

Access Road (feet)

Definition

A travelway constructed as part of a conservation plan.

Scope

This standard applies to vehicular and equipment roads constructed to provide access to farms, ranches, fields, conservation systems, structures, woodlands, and recreation areas.

Purpose

To provide a fixed route for travel for moving livestock, produce, equipment, and supplies; and to provide access for proper operation, maintenance, and management of conservation enterprises while controlling runoff to prevent erosion and maintain or improve water quality.

Conditions where practice applies

Where access is needed from a private or public road or highway to a conservation enterprise or measure, or where travelways are needed in a planned land use area.

Planning Considerations

Water Quantity

1. Effects on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation, and ground water recharge.
2. Effects of snowcatch and melt on water budget components.
3. Effects on downstream flows or aquifers that would affect other water uses or users.
4. Effects on the volume and timing of downstream flow to prohibit undesirable environmental, social, or economic effects.

Water Quality

1. Short-term and construction-related effects of this practice on the quality of on-site downstream water courses.
2. Effects on erosion and the movement of sediment, pathogens, and soluble and sediment-

attached substances that would be carried by runoff.

3. Effects on the visual quality of water resources.
4. Effects on the movement of dissolved substances below the root zone toward the ground water.
5. Effects on wetlands and water-related wildlife habitats that would be associated with the practice.

Design criteria

Access roads shall be designed to serve the enterprise or planned use with the expected vehicular or equipment traffic. The type of vehicle or equipment, speeds, loads, climatic, and other conditions under which vehicles and equipment are expected to operate need to be considered.

Visual resources and environmental values shall be considered in planning and designing the road system.

Access roads range from seldom used trails to all-weather roads heavily used by the public and built to very high standards. Some trails facilitate control of forest fires, are used for logging, serve as access to remote areas for recreation, or are used for maintenance of facilities.

Where general public use is anticipated, roads should be designed to meet applicable federal, state, or local criteria.

Sound engineering practices shall be followed to insure that the road meets the requirements of its intended use and that maintenance requirements are in line with operating budgets.

Location. Roads shall be located to serve the purpose intended, to facilitate the control and disposal of water, to control or reduce erosion, to make the best use of topographic features, and to include scenic vistas where possible. The roads should generally follow natural contours and slopes to minimize disturbance of drainage patterns. Roads should be located where they can be maintained and so water management problems are not created. To reduce pollution, roads should not be located too near watercourses.

Alignment. The gradient and vertical and horizontal alignment shall be adapted to the intensity of use, mode of travel, and the level of development.

Grades normally should not exceed 10 percent except for short lengths, but maximum grades of 20 percent or more may be used if necessary for special uses.

Width. The minimum width of the roadbed is 14 ft for one-way traffic and 20 ft for two-way traffic. Single-lane logging or special-purpose roads have a minimum width of 10 ft, with greater widths at curves and turnouts. The two-way traffic width shall be increased approximately 4 ft for trailer traffic.

The minimum tread width is 10 ft for one-way traffic and 15 ft for two-way traffic. The tread width for two-way traffic shall be increased approximately 4 ft for trailer traffic.

The minimum shoulder width is 2 ft on each side of the tread width.

Where turnouts are used, road width shall be increased to a minimum of 20 ft for a distance of 30 ft.

Side slopes. All cuts and fills shall have side slopes designed to be stable for the particular site conditions.

Areas with geological conditions and soils subject to slides shall be avoided or treated to prevent slides.

Drainage. The type of drainage structure used will depend on the type of enterprise and runoff conditions. Culverts, bridges, or grade dips for water management shall be provided at all natural drainageways. The capacity and design shall be consistent with sound engineering principles and shall be adequate for the class of vehicle, type of road, development, or use.

Roadside ditches shall be adequate to provide surface drainage for the roadway and deep enough, as needed, to serve as outlets for subsurface drainage. Channels shall be designed to be on stable grades or protected with structures or linings for stability.

Water breaks or bars may be used to control surface runoff on low-intensity use forest or similar roads.

