

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**ACCESS ROAD**

(Ft.)

**CODE 560**

**DEFINITION**

An access road is an established route for equipment and vehicles.

**PURPOSE**

An access road is used to provide a fixed route for vehicular travel for resource activities involving the management of timber, livestock, agriculture, wildlife habitat, and other conservation enterprises.

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies where access is needed from a private or public road or highway to a land use enterprise or conservation measure, or where access is needed in a planned land use area.

Access roads range from single purpose, seasonal use roads, designed for low speed and rough driving conditions, to all-purpose, all-weather roads. Single purpose roads provide access to areas such as forest fire lines, forest management activities, remote recreation areas, or for maintenance of facilities.

This practice does not apply to temporary or infrequently used trails used for logging. Use Oklahoma NRCS Conservation Practice Standard (CPS), *Forest Trails and Landings (655)*. Trails and walkways used for animals, pedestrians, or off-road vehicles are addressed in Oklahoma NRCS CPS, *Trails and Walkways (575)*.

**CRITERIA**

Design the access road to serve the enterprise or planned use with the expected vehicular or equipment traffic. Factors in the design include the type of vehicle or equipment and the speed, loads, soils, climate, and other

conditions under which vehicles and equipment are expected to operate.

**Location.** Locate the access road to serve the purpose intended, to facilitate the control and disposal of surface and subsurface water, to control or reduce erosion, and to make the best use of topographic features. Design the layout of the road to follow natural contours and slopes to minimize disturbance of drainage patterns. Locate the access road where it can be maintained and where water management problems are not created. To reduce potential pollution, position the road as far as possible from water bodies and watercourses. To the extent possible, do not impede overland flow.

**Alignment.** Adapt the gradient and horizontal alignment to the intensity of use, the mode of travel, the type of equipment and load weights, and the level of development.

Grades normally should not exceed 10 percent except for short lengths. A maximum grade of 15 percent should only be exceeded if necessary for special uses such as field access roads or fire protection roads.

**Width.** The minimum width of the roadbed for an all-purpose road is 14 feet for one-way traffic and 20 feet for two-way traffic. The roadbed width includes a tread-width of 10 feet for one-way traffic or 16 feet for two-way traffic and 2 feet of shoulder width on each side. Increase the two-way traffic width by a minimum of 4 feet for trailer traffic. Single purpose roads will have a minimum width of 10 feet with greater widths at curves and turnouts. Use vegetation or other measures to protect the shoulders from erosion.

Use turnouts on single lane roads where vehicles travel in both directions on a limited basis. Design the turnout to accommodate the anticipated vehicle use.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

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Provide a turnaround at the end of dead end roads. Size the turnaround for the anticipated vehicle type that will be using the road.

Provide parking space as needed to keep vehicles from parking on the shoulder or other undesirable locations.

**Side Slopes.** Design all cuts and fills to have stable slopes that are a minimum of 2 horizontal to 1 vertical. For short lengths, rock areas, or very steep hillsides, steeper slopes may be permitted if soil conditions warrant and special stabilization measures are installed.

Where possible, avoid areas with geological conditions and soils that are subject to slides. When the area cannot be avoided, treat the area to prevent slides.

**Drainage.** The type of drainage structures used will depend on the intended use and runoff conditions. Provide a culvert, bridge, ford, or surface cross drain for water management at every natural drainage way. The capacity and design of the drainage feature must be consistent with sound engineering principles and must be adequate for the class of vehicle, road type, land use in the watershed, and intensity of use.

When a culvert or bridge is installed in a drainage way, it must have a minimum capacity that is sufficient to convey the design storm runoff without causing erosion or road overtopping. Table 1 lists minimum design storm frequencies for various road types.

Table 1

Road Intensity & Usage	Storm Frequency
Intermittent; single purpose or farm use	2 year - 24 Hour
Frequent; farm headquarters, livestock access, isolated recreation areas	10 year - 24 Hour
High intensity; residential or public access	25 year - 24 Hour

Use Oklahoma NRCS CPS, *Stream Crossing (578)* to design stream crossings.

