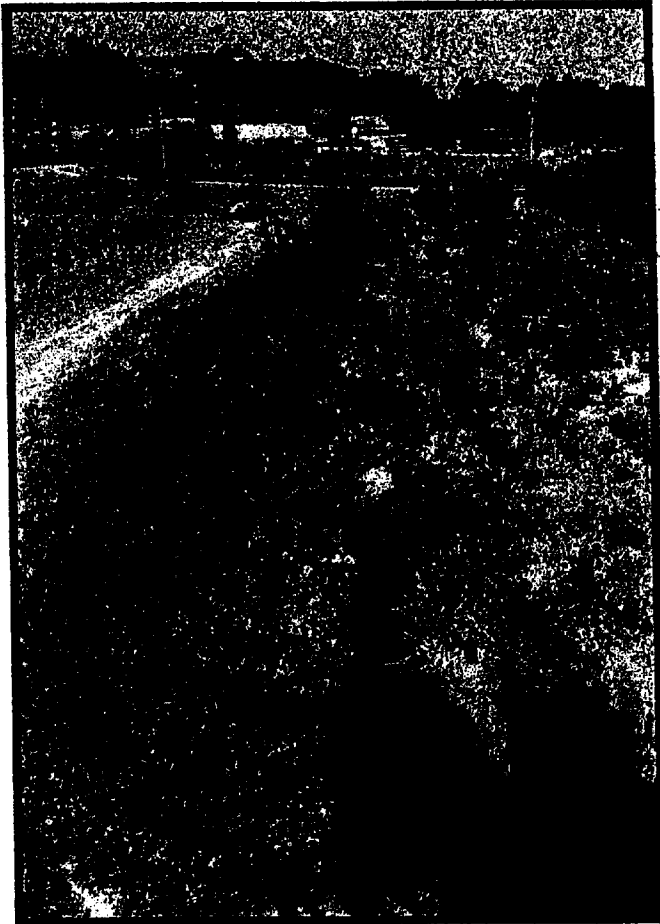


FARM WATER QUALITY PLANNING MANAGEMENT PRACTICE

University of California Cooperative Extension
Natural Resources Conservation Service

~~Channel Vegetation
#329~~

See Note for
Channel Stabilization
#584



Channel Vegetation is the practice of using vegetation to stabilize and protect the banks of streams and other waterbodies. The purpose is to prevent bank erosion and reduce sediment loads.

Note:

Stream Channel Stabilization #584 can be used when the stream channel is deepening also called 'downcutting' or filling with sediment. Streambank Protection #580 can be used when structures are needed to stabilize the channel banks.

Advantages

- Retention of sediment by vegetation
- Reduced erosion due to decreased flow at the base of stream banks
- Habitat enhancement

Disadvantages

- Can deflect flow to unprotected banks on opposite side or downstream if not properly designed

Practice Effectiveness for Reducing Water Quality NPS Pollution Potential

Erosion-sheet & rill	Erosion-streambank	Pesticides-leaching	Pesticides-dissolved in runoff	Pesticides-adsorbed to sediment	Nutrients-leaching	Nutrients-surface waters
	significant					negligible

Empty boxes indicate information not yet collected for this practice

Additional sources of information regarding channel vegetation:

UC Sustainable Agriculture Research and Extension Program <http://www.sarep.ucdavis.edu/>
 UC Weed Research and Information Center <http://wric.ucdavis.edu/>

Photo provided by Monterey County RCD

Some of the information in this management sheet has been taken from the Natural Resource Conservation Service (NRCS) Handbook of Conservation Practices practice #322. Contact your local NRCS office or visit <http://www.nrcs.usda.gov> for more information.

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION

584 - CHANNEL STABILIZATION

I. SCOPE

The work shall consist of furnishing materials and constructing stream stabilization measures to the lines, grades and elevations as shown on the drawings, or as staked in the field.

II. SITE PREPARATION

The area specified shall be cleared of trees, stumps, roots, brush, boulders, and debris. Removal of this material shall be done in such a manner as to avoid damage to other trees and property.

All material removed shall be piled in designated areas, and disposed of in such a manner as to have the least detrimental effect on the environment.

