



**Natural Resources Conservation Service**  
**CONSERVATION PRACTICE STANDARD**  
**HEAVY USE AREA PROTECTION**  
**CODE 561**  
**(sf)**

**DEFINITION**

Stabilization or protection of an intensively used area.

**PURPOSE**

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

- Reduce soil erosion
- Provide a stable, noneroding surface for areas frequently used by animals, people, or vehicles
- Protect or improve water quality

**CONDITIONS WHERE PRACTICE APPLIES**

This practice applies to all land uses where a frequently or intensively used area requires relocation or treatment to address one or more resource concerns.

**CRITERIA**

**General Criteria Applicable to All Purposes**

All planned work must comply with Federal, State, Tribal, and local laws and permit regulations.

**Design load**

Base the design load on the type and frequency of traffic (vehicular, animal, or human) anticipated on the heavy use area.

**Foundation**

Evaluate the site foundation to ensure that the presumptive bearing capacity of the soil meets the intended design load and frequency of use for the anticipated climate conditions. Prepare the foundation by removal and disposal of materials that are not adequate to support the design loads.

Use a base course of gravel, crushed stone, other suitable material, geotextile, or a combination of materials on all sites that need increased load-bearing strength, drainage, separation of material, and soil reinforcement. Refer to NRCS Technical Note (Title 210), Design Engineering, Design Note 24, "Guide for the Use of Geotextiles," or other State-approved reference for geotextile.

**Surface treatment**

Select a surface treatment that is stable and appropriate to the purpose of the heavy use area. Use concrete, bituminous concrete pavement, cementitious materials, mulches, aggregates, geotextiles, or a combination of materials to prevent punching or rutting failure in a heavy use area. Surface treatments must meet the following requirements according to the material used.

**Heavy use areas comprised of smooth surfaces including concrete, bituminous concrete, or other cementitious materials shall not exceed the maximum slopes for the following conditions:**

**Table 1: Maximum Slopes for Smooth Surfaces**

<b>Heavy Use Area Function</b>	<b>Maximum Slope</b>
<b>Cattle Access/Use (Barnyards or Walkways)</b>	<b>20H : 1V ( 5.0%)</b>
<b>Skidsteer Access (Ramp)</b>	<b>5H : 1V (20.0%)</b>
<b>Vehicular/Equipment Access (Ramp)</b>	<b>10H : 1V (10.0%)</b>
<b>No Access (Runoff)</b>	<b>2H : 1V (50.0%)</b>

#### Concrete

Design concrete structures and slabs-on-ground in accordance with NRCS National Engineering Manual (NEM) (Title 210), Part 536, "Structural Engineering."

#### Bituminous concrete pavement

Refer to the American Association of State Highway and Transportation Officials (AASHTO) "Guide for Design of Pavement Structures" or the applicable State highway department's specification for design criteria for bituminous concrete paving.

In lieu of a site-specific design for areas that will be subject to light use, pave with a minimum of 4 inches of compacted bituminous concrete over a subgrade of at least 4 inches of well-compacted gravel. Use bituminous concrete mixtures commonly used for road paving in the area.

#### Other cementitious materials

Cementitious materials such as soil cement, agricultural lime, roller-compacted concrete, and coal combustion byproducts (flue gas desulphurization sludge and fly ash) can be used to provide a durable, stable surfacing material. Based on the properties of the surface material, develop a site-specific mix design with compressive strengths necessary for the expected use and loading on the heavy use area. Select materials that are nontoxic and that have chemical properties that are compatible with the intended use.

#### Aggregate

Design aggregate surfaces for expected wear and intended use. In lieu of a site-specific design for areas that will be subject to light nonvehicular use, install a minimum combined thickness for aggregate surfacing and base course of 6 inches for animals and 4 inches for other applications.

For other applications, use NRCS Technical Note (Title 210), Agricultural and Biological Engineering, Agricultural Engineering Technical Note 4, "Earth and Aggregate Surfacing Design Guide," or other appropriate methodology to design aggregate thickness.

#### Mulches

Use a minimum layer thickness of 6 inches for materials such as limestone screenings, cinders, tanbark, bark mulch, brick chips, or shredded rubber. Mulches are not recommended for livestock or vehicular applications.

