United States Department of Agriculture

Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

ACCESS ROAD

CODE 560

(ft)

DEFINITION

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

PURPOSE

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

- To provide a fixed route for vehicular travel for resource activities involving the management of conservation forestry operations, 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 NRCS Conservation Practice Standard (CPS) Forest Trails and Landings (Code 655) to meet this need. Trails and walkways used for animals, pedestrians, or off-road vehicles are addressed in NRCS CPS Trails and Walkways (Code 575).

CRITERIA

General Criteria Applicable to All Purposes

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, turning radius, and other conditions under which vehicles and equipment are expected to operate.

NRCS reviews and periodically updates conservation practice standards. To obtain the current version of this standard, contact your Natural Resources Conservation Service State office or visit the Field Office Technical Guide online by going to the NRCS website at https://www.nrcs.usda.gov/ and type FOTG in the search field.

USDA is an equal opportunity provider, employer, and lender.

Decisions regarding planned road usage will be documented in the design folder. Where general public use is anticipated, design roads to meet applicable Federal, State, or local criteria. If applicable, meet County or Township regulations regarding roadways on private land.

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.

For recreational enterprises, the minimum horizontal radius of curvature along the road centerline will be:

- 40 ft. for recreational vehicles
- 50 ft. for vehicles with trailers 30 ft. long or less
- 80 ft. for vehicles with trailers longer than 30 ft.

Vertical curves will be used to avoid abrupt changes in grade. For recreational enterprises or other purposes designed for two-wheel drive vehicles, the minimum curve length will be as shown in Table 1:

Table 1: Minimum curve length per change in grade

Change in Grade (Percent)	Minimum Length (ft)
5 or less	35
5.1 - 10	70
10.1 - 15	105
15.1 - 20	140
20.1 - 24	175

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. Where turnouts are used, increase the one-way paved width to a minimum of 20 ft. for a distance of 30 ft.

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.

The minimum design roadbed and surfaced widths are shown in Table 2:

Table 2: Minimum design roadbed and surface widths

Roadway Purpose	Surfaced Width	Shoulder Width (each side)	Increased surfaced width to accommodate trailer traffic
1 Way Vehicular Traffic	10 ft	2 ft	4 ft
2 Way Vehicular Traffic	16 ft	2 ft	4 ft
Single Purpose	10 ft min	———	———
Single Lane Farm Equipment	10 ft min. or travel equip. outside tread width plus 3 ft.	2 ft	———

The clear travel width and alignment of roadways designed for agricultural operations must be planned to accommodate the use of travel equipment attachments such as combine grain heads. Widening of the traveled way is required on some curves to provide for the off-tracking of tractor-trailer vehicles and for some light vehicle-trailer combinations. Curve widening to accommodate the design vehicle is considered a part of the traveled way.

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, design slopes to a minimum of 4 horizontal to 1 vertical to improve establishment and maintenance of turf.

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.

Earthfill
Earthfill required to build the road base will meet the requirements of NRCS - Ohio Construction Specification OH-23 “Earthfill”.

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 drainageway, it must have a minimum capacity that is sufficient to convey the design storm runoff without causing erosion or road overtopping. Table 3 lists minimum design storm frequencies for various road types.

Table 3: Minimum design storm frequencies

Road Intensity and 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

For public access roads, design storm frequencies must also meet local standards.

Use NRCS CPSs Stream Crossing (Code 578), or Aquatic Organism Passage (Code 396) when aquatic species are present, to design stream crossings.

