

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD  
ARIZONA**

**ACCESS ROAD  
(Ft.)**

**CODE 560**

**DEFINITION**

A travel-way for equipment and vehicles constructed as part of a conservation plan.

*applicable Natural Resource Conservation Service (NRCS) standards. The criteria for the design of any components not specifically addressed in NRCS practice standards or specifications shall be consistent with sound engineering principles and/or manufacturer recommendations.*

**PURPOSE**

To provide a fixed route for vehicular travel for resource activities involving the management of timber, livestock, agriculture, wildlife habitat, and other conservation enterprises while protecting the soil, water, air, fish, wildlife, and other adjacent natural resources.

**Laws and Regulations.** *Planned work shall comply with all federal, state, Tribal and local laws rules, and regulations. Laws and regulations of particular concern include those involving water rights, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.*

**CONDITIONS WHERE PRACTICE APPLIES**

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

*The owner is responsible for securing necessary permits and water rights, complying with all laws and regulations, and meeting legal requirements applicable to the installation, operation, and maintenance of this practice and associated structures.*

Access roads range from seasonal use roads, designed for low speed and rough driving conditions, to all-weather roads heavily used by the public and designed with safety as a high priority. Some roads are only constructed for a single purpose; i.e. control of forest fires, logging and forest management activities, access to remote recreation areas, or access for maintenance of facilities.

**Location.** Roads shall be located to serve the purpose intended, to facilitate the control and disposal of surface and subsurface 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 shall be located where they can be maintained and where water management problems are not created. To reduce potential pollution, roads shall be located away from watercourses. Utilize buffers where possible to protect water-bodies.

**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, speed, loads, soil, climatic, and other conditions under which vehicles and equipment are expected to operate need to be considered.

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

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

Grades normally should not exceed 10 percent except for short lengths. Maximum grades of 18 percent should only be exceeded if necessary for special uses such as logging roads, field

*Design and implementation of subsidiary components and/or structures shall meet all*

access roads, fire protection roads or other roads not accessible for use by the general public.

For stream crossings, the road should be aligned so that it crosses perpendicular to the channel as much as possible.

**Width.** The minimum width of the roadbed is 14 ft for one-way traffic and 20 ft 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. Each type of road also requires 2 feet of shoulder width on each side. Single-lane logging or special-purpose roads can have a minimum width of 10 feet, with greater widths at curves and turnouts. The two-way traffic width shall be increased approximately 4 feet for trailer traffic. The shoulder width may be either gravel or grass.

Turnouts shall be used on single lane roads where vehicles travel in both directions on a limited basis. Where turnouts are used, road width shall be increased to a minimum of 20 feet for a distance of at least 30 feet.

**Side Slopes.** All cuts and fills shall be designed to have stable slopes of a minimum of 2 horizontal to 1 vertical on heights of less than 4 feet. For short lengths, rock areas, or very steep hillsides, steeper slopes may be permitted, if soil conditions warrant and special stabilization measures are installed.

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 intended use and runoff conditions. Culverts, bridges, fords, or grade dips for water management shall be provided at all natural drainage ways. 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. When a culvert or bridge is installed in a drainage way, its minimum capacity shall 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 Type  | Storm Frequency   |
|--|-------------------|
| Forest Access Roads, Farm Field Access Roads     | 2 year - 24 Hour  |
| Farm Driveways, Recreation Facility Access Roads | 10 year - 24 Hour |
| Public Access Roads, Camp grounds, Etc.          | 25 year - 24 Hour |

An erosion-resistant low point or overflow area may be constructed across the access road to supplement culvert capacity on non-public use roads. Culverts, bridges, fords and hardened overflow areas should be installed so the road crossing does not significantly impact fish migration.