An erosion-resistant low point or overflow area may be constructed across the access road to

supplement the culvert capacity on non-public use roads.

Surface cross drains, broad-based or rolling dips, may be used to control and direct water flow off the road surface on low-intensity use forest, ranch or similar roads. Protect the outlets of drainage measures to limit erosion. On steep grades where water could run down the road, use a broad-based dip or other similar feature to divert runoff. The surface cross drain must be constructed of materials that are compatible with the use and maintenance of the road surface. The discharge area for a surface cross drain must be well-vegetated or have other erosion resistant materials. See Figure 1 - Recommended Spacing of Surface Cross Drains Based on Soil Type. Reduce separation distances as needed to account for local hydrologic conditions.

Design broad-based dips to have a 20-30 foot long, 3% reverse grade constructed into the existing roadbed by cutting from upgrade of the dip location. Install the cross drain outslope of broad-based dips at a grade of 3% toward the outlet, at a 10-25 degree angle downslope, and release onto a stable area. Outslope only the dip, not the road. The road grade between dips is adjusted so there is a constant grade from the bottom of the dip to the crest of the next crest hump upslope. Neither the dip nor the crest should have a sharp, angular break, but should be rounded to allow for a smooth flow of traffic. Properly constructed broad-based dips do not damage vehicles or slow vehicle speed. Limit broad-based dips to roads with grades of less than 12%. Broad-based dips will not be used for cross drainage of springs, seeps or other live water. See Figure 1 for spacing of broad-based dips, and see Figure 2 for additional broad-based dip design clarification.

Design rolling dips to have a 10-15 foot long, 3-8% reverse grade constructed into the existing roadbed by cutting from upgrade to the dip location and then using the cut material to build the 10-30 inch tall mound for the reverse grade. Install the cross drain outslope of rolling dips at a grade of 3% toward the outlet, at a 10-25 degree angle downslope, and release onto a stable area. The total length of a rolling dip is 30-50 feet long. Limit rolling dips to roads with grades of less than

15%. Rolling dips will not be used for cross drainage of springs, seeps or other live water. See Figure 1 for spacing of broad-based dips, and see Figure 3 for additional rolling dip design clarification.

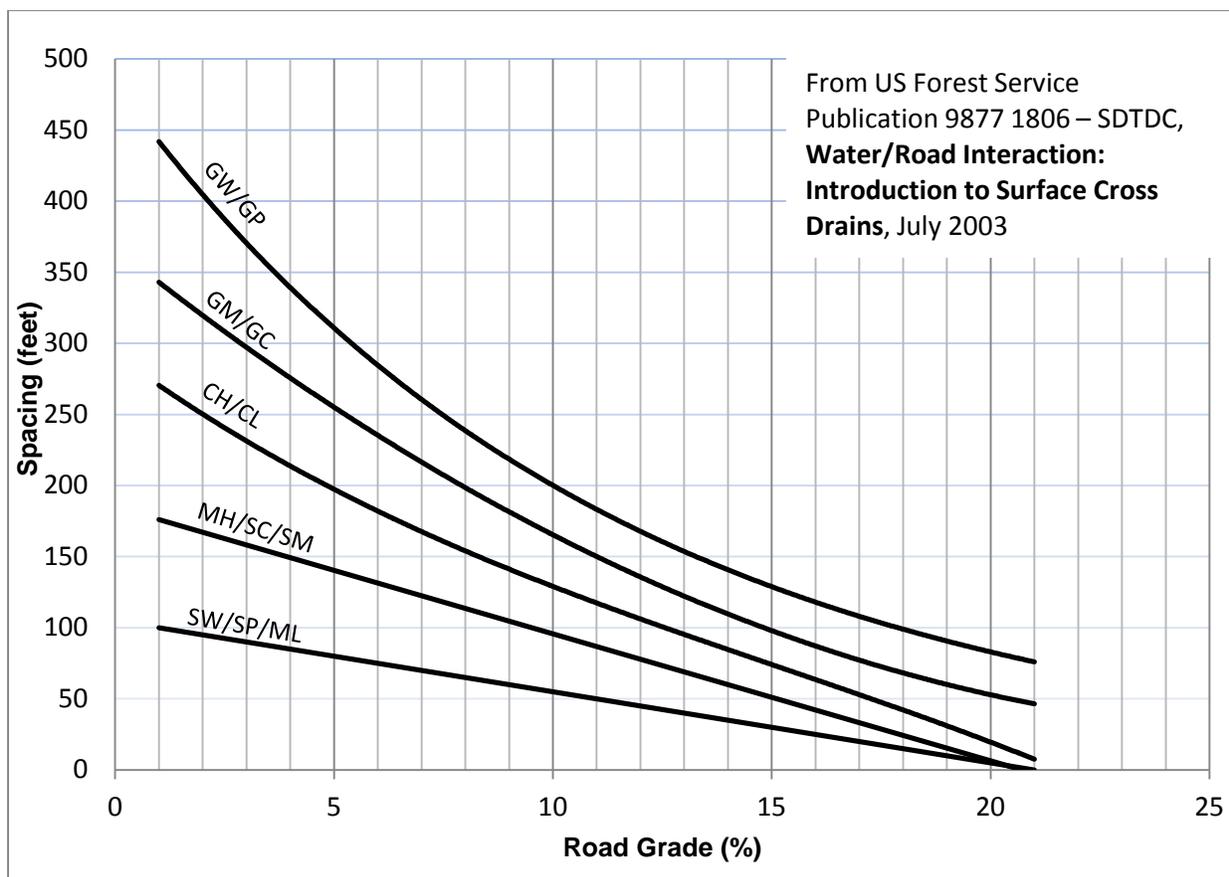
Crown the road surface to direct precipitation off of the road.

