



Natural Resources Conservation Service
CONSERVATION PRACTICE STANDARD
STRUCTURE FOR WATER CONTROL

CODE 587

(No.)

DEFINITION

A structure in a water management system that conveys water, controls the direction or rate of flow, maintains a desired water surface elevation or measures water.

PURPOSE

Apply this practice as a component of a water management system to control the stage, discharge, distribution, delivery, or direction of water flow.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies wherever a permanent structure is needed as an integral part of a water-control system to serve one or more of the following functions:

1. Convey water from one elevation to a lower elevation within, to, or from a water conveyance system such as a ditch, channel, canal or pipeline. Typical structures include drops, chutes, turnouts, surface water inlets, head gates, pump boxes, and stilling basins;
2. Control the elevation of water in drainage or irrigation ditches. Typical structures include checks, flashboard risers, and check dams;
3. Control the division or measurement of irrigation water. Typical structures include division boxes and water measurement devices;
4. Keep trash, debris, or weed seeds from entering pipelines. Typical structure include trash racks and debris screen;
5. Control the direction of channel flow resulting from tides and high water or back-flow from flooding. Typical structures include tide and water management gates;
6. Control the water table level, remove surface or subsurface water from adjoining land, flood land for frost protection or manage water levels for wildlife or recreation. Typical structures include water level control structures, flashboard risers, pipe drop inlets, and box inlets;
7. Convey water over, under, or along a ditch, canal, road, railroad, or other barriers. Typical structures include bridges, culverts, flumes, inverted siphons, and long span pipes;
8. Modify water flow to provide habitat for fish, wildlife, and other aquatic animals. Typical structures include chutes, cold water release structures, and flashboard risers;

9. Provide silt management in ditches or canals. Typical structures include sluice gates and sediment traps;
10. Supplement a resource management system on land where organic waste or commercial fertilizer is applied;
11. Create, restore, or enhance wetland hydrology.

CRITERIA

General Criteria Applicable to All Purposes

All structures designed under this standard must comply with applicable Federal, Tribal, State and local laws, rules and regulations. Obtain all required permits before construction begins.

Do not install structures that have an adverse effect on septic filter fields.

Do not raise the water level upstream of water control structures on adjacent landowners without their permission.

Structure Capacity

For farm ditches, size the minimum capacity of the water control structure on the drainage removal rates. Determine these rates from the drainage curves found in Chapter 14 of the Engineering Field Handbook.

For main ditch outlets, size the minimum capacity of the water control structure for the lesser of the calculated discharge from the existing ditch capacity or the peak flow from a 10-year, 24-hour storm.

For all other locations and purposes, size the capacity of the water control structure on the required discharge to meet the total system design capacity.

Where site conditions dictate, provide anti-seep collars on any pipe conduit greater than 6 inches in diameter through an earth fill greater than 4 feet in height.

Protect outlets to the extent that design flows will not result in erosion downstream of the structure.

Analyze riser structures for flotation with a factor of safety of 1.2 or greater.

Seed or sod the exposed surfaces of earthen embankments, earth spillways, borrow areas and other areas disturbed during construction in accordance with the criteria in NRCS Conservation Practice Standard (CPS) Critical Area Planting (Code 342). When necessary to provide surface protection where climatic conditions preclude the use of seed or sod, use the criteria in CPS Mulching (Code 484) to install inorganic cover material such as gravel.

Fence the structure, if necessary, to protect the vegetation.

Safety

Design measures necessary to prevent serious injury or loss of life in accordance with requirements of Title 210, National Engineering Manual (NEM), Part 503, Safety.

Cultural Resources

Evaluate the existence of cultural resources in the project area and any project impacts on such

resources. Provide conservation and stabilization of archeological, historic, structural and traditional cultural properties when appropriate.

Note: Specific programs may dictate criteria in addition to, or more restrictive than, those specified in this standard.