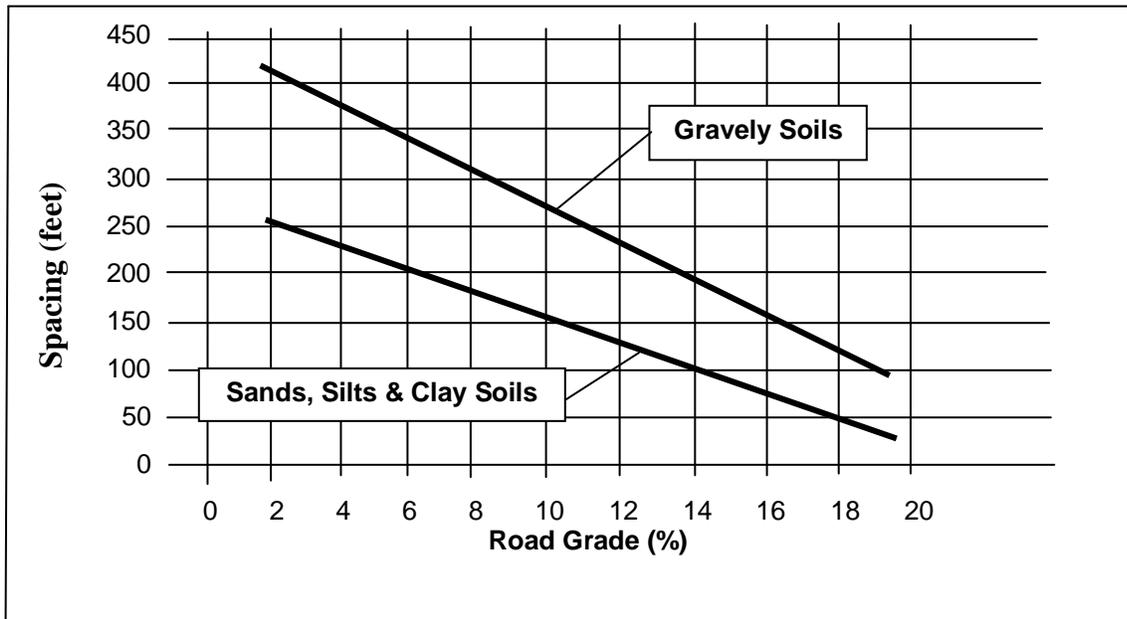
Roadside ditches shall be adequate to provide surface drainage for the roadway and deep enough, as needed to serve as outlets for subsurface drainage. At a minimum, the roadside ditch shall be 1.0 foot below the top of road surface to provide internal drainage. Ditch channels shall be designed to be on stable grades or protected with structures or linings for stability.

Water-breaks, water-bars, diversions or broad based dips may be used to control surface runoff on low-intensity use forest, ranch or similar roads. On steep grades where runoff and erosion is anticipated down the road, water bars should be considered. Water bars must be constructed of materials that are compatible with the use and maintenance of the road surface. Water bar discharge areas must be well vegetated or have other erosion resistant materials. See Figure 1- Recommended Spacing of Relief Culverts and Water Bars Based on Soil Type.

Surface crowning can also help direct road runoff into the side drainage ditches. Unobstructed flow into the ditches must be maintained to prevent flows from causing roadside erosion. Provide a turnaround at the end of dead end roads. In some areas, turnarounds may also be desirable for stream, lake, recreation, or other access purposes.

Provide parking space as needed to keep vehicles off the road or from being parked in undesirable locations.

**Figure 1. Recommended Spacing of Relief Culverts and Water Bars Based on Soil Types**



**Surfacing.** Access roads shall be given a wearing course or surface treatment if required by traffic needs, soil, climate, erosion control, or particulate matter emission control. The type of treatment, if needed, 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. On weak bearing capacity soils such as silts, organics, and clays, the surface treatment should be underlain with a geotextile material specifically designed for road stabilization applications when the road is used on a regular basis.

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

Toxic and 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 after considering potential impacts on stabilizing vegetation.

Utilize additional conservation practices to reduce the potential for generation and transport of particulate matter emissions.

**Construction Operations.** Construction operations should be carried out in such a manner that erosion and air and water pollution are minimized and held within legal limits. Construction shall include the following requirements as necessary 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. Grading, sub-grade preparation, and compaction shall be done as needed.
4. Surfacing shall be done as needed.
5. Measures must be in place to limit the generation of particulate matter during construction.

**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 or as required by local regulations.

**Erosion Control.** If soil and climatic conditions are favorable, road-banks 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 (see Critical Area Planting-342). If the use of vegetation is precluded and protection against erosion is needed, protection shall be provided by non-vegetative materials, such as gravel or other organic or inorganic material (see Mulching 484), or in accordance with local regulations.

Roadside channels, cross drains, and drainage structure inlets and outlets shall be designed to be stable (see Structure for Water Control). If protection is needed, riprap or other similar materials shall be used.

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

### **Investigations, Surveys and Design**

**Criteria.** Documentation requirements will be as outlined below, in addition to the documentation requirements of the practice components used in the system.