Surfacing. Access roads shall be given a wearing course or surface treatment if required by traffic needs, climate, erosion control, or dust control. The type of treatment depends on local conditions, available materials, and the existing road base. If these factors or the volume of traffic is not a problem, no special treatment of the surface is required.

Unsurfaced roads may require controlled access to prevent damage or hazardous conditions during adverse climatic conditions.

Toxic or acid-forming materials shall not be used on roads. This should not be construed to prohibit use of chemicals for dust control and snow and ice removal.

Traffic safety. Passing lanes, turnouts, guardrails, signs, and other facilities as needed for safe traffic flow shall be provided. Traffic safety shall be a prime factor in selecting the angle and grade of the intersection with public highways. Preferably, the angles shall be not less than 85 degrees. The public highway shall be entered either at the top of a hill or far enough from the top or a curve to provide visibility and a safe sight distance. The clear sight distance to each side shall not be less than 300 feet, if site conditions permit.

Erosion control. If soil and climatic conditions are favorable, roadbanks and disturbed areas shall be vegetated as soon as possible and skid trails, landings, logging, and similar roads shall be vegetated after harvesting or seasonal use is completed. If the use of vegetation is precluded and protection against erosion is needed, protection shall be provided by nonvegetative materials, such as gravel or other mulches.

Roadside channels, cross drains, and drainage structure inlets and outlets shall be designed to be stable without protection. If protection is needed, riprap or other similar materials shall be used.

General criteria

Watercourses and water quality shall be protected during and after construction by erosion-control facilities and maintenance. Filter strips, sediment and water control basins, and other conservation practices shall be used and maintained as needed.

Dead end roads shall be provided with a turnaround. In some areas turnarounds may also be desirable for stream, lake, recreation, or other access purposes.

Parking space as needed shall be provided to keep vehicles off the road or from being parked in undesirable locations.

Plans and specifications

Plans and specifications for constructing access roads shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

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Technical Guide
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ACCESS ROAD (Feet)

Design Criteria

Low use roads shall have the same design considerations as other roads, except that certain design criteria may be reduced in keeping with specific site conditions.

Location

To reduce pollution, roads should not be located too near watercourses. A minimum of 25 feet of native filter strip should be left between the road and watercourses on level areas with two (2) additional feet added for each additional percent of slope increase.

If the road must cross a stream, culverts or bridges should be installed. Ridge tops and wet flood plains should generally be avoided as locations for access roads, due to potential drainage and flooding problems.

When roads must be constructed on level ridge tops or in other problem areas, side ditches should be installed to provide for surface run-off and road bed drainage.

Locate roads where possible on slopes so that broad base dips can be used for drainage to avoid side ditches.

Grade and Alignment

For low use roads grades shall not exceed 10 percent, except for short distances (200 feet or less) where this limit may be increased to a maximum of 20 percent. Frequent grade changes generally cause fewer erosion problems than long, continuous gradients. Curves and switch backs must be of sufficient radius for trucks and other large vehicles to negotiate easily. The radius should be no less than 35 feet for standard vehicles and 50 feet for tractor-trailers.

For all other roads maximum sustained grades should not exceed 10 percent, but may be increased to 12 percent for gravel surfaces and 16 percent, if paved. Increases of grades for other roads require the approval of an engineer on an individual site basis.

Within recreational areas, the minimum radius of curvature of centerline shall be as follows:

40 feet for cars only (50' is the recommended minimum that can be effectively maintained with standard equipment)

50 feet for cars with trailers up to 30 feet long

80 feet for cars with trailers over 30 feet long

For access roads leading to recreational areas, the minimum radius of curvature of the centerline shall be 175 feet for all vehicles. This larger radius is necessary to handle larger amounts of traffic more safely.

The following items should be carefully considered when selecting grades: (1) erosion control; (2) weight and type of vehicle; and (3) the volume of traffic using the road. Steep grades should always be avoided at road curves or intersections.