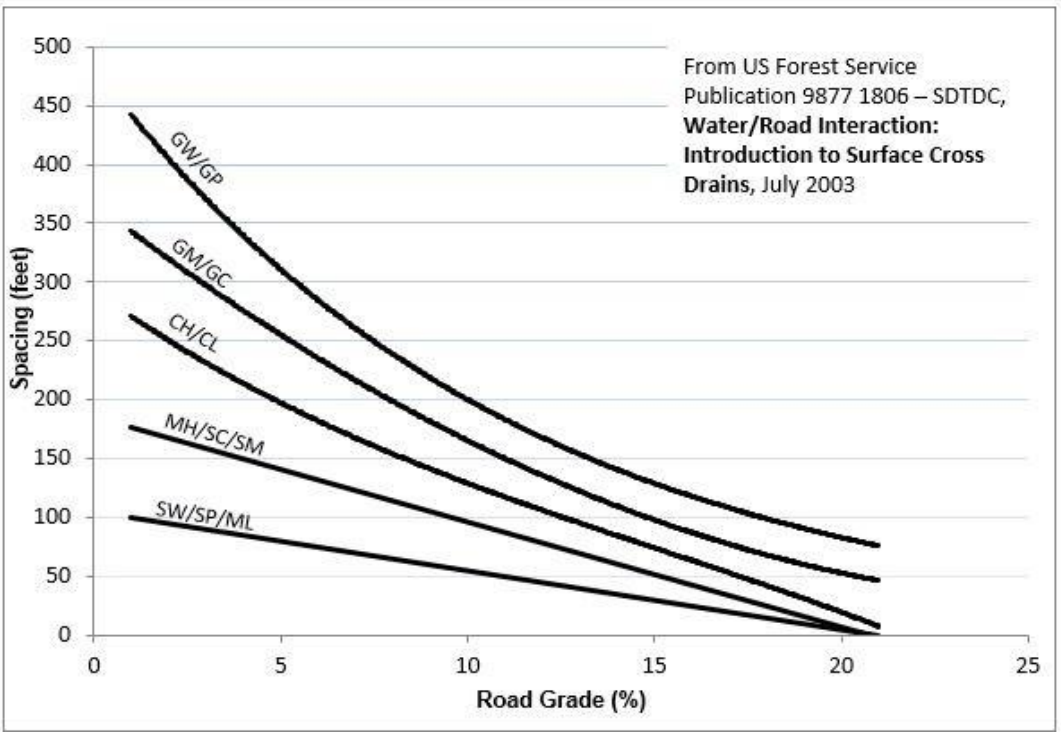
An erosion-resistant low point or overflow area may be constructed across the access road to supplement the culvert capacity on nonpublic-use roads.

Surface cross drains, such as 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 fig. 1). Reduce separation distances as needed to account for local hydrologic conditions.

Design a minimum cross slope to direct precipitation off of the roadway. Cross slopes range from 1.5 to 2 percent for paved surfaces and 2 to 6 percent for unpaved surfaces.

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 NRCS CPSs Structure for Water Control (Code 587), Lined Waterway or Outlet (Code 468), or Grade Stabilization Structure (Code 410), if needed.

Figure 1. Recommended spacing of surface cross drains based on soil types



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 NRCS CPS Heavy Use Area Protection (Code 561) to design the surface treatment. Do not use toxic and acid-forming materials to build the road.

TABLE 4- Access Road Material Configurations A, B, and C (minimum compacted thickness)

	MATERIALS 1/	DESIGN OPTIONS					
		Livestock Only			Livestock & Vehicular Traffic		
BASE		A	B	C	A	B	C
	AASHTO M43 #1 or #2 2/	4”	4”	—	6”	4”	—
	AASHTO M43 #57 or #67 2/	2”	—	—	2”	—	—
	ODOT 304.02 or 411.02 3/	—	2”	6”	—	4”	8”
PAD SURFACE	SCREENINGS 4/	Required			Optional (for Vehicles Only)		
	Crushed Limestone (AASHTO M43 #10 or AASHTO M43 #9)	3”	3”	3”	3”	3”	3”

1/ Materials are to be supplied from sources listed on the most current ODOT Aggregate Producer/Supplier list (see References section) and meet AASHTO M43 gradations. Steel slag and Recycled-Concrete Aggregate (RCA) (also known as Reclaimed Concrete Material (RCM)) from listed sources may be substituted for crushed gravel or limestone, meeting equivalent gradations of the materials listed in Table 4.

2/ The voids between the stone (AASHTO M43, Nos. 1, 2, 57 or 67) are to be choked with fines, (ODOT 304 or 411), and/or screenings (AASHTO M43 No. 9 or AASHTO M43 No. 10) to create a smooth surface.

3/ Compaction is required for materials containing fines (e.g., 304 and 411). Compact by tracking over the entire surface with a minimum of 4 passes of a drum roller or vibratory drum roller. Rubber tired equipment having a 4000 lb. minimum wheel load may be used when the entire surface can be uniformly tracked.
Addition of water may be necessary to obtain maximum compaction. The moisture content should be sufficient that a hand-held ball can be formed, and material will stain the hands.

4/ Select screening materials appropriate to the type of livestock that utilize the pad. Exception - 3-inches of screenings are not necessary with the pad is for vehicular traffic use only (the right-hand side columns A, B, or C are viable options). An additional 3” of ODOT 304 or 411 may be used in lieu of screenings.

If dust control is needed, use NRCS CPS Dust Control on Unpaved Roads and Surfaces (Code 373).

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. Select angles and grades at intersections with public highways with safety as a prime factor.

Preferably, the angle of the intersection of the access road with a public highway 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 be at least 300 feet, if site conditions permit.

Design the turnout at the end of the access road to drain away from the public highway. Design the access road surface level to be at or slightly below the elevation of the edge of the highway for at least twenty-five feet from the highway edge. Design a turning radius of at least twenty-five feet on both sides of the access road.

Roads built along or benched into a hillside may be insloped (graded toward the cut) or outsloped (graded down the hillside) depending on the resistance of the soil to erosion and based on the benefits of dispersing water.

