



## Natural Resources Conservation Service

### CONSERVATION PRACTICE STANDARD

## DAM, DIVERSION

### CODE 348

(no)

#### DEFINITION

A structure built to divert all or part of the water from a waterway or a stream.

#### PURPOSE

This practice is used to accomplish one or more of the following purposes:

- Divert all or part of the water from a waterway in a controlled manner for beneficial use
- Divert periodic flows from one watercourse to another watercourse

#### CONDITIONS WHERE PRACTICE APPLIES

This standard applies to structures of a permanent nature, constructed of materials having an expected lifespan consistent with the designed purpose of the structure.

This practice applies where—

- A diversion dam is an integral part of an irrigation system or a water-spreading system.
- Diversion of water from an unstable watercourse to a stable watercourse is desirable.
- The water supply available is adequate to divert.

This standard does not apply where NRCS Conservation Practice Standards (CPSs) Diversion (Code 362), Dam (Code 402), or Grade Stabilization Structure (Code 410) apply.

#### CRITERIA

##### General Criteria Applicable to All Purposes

The installation and operation of this practice must follow applicable Federal, Tribal, State, and local laws, rules, and regulations. Obtain all required permits before construction.

##### **Environmental impacts**

Evaluate the impacts of a proposed diversion dam on environmental resources including water quality, fish and wildlife habitat, forest, and visual resources. Identify and address the techniques and measures necessary to overcome any undesirable effects.

##### **Source water impacts**

Evaluate the impacts of a proposed diversion dam on sources of drinking water including water quality, water quantity, and long-term water availability. Identify and document potential risks to sources of drinking water and develop solutions to mitigate such risks.

**Materials**

All materials used to construct the diversion dam and appurtenances must have the strength, durability, and workability needed to meet the installation and service conditions of the site.

**Structural design**

Design appurtenant structures to withstand all expected loads, including all required loads described by NRCS National Engineering Manual (Title 210), Part 536, "Structural Engineering."

**Outlet works**

For diverted flows, the outlet works must provide positive control for both maximum and minimum flow rates consistent with the purpose of the diversion. The outlet works must provide safe diversion of all expected flows, considering such hazards as the potential for erosion, cavitation, and reduction in flow capacity due to the buildup of debris and sediments.

**Bypass works**

The bypass works must be capable of passing all flows needed to satisfy downstream priorities and all flows greater than diversion requirements, including expected flood flows. This may require a combination of orifices, weirs, and gates designed to meet the requirements of the site. The bypass works must provide safe bypass of all expected flows, considering such hazards as the potential for erosion, cavitation, and reduction in flow capacity due to the buildup of debris and sediment.

**Special-purpose works**

If debris, bed load materials, or sediments are present under flow conditions subject to diversion, make provision to bypass or remove materials that may be detrimental to the functioning of the outlet works, other parts of the works, or areas to where water is diverted. This may require the use of settling basins, debris traps, trash guards, or sluiceways, depending on site conditions.

**Vegetation**

Vegetate disturbed areas, not otherwise covered or protected, as soon as practicable after construction. Seed, fertilize, and mulch in accordance with NRCS CPS Critical Area Planting (Code 342). Consider using a diverse mix of native vegetation that is adapted to the site to provide enhanced ecological habitat and pollinator benefits. Protect the area from livestock and human traffic until the site is fully stabilized. If soil or climatic conditions prevent the use of vegetation, use nonvegetative materials, such as mulches, gravel, and rock riprap.

**Public safety**

Diversion dams often have public safety hazards such as hydraulic rollers downstream of weirs, high flow velocity upstream of gate openings, and high vertical walls. Evaluate all structures for potential safety hazards. Design means to minimize safety hazards when possible. Provide fences, railings, warning signs, and other safety devices to prevent access to hazardous areas.

**CONSIDERATIONS**

Consider the effects of this practice on water quantity, water quality, and the environment. Consider—

- Effects on the water budget on the volume and rate of runoff, infiltration, evaporation, transpiration, deep percolation, and ground water recharge.
- Effects of the use of diverted waters for irrigation.
- Effects of the original watercourse on the newly constructed watercourse and on the areas providing and receiving diverted water.
- Effects on erosion and the movement of sediment, pathogens, and soluble and sediment-attached substances carried by runoff.
- Potential temperature changes in downstream waters resulting from reduced flows and differences in bank shading in different watercourses.
- Potential changes in quantities of soluble substances infiltrating the soil and available for ground

water recharge, as well as the potential for salt pick-up.

- Potential for introducing new plant or animal species to either the upstream or downstream waters.

## PLANS AND SPECIFICATIONS

Prepare plans and specifications that describe the requirements for applying the practice according to this standard. As a minimum, include—

- A plan view of the layout of the diversion dam.
- Typical profiles and cross sections of the diversion dam.
- Details of the outlet system.
- Structural drawings adequate to describe the construction requirements.
- Requirements for vegetative establishment and mulching, as needed.
- Safety features.
- Site-specific construction and material requirements.

## OPERATION AND MAINTENANCE

Prepare an operation and maintenance plan for the operator.

At a minimum, include—

- 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.
- 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.
- Repair of erosion adjacent to the structure.

## REFERENCES

USDA NRCS. 2020. National Engineering Handbook (Title 210), Part 630, Hydrology. Washington, D.C. <https://directives.sc.egov.usda.gov/>

USDA NRCS. 2017. National Engineering Handbook (Title 210), Part 633, Soil Engineering. Washington, D.C. <https://directives.sc.egov.usda.gov/>

USDA NRCS. 2008. National Engineering Handbook (Title 210), Part 636, Structural Engineering. Washington, D.C. <https://directives.sc.egov.usda.gov/>

USDA NRCS. 2012. National Engineering Handbook (Title 210), Part 650, Engineering Field Handbook. Washington, D.C. <https://directives.sc.egov.usda.gov/>

USDA NRCS. 2017. National Engineering Manual (Title 210). Washington, D.C. <https://directives.sc.egov.usda.gov/>