The length of vertical curves in feet shall not be less than 7 times the algebraic difference of the intersection grades in percent. (Example: A downhill slope of 8 percent intersects an uphill slope of 3 percent. The length of the vertical curve would be 77 feet.)

Width

For low use roads, the minimum width of the roadbed may be reduced to 10 feet.

Side Slopes

All cuts and fills shall have side slopes that are stable for the particular site conditions and materials involved. Generally, cut slopes should not be steeper than 1:1 and fill slopes not steeper than 2:1. When maintenance by machine mowing is planned, side slopes should not be steeper than 3:1.

Vertical cuts up to 4.0 feet may be allowed for low use roads where specific experience has shown that these cut areas are stable.

Drainage

The hydraulic design of these structures shall consider the 10-year, 24-hour storm. Where it is determined to be impractical to size the structures to carry this peak discharge, adequate overflow areas shall be provided away from the structure to prevent road wash-outs or serious erosion and the structures sized to handle the peak discharge of an appropriate smaller storm. The minimum size structures for low use roads shall not be designed to handle less than the 1-year-24-hour peak discharge.

Outsloping is a good way to remove small quantities of water from road surfaces. A road that is properly outsloped, slopes slightly from the cut bank to the outside edge of the roadbed. The outslope should only be enough to divert the water, normally 1/4 inch to 3/8 inch per foot of width.

On fill slopes, where it is necessary to protect the fill from eroding, the road should be insloped with cross drainage design from the inside toe of the slope to the downhill side.

Figure 1 shows an example of outsloping and insloping for road surface drainage.