Outsloping can be hazardous when roads become slippery. The cross grades of roads should not exceed 4 percent because slow moving vehicles have a tendency to slip sideways when they lose their momentum on slippery surface. This is particularly troublesome on horizontal curves.

Vehicle safety must be considered in the planning and design of drainageways within or adjacent to the roadway.

Erosion control
Use the criteria in NRCS CPS Critical Area Planting (Code 342) or the NRCS State-approved seeding specification to vegetate road banks and disturbed areas as soon as 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 NRCS CPS Mulching (Code 484) to provide surface protection.

During and after construction, use erosion and sediment control measures to minimize offsite damages.

CONSIDERATIONS

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

Consider locating roads outside of the active floodplain to reduce bank erosion potential and the effects on stream hydrology.

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, such as NRCS CPSs Dust Control on Unpaved Roads and Surfaces (Code 373) or Windbreak/Shelterbelt Establishment (Code 380), to reduce the potential for generation and transport of particulate matter emissions.

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

When revegetation is needed, consider revegetating using species or diverse mixes that are native or adapted to the site and have multiple benefits. In addition, where appropriate, consider a diverse mixture of forbs and wildflowers to support pollinator and other wildlife habitat.

Consideration should be given to—

- 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. Requirements for all drawings prepared by NRCS/SWCD as well as by others (Professional Engineer or Registered Architect) are contained in the National Engineering Manual (NEM) Part 541 - Drafting and Drawings. As a minimum, include—

- A plan view of the proposed road that shows the practice location with elevations to detail the proposed road surface as needed, water features, known utilities, and other features that affect the design.
- Road width and length with profile and typical cross section(s) including the base materials, turnouts, parking, and turnarounds.
- Planned drainage features for surface water conveyance as needed. (water bars; side drainage)
- Design road grades or maximum grades when applicable.
- Soils investigation. Include location of soil borings and plot of the soil/geologic boring showing the Unified Soil Classification System, as needed.
- Type and thickness of surface treatment including any subbase preparation; base material requirements (specifications for concrete, stone, filter fabric materials).
- 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, fertilizer to be used, establishment rates, and season of planting.
- Erosion and sediment control measures, as needed.
- Safety features.
- Construction and material specifications.
- Quantities
- Reference to O&M plan

OPERATION AND MAINTENANCE

Prepare a written operation and maintenance plan for the access road. As a minimum, include the following activities:

- Inspect culverts, roadside ditches, water bars, 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 to meet the intended purpose(s).
- Fill low areas in travel treads and regrade, as needed, to maintain road cross section. Repair or replace surfacing materials as needed.
- Selection of chemical treatment(s) for surface treatment or snow/ice removal, as needed. Select the chemicals used for surface treatment or snow and ice removal to minimize adverse effects on stabilizing vegetation.
- Selection of dust control measures, as needed.

REFERENCES

American Association of State Highway and Transportation Officials. 2011. A Policy on Geometric Design of Highways and Streets, 6th Edition. Washington, D.C.

American Association of State Highway and Transportation Officials. 2001. Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400). Washington, D.C.

Swift, L.W., Jr. 1988. Forest Access Roads: Design, Maintenance, and Soil Loss. *In*: W.T. Swank and D.A. Crossley, Jr. (ed.) Ecological Studies, Vol. 66: Forest Hydrology and Ecology at Coweeta. New York: Springer-Verlag: 313-324.

USDA Forest Service. 2003. Water/Road Interaction: Introduction to Surface Cross Drains, Publication 9877 1806 – SDTDC. Washington, D.C.

Weaver, W.E., E.M. Weppner, and D.K. Hagans. 2015. Handbook for Forest, Ranch & Rural Roads: A Guide for Planning, Designing, Constructing, Reconstructing, Upgrading, Maintaining and Closing

Wildland Roads (Rev. 1st ed). Mendocino County Resource Conservation District. Ukiah, CA. https://www.pacificwatershed.com/sites/default/files/RoadsEnglishBOOKapril2015b.pdf

OH-NRCS Field Office Technical Guide (FOTG), Section IV, Engineering Specifications "Design and Construction Specification- Concrete"

OH-NRCS Field Office Technical Guide (FOTG), Section IV, Engineering Specifications "OH-95 Geotextile"

ODOT Construction and Material Specifications: https://www.transportation.ohio.gov/working/publications/spec-book

ODOT Construction Management Reporting System (CMRS), Contractors Reports, Certified Aggregate https://cmsportal.dot.state.oh.us/

Recycled Concrete Aggregate (RCA), National Concrete Pavement Technology Center, Iowa State University Institute of Transportation, Ames, IA: https://www.cptechcenter.org/concrete-recycling/