Clearing and disposal methods shall be in accordance with state and county laws with due regard to the safety of persons and property.

III. EXCAVATION

Excavation under this specification shall be limited to minor channel excavation and shaping as shown on the drawings or as staked in the field.

Excavation material shall be disposed of as shown on the drawing or as staked in the field.

All finished surfaces shall be generally smooth and pleasing in appearance.

IV. EARTHFILL PLACEMENT

Material

All fill material shall be obtained from approved borrow pits and from excavations (if suitable) required for other parts of the work. Fill materials shall contain no sod, brush, roots, or other perishable or unsuitable materials. Cobbles and rock fragment having maximum dimension of more than six inches shall be removed from the materials prior to compaction, and be disposed of or placed in areas designated by the Engineer.

Placement

The placing and spreading of fill material shall be started at the lowest point of the foundation and the fill brought up in horizontal layers of such thickness that the required compaction can be obtained. The fill shall be constructed in continuous horizontal layers except where openings or sectionalized fills are required. In those cases, the slope of the bonding surfaced between the embankment in place and the embankment to be placed shall not be steeper than 3 horizontal to 1 vertical. The bonding surface shall be treated the same as that specified for the foundation so as to insure a good bond with the new fill.

The distribution and gradation of materials shall be such that there are no lenses, pockets, streaks, or layers of material. If it is necessary to use materials of varying texture and gradation, the more impervious material shall be placed in the center and outer parts of the fill. If zoned fills of substantially differing materials are specified, the zones shall be placed according to lines and grades shown on the drawings.

Selected backfill material shall be placed around structures, pipe conduits, and anti-seep collars at about the same rate on all sides to prevent damage from unequal loading.

Fill placed around structures will be brought up at approximately uniform height on all sides of the structure.

Moisture content of the fill material shall be adequate for obtaining the required compaction. Material that is too wet shall be dried to meet this requirement, or removed, and material that is too dry shall have water added and mixed until the requirement is met.

The proper moisture content for compaction will be determined by inspection during the placement operation. The material should maintain a ball shape when squeezed in the hand. When specified, the moisture shall be maintained within 2 percentage points of optimum as determined by ASTM D-698.

As far as practicable, the material shall be brought to the proper water content in the borrow pits before excavation. Supplemental water, when required, may be applied by sprinkling the materials on the fill. Uniform distribution of the moisture shall be obtaining by discing, blading or other approved method prior to compaction.

Compaction

Construction equipment shall be operated over each layer of fill to insure that the required compaction is obtained. Special equipment shall be used if needed to obtain the required compaction.

Compaction shall meet the requirements of the method specified in the Practice Requirements and as described below:

- A. Sheepsfoot roller - the maximum layer thickness shall be 8 inches before compaction. The roller shall have staggered, uniformly spaced tamping feet and be equipped with suitable cleaners. The weight of the roller shall not be less than 2,500 pounds per foot of width. The maximum speed of the compaction equipment shall be 3 miles per hour. The entire surface of each layer placed should receive 6 passes of this equipment to attain the necessary compaction.
- B. Pneumatically tired equipment - The maximum layer thickness before compaction shall be 6 inches. A loaded scraper may be considered a pneumatic roller. The wheels of this equipment must pass over 90 percent of the surface of each lift before a new lift is placed.
- C. Track laying equipment (bulldozer) - The maximum layer thickness before compaction shall be 4 inches. The tracks of the equipment must pass over 90 percent of the surface of each lift before a new lift is placed.
- D. Compaction shall result in densities equal to or greater than 95 percent of the maximum obtained by laboratory compaction at optimum moisture of like soils in accordance with the procedure given to ASTM D-698, Procedure A.
- E. Compaction shall result in densities equal to or greater than 90 percent of the maximum obtained by laboratory compaction at optimum moisture of like soils in accordance with the procedure given in ASTM D-1557, Procedure A.

Heavy compaction equipment shall not be operated within 2 feet of any structure. Hand directed tampers or compactors shall be used on areas not accessible to heavy compaction equipment, and within 2 feet of any structure. Fills compacted in this manner shall be placed in layers not greater than 4 inches in thickness before compaction, and shall meet the same density requirement as for the adjacent area.