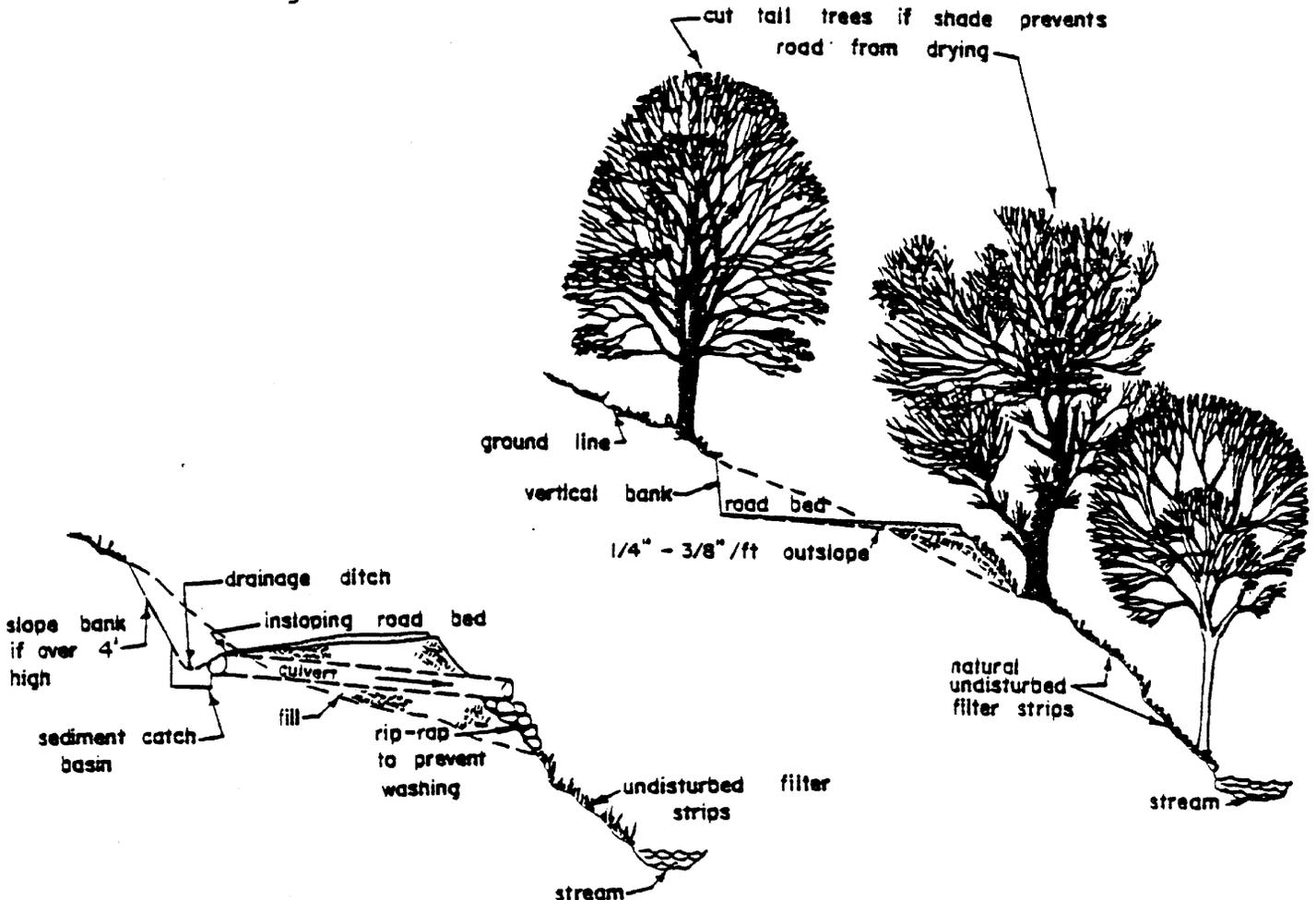


Figure 1. Example of outsloping and insloping for road surface drainage

Roadside ditches shall be adequate to provide surface drainage to the roadway and deep enough, as needed, to serve as outlets for subsurface drainage.

Broad Based Dips

Broad based drainage dips should be used instead of side ditches where possible. Broad based dips are a dip and reverse slope in the road surface with an outslope in the dip to provide natural cross drainage. The purpose of the dip is to prevent build-up of excess surface run-off and subsequent erosion. Because of construction characteristics, dips should not be used on a road that has a grade greater than 10%. The dips should be installed during initial road construction, using the following design criteria:

- (1) Construct a 20 foot long, 3 percent reverse grade in the roadway by cutting from upgrade of the dip location and using cut material for the reverse grade.
- (2) Use the following formula as a guide to dip spacing:

$$\text{Spacing (in feet)} = \frac{400'}{\text{slope } \%} + 100'$$

- (3) The dip and reverse grade section may require bedding with gravel for stability.
- (4) Install dips to outlet water on flatter areas when possible.

The following table gives the spacing for broad based dips, as computed, using the above formula:

<u>Road Grade (Percent)</u>	<u>Approximate Distance Between Dips (Ft.)</u>
1	500
2	300
5	180
10	140

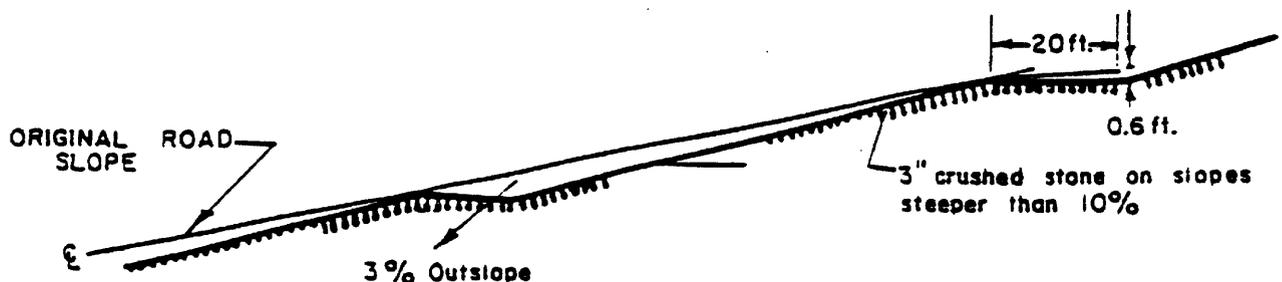


Diagram showing how to properly construct a broad-based drainage dip. A broad-based drainage dip is constructed by building a 20 foot long 3 percent reverse grade into the existing roadbed. The bottom of a broad-based drainage dip constructed in a roadbed having a 10 percent grade would be 2.6 feet below the original roadbed.