*Make a preliminary site assessment or investigation to determine the approximate alignment or location, the appropriate surface treatment to meet the planned use and purpose(s) and may include the following:*

1. *The need, type and location for water control or drainage structures.*
2. *Soil or geological investigation to determine soil conditions and topography along the proposed alignment to design the road*

*foundation. Documentation may include the following:*

- a. *Classification by the Unified Soil Classification System (SM, CL, etc.) and texture (silty sand, lean clay, etc.);*
- b. *Corrosion potential or conditions (metal pipe), resistivity readings or published data, if applicable.*
3. *Verify appropriate state or local laws for permitting and approval requirements and notify landowner of his/her responsibilities.*
4. *Verification or certification of used materials (if any).*

*To adequately plan and layout this practice, a detailed topographic survey is required, that adequately details:*

1. *Site topography, as needed to show the physical features of the site, including existing features/practices, ground elevations, location of any utilities or markers, etc.*
2. *Surveys shall be taken to determine the location, grades, length, cut and fill volumes, and drainage structures. As a minimum, the profile shall be taken along the proposed alignment with sufficient cross sections to determine earthwork quantities. All measurements for earthwork quantities will be performed by field surveys.*
3. *A permanent benchmark(s) shall be set and described. Preferably, the elevations and coordinates should be based on a local (assumed) or coordinate system (State or grid) and clearly stated on the plan. Datum may be in the form of Northing and Easting coordinates or Longitude and Latitude.*

*Design computations, calculations or analysis shall meet the following criteria:*

1. *Layout of the road, including width, length, side slopes, grade, type and thickness of surface materials (typical cross section).*
2. *Foundation requirements, subgrade preparation, cut/fill quantities, identify borrow materials and/or disposal areas.*
3. *Determine the drainage area(s) and hydrology/hydraulic conditions to size drainage culverts, roadside ditches, structural calculations for headwalls, etc.*
4. *Determine the location, size, length, and invert elevations for all drainage facilities.*
5. *Structural calculations for concrete headwalls,*

6. Prepare material and cost estimates, including earthwork quantities, vegetative components, etc.
7. Subsidiary and applicable components shall be designed in accordance with applicable conservation practice standards (i.e., structures shall meet the requirements of Conservation Practice 587, Structure for Water Control, etc.).

**Installation and Basis of Acceptance.** For construction that does not meet State, OSHA, or Tribal criteria or requirements where deficient construction materials were used, NRCS may consider a waiver request for approval of construction after it has received a signed and sealed construction and/or material exemption from a licensed engineer. Required exemption shall be for installation of materials that do not meet minimum quality criteria as found in applicable Standards, Specifications, ASTM's, AWWA standards, etc.

## CONSIDERATIONS

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

When available, consider using organic biodegradable materials as a surface treatment.

Access roads should be located where minimal adverse impacts will affect wetlands, water-bodies wildlife habitat, and air quality. Consideration should be given to the following:

- Effects on downstream flows or aquifers that would affect other water uses or users.
- Effects on the volume and timing of downstream flow to prohibit undesirable environmental, social, or economic effects.
- Short-term and construction-related effects of this practice on the quality of on-site downstream water courses.
- Overall effects on erosion and the movement of sediment, pathogens, and soluble and sediment-attached substances that would be carried by runoff from construction activities.
- Effects on wetlands and water-related wildlife habitats that would be associated with the practice.

- Establishing vegetation on road shoulders wider than the 2-4 feet.
- Limiting the number of vehicles and vehicle speed will reduce the potential for generation of particulate matter and decrease safety and air quality concerns.

*Design alternatives presented to the client should address economics, ecological concerns and acceptable level of risk for design criteria as it relates to hazards to life or property.*

## PLANS AND SPECIFICATIONS

*Use Arizona drawing templates to the extent possible. These may be supplemented by additional drawings or specification notes on the drawings to provide full installation instructions.*

*Construction plans shall include all components needed for the safe operation of the proposed improvements such as railing, fencing, or warning signs as appropriate. The plans shall address operations near existing utilities, trench excavations and any other items related to construction of the structure that may pose a safety risk to those involved.*

*Development of plans and specifications for constructing access roads will be guided by the National Engineering Handbook, Part 650, the Engineering Field Handbook, Chapter 5, and shall be in accordance with the National Engineering Manual, Parts 541 and 542, and shall be in keeping with this standard, prepared for each specific site and shall describe the requirements for applying the practice to achieve its intended purpose. As a minimum this shall include the following:*