#### Vegetation

Use vegetative measures only on areas where traffic can be managed so the vegetative cover can be maintained. Select grass species or other plant materials that are wear resistant, have fast recovery from heavy use, and are suitable to the site. Establish the vegetation in accordance with the criteria in NRCS Conservation Practice Standard (CPS) Critical Area Planting (Code 342) or the appropriate State reference.

For heavy use areas managed as vegetated lots, provide an adequate number of lots in the system to allow the vegetation to be sustained by moving the animals. Establish a rotation that ensures the vegetated lot will be used only when vegetation has had time to recover between animal activities.

Other

Other materials can be used for surface treatment if they will serve the intended purpose and design life.

**Drainage**

Include provisions in the design for surface and subsurface drainage, as needed. Design positive grade in the planned direction of flow. Fill low areas that may contribute to subgrade instability or ground water contamination.

**Diversion of clean water**

To the extent possible, prevent surface water from entering the heavy use area. Refer to NRCS CPSs Diversion (Code 362), Underground Outlet (Code 620), Roofs and Covers (Code 367), Roof Runoff Structure (Code 558), or other appropriate CPSs for drainage control.

**Stabilization and erosion control**

Stabilize all areas disturbed by construction as soon as possible after construction. Refer to the criteria in NRCS CPS Critical Area Planting (Code 342) for establishment of vegetation. If vegetation is not appropriate for the site, use the criteria in NRCS CPS Mulching (Code 484) to stabilize the disturbed area.

**Water quality**

If there is the potential for ground water contamination from the heavy use area, select another site or provide an impervious surface to reduce infiltration of pollutants.

For heavy use areas with surface water quality concerns, relocate the site or make provisions to collect, store, treat, or utilize contaminated surface runoff from the heavy use area. Include provisions to address runoff without causing erosion or water quality impairment. Use NRCS CPSs Waste Transfer (Code 634), Vegetated Treatment Area (Code 635), Critical Area Planting (Code 342), Fence (Code 382), Prescribed Grazing (Code 528), Filter Strip (Code 393), Access Control (Code 472), or other similar CPSs as supporting practices, when needed.

**Recreation**

Address accessibility requirements for new construction and when existing facilities are being altered. The Americans with Disabilities Act of 1990 (ADA) requires recreation areas that are used by the public to be accessible to people with disabilities.

**Additional Criteria for Livestock Heavy Use Areas****Sizing and confinement**

*The recommended size of a paved livestock heavy use area shall not exceed 50 square feet per animal unit. This area will allow room for bale feeders, feed bunks, water facilities, as well as sufficient room for livestock to feed and exercise. Fencing shall be installed to confine the livestock to the barnyard. Fencing shall be installed in accordance with NRCS CPS Fence (Code 382).*

**Drainage**

*Where possible, roof runoff structures shall be installed to divert roof runoff away from barnyards. Roof runoff practices shall be installed in accordance with NRCS CPS Roof Runoff Structure (Code 558).*

*Where it is economically practical, a roof may be installed over a barnyard to divert precipitation away. The roof and supporting structure shall be designed and installed in accordance with NRCS CPS Roofs and Covers (Code 367).*

*Curbing shall be installed in barnyards in order to:*

- *Aid in scraping and removal of manure from the barnyard*
- *Divert clean runoff water away from the barnyard*
- *Divert manure laden runoff to a waste storage facility.*

***Minimum curb height shall be 12 inches. Where the curb is used to aid scraping equipment to remove manure from the barnyard, minimum curb height shall be increased to 24 inches.***

#### **Water quality**

***To minimize contamination to streams, barnyards and other livestock concentration areas shall be located outside the 25-year floodplain. Separation distances shall be such that prevailing wind and landscape elements (buildings arrangement, landforms, vegetation, etc) minimize odor and protect aesthetic values.***

***Springs, wells, and other on-farm potable water sources shall be located as far from the barnyard and other concentrated livestock areas as possible. Livestock heavy use areas shall not be installed closer than 200 ft to neighboring wells and potable water sources.***

#### **CONSIDERATIONS**

Heavy use areas can have a significant impact on adjoining land uses. These impacts can be environmental, visual, and cultural. Select a treatment that is compatible with adjoining areas. Consider such things as proximity to neighbors and the land use where the stabilization will take place.

Vegetated heavy use areas may need additional materials such as geogrids or other reinforcing techniques or planned periods of rest and recovery to ensure that vegetative stabilization will succeed.