CONSIDERATIONS

Consider the following items when planning, designing and installing this practice:

1. Effects on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation and ground water recharge;
2. Potential for a change in the rate of plant growth and transpiration because of changes in the volume of soil water;
3. Effects on downstream flows or aquifers that would affect other water uses or users;
4. Effects on the field water table to ensure that it will provide a suitable rooting depth for the anticipated crop;
5. Potential use for irrigation management to conserve water;
6. Effect of construction on aquatic life;
7. Effects on stream system channel morphology and stability as it relates to erosion and the movement of sediment, solutes, and sediment-attached substances carried by runoff;
8. Effects on the movement of dissolved substances below the root zone and to ground water;
9. Effects of field water table on salt content in the root zone;
10. Short term and construction-related effects of this practice on the quality of downstream water;
11. Effects of water level control on the temperatures of downstream waters and their effects on aquatic and wildlife communities;
12. Effects on wetlands or water-related wildlife habitats, including fish migration, where applicable;
13. Effects on the turbidity of downstream water resources;
14. Conservation and stabilization of archeological, historic, structural and traditional cultural properties, when appropriate.

This practice has the potential to affect National Register listed cultural resources or eligible (significant) cultural resources. These may include archeological, historic, or traditional cultural properties. Care should be taken to avoid adverse impacts to these resources. Follow NRCS state policy for considering cultural resources during planning.

PLANS AND SPECIFICATIONS

Prepare plans and specifications that describe the requirements for installing the practice according to this standard. As a minimum, include the following items in the plans and specifications:

Design Data

Record all required information in the case file, on plan sheets or other appropriate locations.

1. Location of the practice on the conservation plan map;
2. Assistance notes. The notes shall include dates of site visits, name or initials of the person who made the visit, specifics as to alternatives discussed, decisions made, and by whom;
3. Location map with the site identified;
4. Soils investigation logs and notes, as appropriate for site conditions and the proposed design;
5. Topographic survey of the site, as appropriate for site conditions and the proposed design.
6. Design computations;
 - a. Design discharge computations.
 - b. Structure hydraulic computations.
 - c. Structural computations, as needed.
7. A plan view showing the location and extent of the practice. Include the location and distances to adjacent features and known utilities, existing and proposed elevations and grading plan;
8. Profiles and cross sections showing existing and proposed conditions;
9. Structural details of all components with dimensions and special requirements noted;
10. Seeding, fertilizing and mulching requirements to stabilize areas disturbed by construction;
11. Quantities;
12. Construction specifications with site specific installation requirements;
13. Safety requirements;
14. Job Class;

Utilities Notification

Document on CPA-6 initial discussion about the landowner's responsibility to notify Miss Utility, any information from the landowner about the existence and location of known utilities, and assurances from the landowner that Miss Utility has been notified, including staking by the utilities and providing tickets.

Construction Check Data/As-Built Plans

Document approval by the designer of any changes from the drawings or specifications before implementation of the change.

The following is a list of minimum data needed for as-built documentation:

1. Documentation of site visits including the date, who performed the inspection, specifics, alternatives and decisions discussed.
2. Check notes recorded during and after completion of construction showing the as-built elevations of the practice;
3. Red line the construction plans to indicate the construction's conformance to the design;
4. Adequacy of vegetation and/or ground cover;
5. Final quantities and documentation for quantity changes. Material certifications as appropriate;

6. Signature and date on check-notes and plans of someone with the appropriate engineering job approval authority. Include a signed statement that constructed practice meets or exceeds the construction plans and NRCS practice standards.

OPERATION AND MAINTENANCE

Prepare an operation and maintenance (O&M) plan and review the plan with the landowner or operator responsible for the implementation of this practice. Provide specific instructions for proper operation and maintenance of each component of this practice, and detail the level of inspection and repairs needed to maintain the effectiveness and useful life of the practice.

As a minimum, include the following items in the operation and maintenance plan:

1. Periodic inspections of all structures, earthen embankments, spillways and other appurtenances;
2. Description of water level management and timing, as applicable;
3. Prompt removal of trash and debris from pipe inlets and trash racks;
4. Prompt removal of sediment when it reaches predetermined storage elevations;
5. Periodic removal of trees, brush and undesirable species;
6. Periodic inspection of safety components and prompt repair, if necessary;
7. Maintenance of vegetative protection and immediate seeding of bare areas, as needed.

REFERENCES

USDA NRCS. National Engineering Handbook (NEH), Part 636, Structural Engineering. Washington, DC.

USDA NRCS. NEH, Part 650, Engineering Field Handbook. Washington, DC

USDA NRCS. National Engineering Manual. Washington, DC