- *Project location map, including section, township and range, North arrow, cooperator/owner acknowledgement and certification signature blocks, engineering job class (cover sheet);*
- *References that the owner/cooperator are responsible for all permits, rights-of-way, easements and the contact, coordination and location determination of any existing utilities or clearances (buried utility disclaimer);*
- *If applicable, a map showing the location of the practice(s) or system in reference to a known or established benchmark or reference point with the location, description and elevation*

clearly shown. Topographical features and/or controls shall be shown, showing tie in with existing or other planned practices;

- Field surveys and notes, soil investigations or geologic soil boring locations and soil classifications, earthwork or material estimates/quantities (borrow materials or disposal area);
- A plan or system overview of the layout (alignment, stationing, topographical features, reference to existing or proposed features or facilities, etc.) of the proposed road, including drainage structures or facilities; construction and installation criteria, including State and Federal [OSHA] safety requirements [safety features for trenches, if applicable], vegetative requirements on slopes and shoulders;
- Profile view and cross sections, showing road width, length, and grade; foundation or subgrade preparation and requirements; type and thickness of surfacing materials; cut/fill sections and shoulder side slopes; earthfill compaction methods;
- Location, size, type, length and invert elevations of all water control facilities or drainage features (culverts, headwalls, geotextile, rock, etc.), as required, for proper system functionality;
- Use Arizona Construction and Material Specifications for each item of work and material, as applicable and available. Additional specifications may need to be written to provide full material and installation instructions. Fill in blanks and add or delete items from the specifications to make them fit the job as needed.

All designs completed by non-NRCS personal shall meet minimum State licensing board requirements and NRCS requirements and criteria as outlined in the General Manual, the National Engineering Manual (including Arizona Supplements), and the National Engineering Handbook.

ONCE ALL PARTIES HAVE ACCEPTED AND SIGNED THE PLANS AND SPECIFICATIONS, NO CHANGES SHALL BE MADE TO THE DRAWINGS OR SPECIFICATIONS WITHOUT PRIOR APPROVAL OF NRCS.

## OPERATION AND MAINTENANCE

The following actions shall be carried out to ensure that the practice functions as intended throughout its expected life. These actions include normal repetitive activities in the application and use of the practice (operation), and the repair and upkeep of the practice (maintenance). The practice will be inspected periodically, protected and restored as needed.

An operation and maintenance plan will be developed and carried out for the life of the practice:

1. Inspect culverts, roadside ditches, water bars and outlets after each major runoff event and restore flow capacity as needed.
2. Minimize the damage to vegetative buffers adjacent to the road when it is necessary to chemically treat the road surface to maintain erosion protection.
3. Maintain vegetated areas in adequate cover to meet the intended purpose(s).
4. Fill low areas in travel treads and re-grade, as needed, to maintain road cross section.
5. Inspect roads with water-bars periodically to insure proper cross section is available and outlets are stable.
6. Conservation practices that limit particulate matter emissions should be incorporated into long term maintenance plans.
7. Prevent surface ponding by grading to remove depressions.
8. Eradicate or otherwise remove all rodents or burrowing animals that have or may potentially damage any part of the delivery or application facilities. Immediately repair any damage caused by their activity;
9. Immediately repair any damage resulting from vandalism, vehicles, livestock or wildlife;

## REFERENCES

- USDA-Natural Resources Conservation Service, National Engineering Manual, 2<sup>nd</sup> Edition
- National Engineering Handbook - Part 650, Engineering Field Handbook, Chapter 1 – Engineering Surveys; Chapter 2 – Hydrology; Chapter 3 – Hydraulics; Chapter 4 – Elementary

*Soils Engineering; Chapter 5 – Preparation of Engineering Plans; Chapter 12 – Springs and Wells; Chapter 6 – Structures; and Chapter 17 – Construction & Construction Materials*

- *NRCS, National Engineering Handbook (NEH), Part 531 – Geology*
- *USDA-NRCS, TR-62 – Engineering Layout, Notes, Staking and Calculations;*
- *National Environmental Compliance Handbook*
- *General Manual, Title 420-Part 401, Title 450-Part 401, Title 190-Parts 410.22 and 410.26*
- *National Planning Procedures Handbook*