Compliance with compaction requirements will be determined by the procedure given in ASTM D-1556 or D-2167 for methods D and E and by observation of performance for methods A, B, and C.

Fill not meeting the specified requirements shall be reworked or removed and replaced with acceptable fill.

Fill adjacent to structures, pipe conduits, and anti-seep collars shall be compacted to a density equivalent to that of the surrounding fill by means of hand tamping or manually directed power tampers or plate vibrators.

The passage of heavy equipment will not be allowed (1) over cast-in-place conduits prior to seven days after placement of the concrete, or (2) over any type of conduit until the compacted backfill has been placed over the top surface of the structure equal to one-half the clear span width of the structure of pipe, or two feet whichever is greater.

Compaction of backfill adjacent to structures shall not be started until after the expiration of the following minimum time interval after placement of the concrete:

Walls and counterforts	10 days
Anti-seep collars, conduits and cantilever outlet bents	3 days

V. STRUCTURES

All structures within the reach being stabilized, shall be constructed to conform with the reference specifications listed on the Practice Requirements sheet and the drawings.

VI. VEGETATIVE REQUIREMENTS

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. Planted areas shall be fenced where necessary to protect the vegetation until it is established.

VII. SPECIAL MEASURES

Measures and construction methods shall be incorporated as needed and practical that enhance fish and wildlife values. Special attention shall be given to protecting visual resources and maintaining key shade, food and den trees.

VIII. CONSTRUCTION OPERATIONS

Construction operations shall be done in such a manner that erosion and air and water pollution are minimized and held within legal limits. The owner, operator, Contractor or other persons will conduct all work and operations in accordance with proper safety codes for the type of construction being performed with due regards to the safety of all persons and property.

The completed job shall be workmanlike and present a good appearance.

OPERATION AND MAINTENANCE ITEMS

A properly operated and maintained stable stream channel is an asset to your farm. This stable stream channel was designed and installed to stabilize an eroding channel. The estimated life span of this system is at least 10 years. The life of this system can be assured and usually increased by developing and carrying out a good operation and maintenance program.

Maintain vigorous growth of vegetative coverings. This includes reseeding, fertilization and application of herbicides when necessary. periodic mowing may also be needed to control height.

If fences are installed, they shall be maintained to provide warning and/or prevent unauthorized human or livestock entry.

Control livestock access and use of unfenced areas.

Remove all foreign debris as quickly as possible.

Periodic removal of all silt, sand, or gravel deposits.

Repair and revegetate all eroded channel sections.

Eradicate or otherwise remove all rodents or burrowing animals as their burrows may weaken earthen sections and develop flow paths for water and accelerate soil

erosion or failure. Immediately repair any damage caused by their activity.

Immediately repair any vandalism, vehicular, or livestock damage.

Other items specific to you project are listed on the "Practice Requirement" sheet.

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

CHANNEL STABILIZATION
(Feet)
CODE 584

DEFINITION

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

PURPOSE

This practice may be applied as part of a conservation management system to support one or more of the following:

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

CONDITIONS WHERE PRACTICE APPLIES

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

CRITERIA

It is recognized that channels may aggrade or degrade during a given storm or over short periods. A channel is considered stable if over long periods the channel bottom remains essentially at the same elevation.

Measures shall be designed and installed according to a site-specific plan.

Measures to be applied shall be compatible with improvements planned or being carried out by others.

Sufficient depth shall be maintained to provide adequate outlets for subsurface drains, tributary streams or ditches, or other channels.

Effect of channel work on existing structures such as culverts, bridges, buried cables, pipelines, and irrigation flumes shall be evaluated to determine impact on their intended functions.

Measures shall be designed for flow duration, depth of inundation, buoyancy, uplift, scour, angle of attack, and stream velocity.

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

Measures shall be designed for anticipated ice action, debris impact and fluctuating water levels.

Spoil material from clearing, grubbing, and channel excavation shall be disposed of in a manner that will not interfere with the function of the channel and in accordance with all local, state, and federal laws and regulations.

All disturbed areas around measures shall be protected from erosion. Vegetation shall be selected that is best suited for the anticipated site conditions.

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

Measures installed to stabilize stream channels shall also be designed and installed to meet NRCS standards for the particular structure and type of construction.

