

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

ROOF RUNOFF STRUCTURE

(No.)

CODE 558

DEFINITION

Structures that collect, control, and transport precipitation from roofs.

PURPOSE

To improve water quality, reduce soil erosion, increase infiltration, protect structures, and/or increase water quantity.

CONDITIONS WHERE PRACTICE APPLIES

Where roof runoff from precipitation needs to be:

- diverted away from structures or contaminated areas;
- collected, controlled, and transported to a stable outlet; or
- collected and used for other purposes such as irrigation or animal watering facility.

CRITERIA

Federal, State and Local Laws and Permits

Design and construction activities shall comply with all federal, state, and local laws, rules, and regulations governing activities in or along streams and pollution abatement, health, utility and safety activities.

The owner or operator is responsible for securing all required permits or approvals and for performing all planned work in accordance with such laws and regulations. NRCS employees are not to assume responsibility for procuring these permits, rights, or approvals, or for enforcing laws and regulations. NRCS may provide the

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landowner or operator with technical information needed to obtain the required rights or approvals to construct, operate, and maintain the practice.

Permits may be required from the following agencies when obstruction removal is performed within the boundaries of a stream or floodplain or if burning is required:

1. ***US Army Corps of Engineers (USACE)***
2. ***WV Department of Environmental Protection (Air, Land, Water and Waste, Permitting, other)***
3. ***Division of Natural Resources Office of Land and Streams***
4. ***US Fish and Wildlife Service***
5. ***WV Division of Forestry***
6. ***Local, state and county ordinances***

All required permits shall be approved before construction implementation.

General Criteria Applicable to All Purposes

The minimum design capacity for roof runoff structures shall be a 10-year storm frequency, 5-minute rainfall precipitation event, except where excluding roof runoff from manure management facilities. In that case, a 25-year frequency, 5-minute precipitation event shall be used to design roof runoff structures (Refer to Agricultural Waste Management Field Handbook, NEH Part 651 Chapter 10 Appendix 10B). When gutters are used, the capacity of the downspout(s) must equal or exceed the gutter flow rate. ***Peak rainfall amounts of 0.55***

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inch and 0.65 inch, respectively, shall be used for the 10- and 25-year values. Gutters and downspouts will be designed according to procedures contained in NENTC Agricultural Engineering Technical Note No. 1 or AWMFH Section 651.1001(a). Rock-filled trenches, erosion resistant channels and pipe outlets will be designed according to criteria contained in WV Standards for Grassed or Lined Waterway or Outlet, Subsurface Drain, Structure for Water Control, Underground Outlets or other practices, as appropriate.

Runoff may empty into surface or underground outlets, or onto the ground surface. Surface and underground outlets shall be sized to ensure adequate design capacity and shall provide for clean-out as appropriate. When runoff from roofs empties onto the ground surface, a stable outlet shall be provided. When runoff is conveyed through a gutter and downspout system, an elbow and energy dissipation device shall be placed at the end of the downspout to provide a stable outlet and direct water away from the building.

Surface or ground outlets such as rock pads, rock filled trenches with subsurface drains, concrete and other erosion-resistant pads, or preformed channels may be used, particularly where snow and ice are a significant load component on roofs. ***Underground outlet pipes will have small animal guards installed.***

In regions where snow and ice will accumulate on roofs, guards and sufficient supports to withstand the anticipated design load shall be included. ***Gutter supports shall have sufficient strength to withstand anticipated water, snow, and ice loads. They shall have a maximum spacing of 48 in. for galvanized steel and 32 in. for aluminum or plastic. Wood gutters shall be mounted on fascia boards using furring blocks that are a maximum of 24 in. apart. Downspouts shall be securely fastened at the top and bottom with intermediate supports that are a maximum of 10 ft. apart and according to manufacture recommendations.***

Roof runoff structures shall be made of durable materials with a minimum design life of ten years. Roof gutters and downspouts may be made of aluminum, galvanized steel, wood, or

plastic. Aluminum gutters and downspouts shall have a minimum nominal thickness of 0.027 inches and 0.020 inches, respectively. Galvanized steel gutters and downspouts shall be a minimum 28 gauge. Wood shall be clear and free of knots. Wood may be redwood, cedar, cypress, or other species that has the desired longevity. Plastics shall contain ultraviolet stabilizers. Dissimilar metals shall not be in contact with each other.

Rock-filled trenches and pads shall consist of poorly graded rock (all rock fragments approximately the same size) and be free of appreciable amounts of sand and/or soil particles. Crushed limestone shall not be used for backfill material unless it has been washed. Subsurface drains or outlets shall meet the material requirements of the applicable NRCS conservation practice standard.

Concrete appurtenances used shall meet the requirements of NRCS NEH Part 642, Chapter 2, Construction Specification 32 Structure Concrete.

Roof runoff structures shall be protected from damage by livestock and equipment. ***Fences installed to protect outlet structures will conform to WV CPS Access Control(472) or Fencing (382). All disturbed areas will be vegetated according to requirements in Critical Area Planting (342).***

Additional Criteria to Increase Infiltration

Runoff shall be routed onto pervious landscaped areas (e.g., lawns, mass planting areas, infiltration trenches, and natural areas) to increase infiltration of runoff. These areas shall be capable of infiltrating the runoff in such a way that replenishes soil moisture without adversely affecting the desired plant species.

Additional Criteria to Protect Structures

Runoff shall be directed away from structure foundations to avoid wetness and hydraulic loading on the foundation.

On expansive soils or bedrock, downspout extensions shall be used to discharge runoff a minimum of five (5) feet from the structure.

The discharge area for runoff must slope away from the protected structure.

Additional Criteria to Increase Water Quantity

Storage structures for non-potable purposes such as irrigation water shall be designed in accordance with NRCS conservation practice standards, as appropriate.

Potable water storage structures shall be constructed of materials and in a manner that will not increase the contamination of the stored water. Roof runoff collected and stored for potable uses must be treated prior to consumption and shall be tested periodically to assure that adequate quality is maintained for human consumption.

CONSIDERATIONS

Avoid discharging outlets near wells and sinkholes.

Some designs may provide secondary benefits, e.g. rock pads may also reduce rodent problems around livestock and poultry barns.

PLANS AND SPECIFICATIONS

The plans and specifications shall show the location, spacing, size, and grade of all gutters and downspouts and type and quality of material to be used. Plans and specifications for other practices essential to the proper functioning of the roof runoff structure, such as underground outlet, shall be included.

OPERATION AND MAINTENANCE

An operation and maintenance plan shall be developed that is consistent with the purposes of the practice, its intended life, safety requirements, and the criteria for the design.

The plan shall contain, but not be limited to, the following provisions:

- Keep roof runoff structures clean and free of obstructions that reduce flow.
- Make regular inspections and perform repair maintenance as needed to ensure proper functioning of the roof runoff structures.

REFERENCES

USDA-NRCS. 1999. National Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook.

WV5-Engineering Field Handbook, Appendix A- Quick Reference Design and Construction Support Data for Conservation Practices

NRCS National Engineering Policy
<http://policy.nrcs.usda.gov/>

NRCS National and State Utility Safety Policy (NEM Part 503-Safety, Subpart A - Engineering Activities Affecting Utilities 503.00 through 503.06)

NEH-20 or WV "700" Series Specifications

WV e-FOTG Section IV- Practice Standards and Scope of Work such as WV Conservation Practice Roof Runoff (558), Underground Outlet (620), Subsurface Drain (606), others

Title 190- Ecological Sciences; Part 601- National Cultural Resources Procedures Handbook