Provide ditches, as needed, to move water away from the road. Maintain unobstructed flow into the ditches to prevent flows from causing roadside erosion. The capacity of a roadside ditch must be adequate to carry the drainage from the road surface. Design ditch channels to have stable grades and side slopes. Provide a stable outlet for the ditch. Protection may include riprap or other similar materials. Use Oklahoma NRCS CPSs such as *Structure for Water Control (587)*; *Lined Waterway or Outlet (468)*; or *Grade Stabilization Structure (410)*, if needed.

**Surfacing.** Install a wearing course or surface treatment on the access road if required by traffic needs, soil, climate, erosion control, particulate matter emission control, or other site condition. If none of these factors apply, no special treatment of the surface is required.

When a treatment is used, the type of treatment will depend on local conditions, available materials, and the existing road base. On roads made of soils with weak bearing capacity, such as silts, organics, and clays, or where it is necessary to separate the surfacing material from the foundation material, place a geotextile material specifically designed for road stabilization applications under the surface treatment. Use the criteria in Oklahoma NRCS CPS *Heavy Use Area Protection (561)* to design the surface treatment. Do not use toxic and acid-forming materials to build the road. If dust control is needed, refer to the Dust Palliative Selection and Application Guide, USDA, Forest Service.

Figure 1. Recommended Spacing of Surface Cross Drains Based on Unified Soil Classification System Groups



**Safety.** Provide passing lanes, turnouts, guardrails, signs, and other facilities as needed for safe traffic flow. Design an intersection to a public highway to meet applicable federal, state and local criteria.

**Erosion Control.** Use the criteria in Oklahoma NRCS CPS *Critical Area Planting (342)* and/ or the *Oklahoma Plant Materials Technical Note 21* to vegetate road banks and disturbed areas as soon soil and climatic conditions are favorable.

If permanent vegetation cannot be established in a timely manner, use appropriate temporary measures to control erosion. If the use of vegetation is precluded and protection against erosion is needed, use the criteria in Oklahoma NRCS CPS *Mulching (484)* to provide surface protection.

During and after construction, use erosion and sediment control measures to minimize off-site damages.

