

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

ROOF RUNOFF STRUCTURE

(No.)

CODE 558

DEFINITION

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

PURPOSES

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

- Improve water quality
- Reduce soil erosion
- Increase infiltration
- Protect structures
- Increase water quantity

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where:

- Roof runoff structures are a component of an overall resource management system.
- Roof runoff needs to be diverted away from structures or contaminated areas.
- There is a need to collect, control, and transport runoff from roofs to a stable outlet.
- Roof runoff is collected and used for other purposes.

CRITERIA

General Criteria Applicable To All Purposes

Design Capacity. At minimum, a 10-year frequency, 5-minute rainfall precipitation event shall be used to design roof runoff structures, except where excluding roof runoff from manure management systems. 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, Appendix 10B). When gutters are used, the capacity of the downspout(s) must equal or exceed the gutter flow rate.

Materials. 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 nominal thickness of 0.027 inches and 0.020 inches, respectively. Galvanized steel gutters and downspouts shall be at least 28 gauge. Wood shall be clear and free of knots. Wood may be redwood, cedar, or cypress. 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 the Ohio Concrete Specification.

Outlets. 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.

Supports. In regions where snow and ice will accumulate on roofs, guards and sufficient supports to withstand the anticipated design load shall be included.

Protection. Roof runoff structures shall be protected from damage by livestock and equipment.

Additional Criteria To Increase Infiltration

Runoff may be routed onto pervious landscaped areas (e.g., lawns, mass planting areas, infiltration trenches, and natural areas) to increase infiltration of runoff where possible. 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.

CONSIDERATIONS

Avoid discharging outlets near wells.

**Section IV, FOTG
Standard 558**

PLANS AND SPECIFICATIONS

Plans and specifications for installing roof runoff structures shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. 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, 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.

NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATION

ROOF RUNOFF STRUCTURE

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GUTTERS AND DOWNSPOUTS

Materials

Roof gutters and downspouts will be the type and size specified on the drawings. Wood shall be clear and free of knots. A water-repellent preservative shall be applied to the flow area of wood other than redwood, cedar, or cypress. Plastics shall contain ultraviolet stabilizers. Dissimilar metals shall not be in contact with each other.

Roof gutters shall be aluminum with baked enamel finish, galvanized steel or other approved material. If roof gutters and downspouts are aluminum, they shall have a nominal thickness of 0.027 inches for the gutters and 0.020 for the downspouts and if galvanized steel, a minimum thickness of 28 gauge. All gutter and downspout joints shall be made water-tight by use of mastic or caulking.

Supports

Gutter supports shall be installed as recommended by the manufacturer. They shall have a maximum spacing of 48 inches for galvanized steel and 32 inches for aluminum or plastic. Spikes and ferrules shall not be used. Wood gutters shall be mounted on fascia boards using furring blocks that are a maximum of 24 inches apart. Wedge-shaped stringers may be used for support and/or spacing. Downspouts shall be securely fastened at the top and bottom with intermediate supports that are a maximum of 10 feet apart. Lateral and/or diagonal downspouts shall have supports that are a maximum of 5 feet apart.

Installation

Gutters shall be placed below the roof slope line so ice and snow can slide clear. The top outer edge of the gutter shall be $\frac{1}{2}$ inch below the projected roof slope line on roofs with pitches steeper than 12H:5V and $\frac{3}{4}$ inch below on roofs with pitches of 12H:5V or flatter. Gutter slopes shall be as shown on the drawings, with a maximum slope of $\frac{1}{4}$ inch per 10 feet.

Outlets

Outlet facilities shall be installed as shown on the drawings. When downspouts empty onto the ground surface, there shall be an elbow to direct water away from the building and splash blocks or other protection as shown on the drawings, shall be provided to prevent erosion.

DRIP TRENCHES

Materials

**Section IV, FOTG
Standard 558**

Gravel material used to fill the drip trench shall be washed and free of fines. Gradation shall be as shown on the drawings. Pipe used as drains shall conform to the size and material specified on the drawings. All joints shall be secure and inspected prior to placing gravel material over pipe. No compaction of the gravel material shall be required.

Outlets

The outlet(s) for the drip trench pipe shall be located to be free-flowing, protected from animal and equipment damage and shall have an animal guard of appropriate size and type installed. The outlet shall be located to minimize erosion and flooding.

Upon completion of construction, all disturbed areas shall be graded to drain and seeded and mulched in accordance with Standard 342-Critical Area Planting. Seeding and mulching materials shall be as specified on the drawings. Necessary fencing shall be installed according to the requirements of Standard 372-Fencing.