Channel clearing to remove stumps, fallen trees, debris, and bars shall only be done when they are causing or could cause detrimental bank erosion or structural failure. Habitat forming elements that provide cover, food, pools, and water turbulence shall be retained or replaced to the extent possible.

Measures shall be designed to maintain the appropriate sediment transport regime in order to

avoid detrimental erosion or sedimentation upstream and downstream.

Measures shall not impair the floodplain function.

Measures shall not result in adverse effects on the function of the stream or the stream corridor.

When water surface elevations are a concern, the effects of protective measures shall not cause detrimental changes in water surface elevations.

The quantity and character of the sediments entering the reach of channel under consideration shall be analyzed on the basis of both present conditions and projected conditions caused by changes in land use or land treatment and upstream improvements or structural measures.

CONSIDERATIONS

Consider area-wide planning for proper design, function and management of protective measures where the design reach involves by multiple stakeholders.

An assessment of channel stabilization needs should be considered in sufficient detail to identify the causes contributing to the instability (e.g. watershed alterations resulting in significant modifications of discharge or sediment production). Due to the complexity of such an assessment, use of an interdisciplinary team should be considered.

When designing protective measures, consider the changes that may occur in the watershed hydrology and sedimentation over the design life of the measure.

Consider utilizing woody debris removed during construction in the overall practice design.

Measures should consider habitat and migration needs of aquatic species.

Consider maintaining or improving the habitat value for fish and wildlife, which includes lowering or moderating water temperature, and improving water quality.

Consider opportunities to improve habitat for threatened, endangered, and other species of concern, where applicable.

Consider maximizing adjacent wetland functions and values with the project design and minimizing adverse effects to existing wetland functions and values.

Consider protecting side channel inlets and outlets from erosion or sedimentation.

Consider the type of human use and the social and safety aspects when designing the 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.

Measures should be designed to minimize safety hazards to boaters, swimmers, or people using the channel.

Cultural Resources Considerations

NRCS's objective is to avoid any effect to cultural resources and protect them in their original location. Determine if installation of this practice will have any effect on any cultural resources.

Document any specific considerations for cultural resources in the design docket and the Practice Requirements worksheet.

GM 420, Part 401, the California Environmental Handbook and the California Environmental Assessment Worksheet provide guidance on how the NRCS must account for cultural resources. The Field Office Technical Guide, Section II contains general information, with Web sites for additional information.

Endangered Species Considerations

Determine if installation of this practice, along with any others proposed, will have an effect on any federal or state listed Rare, Threatened or Endangered species or their habitat. NRCS's objective is to benefit these species and others of concern, or at least not have any adverse effect on a listed species. If the Environmental Evaluation indicates that the action may adversely affect a listed species or result in adverse modification of habitat of listed species which has been determined to be critical habitat, NRCS will advise the land user of the requirements of the Endangered Species Act and recommend alternative conservation treatments that avoid the adverse effects. Further assistance will be provided only if the landowner selects one of the alternative conservation treatments for installation; or at the request of the landowners, NRCS may initiate consultation with

the U.S. Fish and Wildlife Service, National Marine Fisheries Service and/or California Department of Fish and Game. If the Environmental Evaluation indicates the action will not affect a listed species or result in adverse modification of critical habitat, consultation generally will not apply and usually would not be initiated. Document any special considerations for endangered species in the Practice Requirements Worksheet.

Water Quantity

1. Stage-discharge and flow velocity relative to the water budget components, geologic materials comprising the stream channel, and objectives of the channel modification.
2. Effects on water tables, soil moisture storage, and rooting depths and transpiration of vegetation.

Water Quality

1. Temporary and long-term effects on erosion and sedimentation.
2. Changes in stream water temperature that may result from the clearing of vegetation or alteration of water sources to the channel.
3. Effects on the visual quality of the water resource.

PLANS AND SPECIFICATIONS

Plans and specifications for this practice shall be prepared for specific channel reaches and field sites and shall describe the requirements for applying the practice to achieve its intended purpose(s).

OPERATION AND MAINTENANCE

The owner or others responsible for operating and maintaining the system shall prepare an operation and maintenance plan. 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.