Figure 2. Surface Cross Drain: Broad-Based Dip

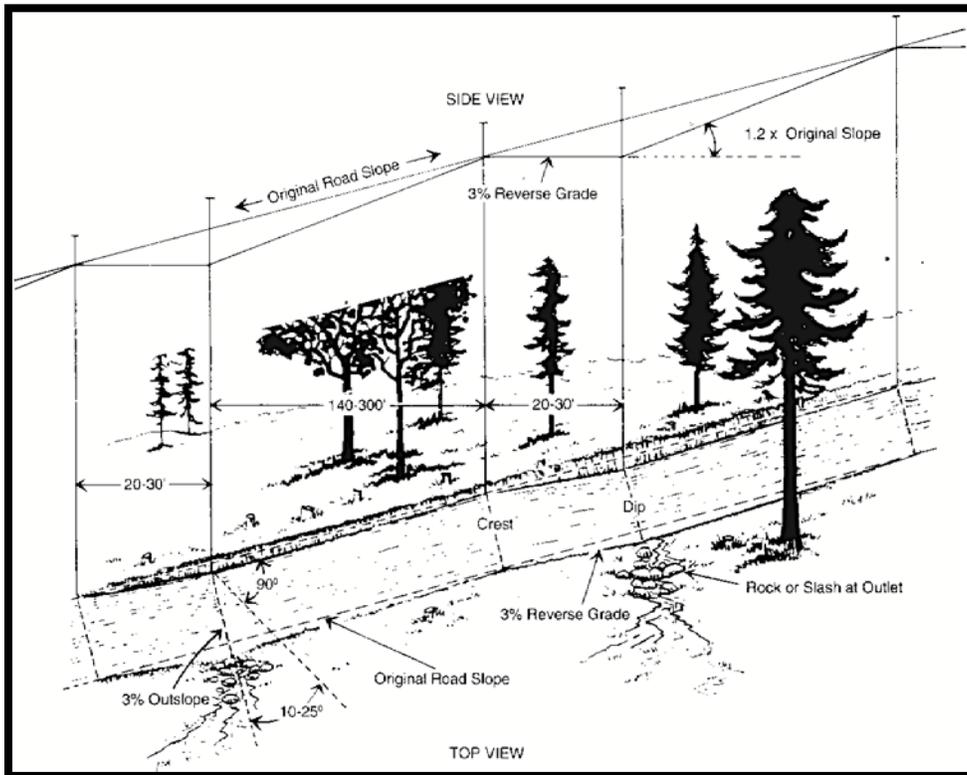
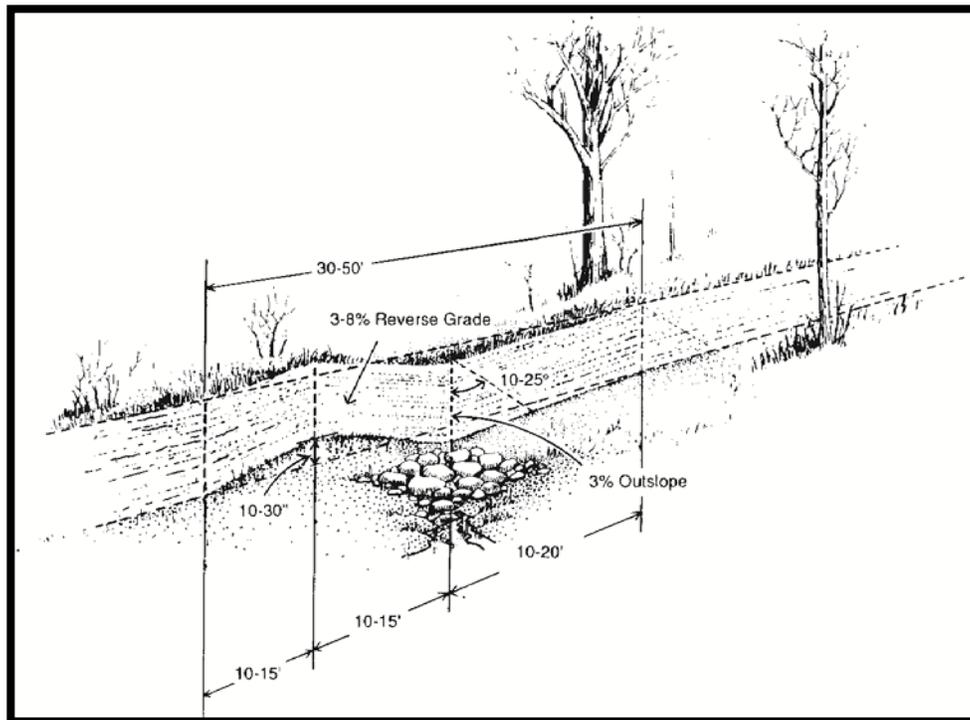


Figure 3. Surface Cross Drain: Rolling Dip



### CONSIDERATIONS

Consider visual resources and environmental values during planning and design of the road system.