Consider the safety of the users during the design. Avoid slippery surfaces, sharp corners, or surfaces and structures that might entrap users. For heavy use areas used by animals, avoid the use of angular aggregates that might injure livestock. When concrete is used for livestock imprint or texture concrete to provide traction in wet or freezing conditions.

Paving or otherwise reducing the permeability of the heavily used area can reduce infiltration and increase surface runoff. Depending on the size of the heavy use area, this can have an impact on the water budget of the surrounding area. Consider the effects to ground and surface water.

Consider the effects on improved animal health from the installation of heavy use area protection on muddy sites. Mud transmits bacterial and fungal diseases and provides a breeding ground for flies. Hoof suction makes it difficult for cattle to move around in muddy areas. In addition, mud negates the insulation value of hair coat and the animals must use more energy to keep warm. As temperatures fall, animal bunching may occur, which can reduce or eliminate vegetative cover and lead to erosion and water quality concerns.

To reduce the negative water quality impact of heavy use areas, consider locating them as far as possible from water bodies or water courses. In some cases, this may require relocating the heavily used area rather than just armoring an area that is already in use.

To the extent possible, maintain a 2-foot separation distance between the bottom of the surface material and the seasonal high water table or bedrock. ***The water table may be lowered by using subsurface drainage. If necessary, blasting of bedrock may take place only with the approval of the State Conservation Engineer.***

To reduce the potential for air quality problems from particulate matter associated with a heavy use area, consider the use of NRCS CPSs Windbreak/Shelterbelt Establishment (Code 380), Herbaceous Wind Barriers (Code 603), Dust Control from Animal Activity on Open Lot Surfaces (Code 375), or Dust Control on Unpaved Roads and Surfaces (Code 373) to control dust from heavy use areas.

Consider ways to reduce the size of the heavy use area as much as possible. This may require changes in how the livestock are managed but in the long run may result in less maintenance and a more efficient operation.

Consider a concrete or other durable surface for areas that require frequent scraping.

## PLANS AND SPECIFICATIONS

Prepare plans and specifications that describe the requirements for installing the practice according to this standard. As a minimum, include—

- A plan view showing the location and extent of the practice. Include the location and distances to adjacent features and known utilities.
- Typical sections showing the type and required thickness of paving or stabilization materials.
- A grading plan, as needed.
- Where appropriate, plans for required structural details.
- Methods and materials used to stabilize areas disturbed by construction.
- Construction specifications with site-specific installation requirements.
- Vegetative establishment specifications, as applicable.

## OPERATION AND MAINTENANCE

Prepare an operation and maintenance (O&M) plan and review it with the operator prior to practice installation. The minimum requirements to be addressed in the O&M plan are—

- Periodic inspections—annually and immediately following significant rainfall events.
- Prompt repair or replacement of damaged components, especially surfaces that are subjected to wear or erosion.
- Requirements for the regular removal and management of manure, as needed, for livestock heavy use areas.
- Restricted uses, as needed, to protect the stand and to allow vegetative recovery for vegetated heavy use areas.

## REFERENCES

American Concrete Institute. 2010. Guide to Design of Slabs-on-Ground. ACI 360R-10. Farmington Hills, MI.

American Concrete Institute. 2008. Guide for the Design and Construction of Concrete Parking Lots. ACI 330R-08. Farmington Hills, MI.

American Concrete Institute. 2006. Code Requirements for Environmental Concrete Structures. ACI 350-06, Appendix H, Slabs on Soil. Farmington Hills, MI.

American Association of State Highway and Transportation Officials. 1993. AASHTO Guide for Design of Pavement Structures. Washington, D.C.

Korcak, R.F. 1998. Agricultural Uses of Coal Combustion Byproducts. *In* R.J. Wright, et al. (eds.). Agricultural Uses of Municipal, Animal, and Industrial Byproducts. USDA-ARS, Conservation Research Report 44, pp. 103-119.

USDA NRCS. 1991. Technical Note (Title 210) Design Engineering, Design Note 24, Guide for the Use of Geotextiles. Washington, D.C. <https://directives.sc.egov.usda.gov/>

USDA NRCS. 2017. Technical Note (Title 210) Agricultural and Biological Engineering, Agricultural Engineering Technical Note 4, Earth and Aggregate Surfacing Design Guide. Washington, D.C. <https://directives.sc.egov.usda.gov/>

USDA NRCS. 2017. National Engineering Manual (Title 210), Part 536, Structural Engineering. Washington D.C <https://directives.sc.egov.usda.gov/>