



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:

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

- 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.
- Control the elevation of water in drainage or irrigation ditches. Typical structures include checks, flashboard risers, and check dams.
- Control the division or measurement of irrigation water. Typical structures include division boxes and water measurement devices.
- Keep trash, debris or weed seeds from entering pipelines. Typical structures include trash racks and debris screens.
- Control the direction of channel flow resulting from tides and high water or backflow from flooding. Typical structures include tide and water management gates.
- 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.
- 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.
- Modify water flow to provide habitat for fish, wildlife, and other aquatic animals. Typical structures include chutes, cold water release structures, and flashboard risers.
- Provide silt management in ditches or canals. Typical structures include sluice gates and sediment traps.
- Supplement a resource management system on land where organic waste or commercial fertilizer is applied.
- Create, restore, or enhance wetland hydrology.

NRCS reviews and periodically updates conservation practice standards. To obtain the current version of this standard, contact your Natural Resources Conservation Service State office or visit the Field Office Technical Guide online by going to the NRCS website at <https://www.nrcs.usda.gov/> and type FOTG in the search field.

USDA is an equal opportunity provider, employer, and lender.

NRCS, OH
January 2019

CRITERIA

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.

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.

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

Design water impoundment structures to meet the requirements of CPS Dike (Code 356) or Pond (Code 378) or other applicable practice standard.

Release of water from control structures shall not allow flow velocities in surface drainage system components to exceed acceptable velocities prescribed by CPS Surface Drainage, Main or Lateral (Code 608).

Protect structures from damage or locate them away from farming operations. Document the location of all drainage control structures and appurtenances on as-built construction drawings to facilitate operation and maintenance activities.

Additional Criteria for Structures Controlling Subsurface Drain Flow

Design structures so drainage capacity is not restricted when operated in free drainage mode.

Install at least 10 feet of non-perforated pipe upstream from the control structure and use anti-seep collars, additional non-perforated pipe or other means to minimize the risk of piping.

When structures are used to prevent discharge during and after manure application, utilize a sump as needed to collect flow and provide a means to remove contaminated water from the system. Properly dispose of contaminated drain water.

Ensure release of water from flow control structures will not cause flow velocities in subsurface drains to exceed velocities prescribed by CPS Subsurface Drain (Code 606).

When water control structures will be used to manage water table elevations by regulating flow in an agricultural drainage system refer to CPS Drainage Water Management (554) for additional criteria and guidance.

When buried, in-line float-controlled valves are used, ensure the system is designed to function under all flow conditions.

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.

CONSIDERATIONS

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

- Effects on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation, and ground water recharge.
- Potential for a change in the rate of plant growth and transpiration because of changes in the volume of soil water.
- Effects on downstream flows or aquifers that would affect other water uses or users.
- Effects on the field water table to ensure that it will provide a suitable rooting depth for the anticipated crop.
- Potential use for irrigation management to conserve water.
- Effect of construction on aquatic life.
- 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.
- Effects on the movement of dissolved substances below the root zone and to ground water.
- Effects of field water table on salt content in the root zone.
- Short term and construction-related effects of this practice on the quality of downstream water.
- Effects of water level control on the temperatures of downstream waters and their effects on aquatic and wildlife communities.
- Effects on wetlands or water-related wildlife habitats.
- Effects on the turbidity of downstream water resources.
- Conservation and stabilization of archeological, historic, structural, and traditional cultural properties when appropriate.

PLANS AND SPECIFICATIONS

Prepare plans and specifications that describe the requirements for applying the practice according to this standard. Requirements for all drawings prepared by NRCS/SWCD as well as by others (Professional Engineer or Registered Architect) are contained in the National Engineering Manual (NEM) Part 541-Drafting and Drawings. As a minimum, include—

- A plan view of the layout of the structure for water control.
- Typical profile of pipe showing ground line, pipe grade, box and anti-seep locations, inlet and outlet elevations, and cross sections showing minimum trench width, bedding, and backfill requirements for the structure for water control.
- Installation details for each water control structure (size and elevation details can be in a table)
- Structural drawings adequate to describe the construction requirements.
- Requirements for vegetative establishment and mulching, as needed.
- Safety features.
- Site-specific construction and material requirements.
- Quantities

OPERATION AND MAINTENANCE

Prepare an operation and maintenance plan for the operator.

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

- Periodic inspections of all structures, earthen embankments, spillways, and other significant appurtenances.
- Prompt removal of trash from pipe inlets and trash racks.
- Prompt repair or replacement of damaged components.
- Prompt removal of sediment when it reaches predetermined storage elevations.

- Periodic removal of trees, brush, and undesirable species.
- Periodic inspection of safety components and immediate repair if necessary.
- Maintenance of vegetative protection and immediate seeding of bare areas as needed.
- When to close drains prior to, during and after manure applications
- How to dispose of contaminated water collected during and after manure applications.

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.