Limiting the number of vehicles and vehicle speed will reduce the potential for generation of particulate matter and decrease safety and air quality concerns.

Consider using additional conservation practices to reduce the potential for generation and transport of particulate matter emissions such as NRCS CPS *Dust Control on Unpaved Roads and Surfaces (373)* which can be found in the USDA-NRCS National Handbook of Conservation Practices or Oklahoma NRCS CPS *Windbreak/Shelterbelt Establishment (380)*.

During adverse weather, some roads may become unsafe or may be damaged by use. Consider restricting access to the road at that time.

Consideration should be given to the following:

- Effects on downstream flows, wetlands or aquifers that would affect other water uses or users.
- Effects on wildlife habitats that would be associated with the practice.
- Utilizing buffers where possible to protect surface water.
- Short-term and construction-related effects of this practice.

### PLANS AND SPECIFICATIONS

Provide plans and specifications that describe the requirements for applying the practice to achieve its intended purpose. As a minimum, include:

- A plan view of the proposed road that shows water features, known utilities, and other features that affect the design.
- Road width and length with profile and typical cross section(s) including turnouts, parking, and turnarounds.

- Design road grades or maximum grades when applicable.
- Soils investigation. Location of soil borings and plot of the soil/geologic boring showing the USCS, as needed
- Type and thickness of surface treatment including any subbase preparation.
- Grading plan.
- Cut and fill slopes where applicable.
- Planned drainage features.
- Location, size, type, length and invert elevations of all required water control structures.
- Vegetative requirements that include vegetation materials to be used, establishment rates, and season of planting.
- Erosion and sediment control measures, as needed.
- Safety features.
- Construction and material specifications.

#### **OPERATION AND MAINTENANCE**

Prepare a written Operation and Maintenance Plan for the access road. As a minimum, include the following activities:

- Inspect access roads once per year and after major storms to determine needed maintenance.
- Inspect culverts, roadside ditches, surface cross drains, and outlets after each major runoff event and restore flow capacity as needed. Ensure proper cross section is available and outlets are stable.
- Maintain vegetated areas in adequate cover and control noxious weeds to meet the intended purpose(s). Re-seed and mow as needed to maintain a good vegetative stand on berms, ditches, and the side slopes. Remove undesirable trees and shrubs from the side slopes.
- Maintain the roadway surface in a good condition, which includes periodic grading or repair of the surface. Fill low areas in travel treads and re-grade, as

needed, to maintain road cross section. Prevent surface ponding by grading to remove depressions.

- Select the chemicals used for surface treatment or snow and ice removal to minimize adverse effects on stabilizing vegetation.
- Conservation practices that limit particulate matter emissions should be incorporated into long-term maintenance plans.
- Limit livestock usage to periods that permit use without damage.
- Repair vandalism, vehicular, or livestock damage to earthfill sections and drainage structures, outlets, or other appurtenances.
- If fences are installed, they shall be maintained to provide warning and/or to prevent unauthorized human or livestock entry to the access road

#### **REFERENCES**

United States Forest Service. July 2003. *Water/Road Interaction: Introduction to Surface Cross Drains* (Publication 9877 1806 – SDTDC).

Oklahoma State University. *Best Management Practices for Forest Road Construction and Harvesting Operations in Oklahoma* (Forestry Extension Report #5)

Bolander, P. and A. Yamada, 1999. *Dust Palliative Selection and Application Guide* Project Report 9977-1207-SDTDC San Dimas Technology Development Center, U.S. Dept. of Agriculture, Forest Service, San Dimas, CA.

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