Water Breaks

Water breaks are a combined shallow trench and ridge constructed across a road. The purpose is to intercept and divert side ditch or surface runoff to minimize erosion and provide conditions suitable for vegetation. Water breaks are more commonly used on low use roads, but may be used as appropriate on any sloping road where surface water runoff may cause erosion of the road surface. Water breaks should be installed at strategic locations, using the following spacing guide:

<u>Road Grade (Percent)</u>	<u>Approximate Distance Between Breaks (Ft.)</u>
1	400
2	245
5	125
10	78
15	58
20	47

The following guides should be followed for installing water breaks:

1. Dig a shallow trench 6" to 12" deep at an angle of approximately 30 degrees downslope to turn surface water off the road.
2. The uphill end of the bar shall extend beyond the side ditch line to fully intercept any ditch flows.
3. The outflow end of the bar should be fully open and extend far enough beyond the edge of road to safely convey runoff water away from the road surface.

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U.S. DEPARTMENT OF AGRICULTURE
Soil Conservation Service

Technical Guide
Section IV
Rev. April 1991

ACCESS ROAD SPECIFICATIONS

Construction operations shall be carried out in a manner that erosion and air and water pollution is minimized and held within legal limitations. The completed job shall present a workmanlike finish. Construction shall be according to the following requirements as specified for the job:

1. Trees, stumps, roots, brush, weeds, and other objectionable material shall be removed from the work area.
2. Unsuitable material shall be removed from the roadbed area.
3. Fill material shall be deposited in layers not to exceed 9 inches and compacted with the controlled movement of compacting and earth moving equipment.
4. The roadbed shall be graded to the required elevations. When special treatment of the road surface is required, subgrade preparation and placement of the surface course shall be in accordance with sound highway construction practice for the surface material used.
5. Structures such as culverts, pipe drops, or bridges shall be installed to the lines and grades shown on the plans or as staked in the field. Pipe conduits shall be placed on a firm foundation. Selected backfill material shall be placed around the conduit in layers not to exceed 6 inches. Each layer shall be properly compacted.
6. Roads shall be planned and laid out according to good landscape management principles.

NORTH CAROLINA SUPPLEMENT - N-560-1

U.S. DEPARTMENT OF AGRICULTURE
Soil Conservation Service

Technical Guide
Section IV
Rev. April 1991

ACCESS ROAD ENGINEERING NOTEKEEPING

Access road layout and construction checking shall be done following applicable procedures and notekeeping format contained in Technical Release 62. Supporting data are to be recorded for design layout and construction checkout. Engineering surveys and field notes may be recorded in bound field notebooks or approved forms.

Design Surveys and Construction Layout

- A. Record the following supporting data as a minimum.
1. Job identification and location. (Can be a sketch on the job plans, field notes, approved forms or a reference to the Conservation Plan Map.) Date and name of person doing design and layout.
 2. Use of road.
 3. Design grades or maximum grades where applicable.
 4. Design road width and length.
 5. Design surface treatment.
 6. Cut and fill slopes, where applicable.
 7. Drainage areas and structure requirements for culverts, bridges, etc.
 8. Design spacing for broad based dips or water breaks where applicable.
 9. Vegetative requirements for slopes, shoulders, etc.

Construction Check

- A. Record the following data as a minimum.
1. Location check.
 2. Length of constructed road.
 3. Constructed road width.
 4. Grade checks, location of broad based dips, and water breaks where applicable.

5. Data for structures installed.
6. Cut and fill slopes where applicable.
7. Constructed surface treatment.
8. Statement of adequacy of protection against erosion.
9. Statement of compliance with plans and specifications.
10. Date and signature of person making the construction check.