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.

Concrete

Design concrete structures and slabs-on-ground in accordance with NRCS National Engineering Manual (NEM) (Title 210), Part 536, “Structural Engineering.” Concrete slabs will have a minimum thickness of five inches underlain by a subgrade of four inches of gravel.

Bituminous concrete pavement

Refer to the American Association of State Highway and Transportation Officials (AASHTO) “Guide for Design of Pavement Structures” or the Virginia Department of Transportation’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 Virginia Plant Establishment Guide.

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) or the Virginia Plant Establishment Guide 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
Include other practices to collect, store, utilize, or treat manure and contaminated runoff where contaminated runoff will cause a resource concern. Design and install these practices in accordance with the operation's Agricultural Waste Management System Plan.

Use Virginia Technical Note – Water Quality #1, Risk Assessment of Water Impairment from Animal Concentration Areas, to evaluate the site for water quality concerns prior to the construction of an HUA for livestock.

Design the HUA in accordance with Virginia Engineering Design Note 561 – Heavy Use Area Protection. Animal waste storage facilities built in conjunction with a HUA will meet the minimum separation distances listed in Virginia Engineering Design Note 2 – Separation Distances for Animal Waste Facilities. A HUA used for storage of animal waste will also meet the noted separation distances.

Loafing Lot Management
A loafing lot management system will consist of three or more HUA grassed paddocks and a sacrifice area. All of the resource concerns associated with the HUA will be addressed. The sacrifice area will be used during times when the vegetation in the paddocks could be damaged by the animals.

Use the 561 VA Implementation Requirements (IR) to document the design and producer requirements.

If the grassed paddocks are not located immediately downslope of the unroofed sacrifice area where they can serve as a filter, use CPS Filter Strip (Code 393) to establish and maintain a vegetated filter strip between the sacrifice area and waterbodies, drainageways, or sensitive areas.

Maintain a minimum 35-foot vegetated buffer between grassed paddocks and any surface water or drainageway unless the runoff is collected and managed.

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.

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) or Herbaceous Wind Barriers (Code 603) 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 for Heavy Use Area Protection that describe the requirements for installing the practice according to this standard.

Record all required information in an engineer field book, on a plan sheet or design sheet, or in another appropriate location. As a minimum, include:

DESIGN DATA

- Completed Environmental Evaluation and subsequent requirements.
- Completed Virginia Technical Note – Water Quality #1, Risk Assessment of Water Impairment from Animal Concentration Areas, as appropriate.
- Soils investigation.
- Survey and plot data: profile, cross-sections, topography, as needed.
- Design computations, including purpose of practice and references used. Include:
    - Type and number of animals, people, and/or vehicles the Heavy Use Area will serve.
    - Where appropriate, plans for required structural details.
    - Design of *Waste Storage Facility (Code 313)* and other components if required by Agricultural

Waste Management System Plan.

- Description of surface treatment (with material description). Include references to plans or components supplied by others.
- Runoff treatment design.

- Plan view of site with the location and extent of the practice. Show existing and planned features, including dimensions, distances, drainage structures, erosion control measures, known utilities, etc.
- Typical section(s) showing the type and required thickness of paving or stabilization materials. Include a grading plan, as needed.
- Standard Cover Sheet (VA-SO-100).
- Agricultural Waste Management System Plan describing type of treatment planned for waste storage and/or disposal if waste will be collected, stored, utilized, or treated.
- Materials and quantities needed. Identify borrow material and/or spoil area, as needed.
- Method and materials used to stabilize areas disturbed by construction. Include vegetation and/or ground cover requirements.
- Identification of needed Erosion & Sediment Control measures.
- Supplemental practices required.
- Virginia Conservation Practice Specifications (700 Series) with site-specific installation requirements.
- Operation and Maintenance Plan.

CHECK DATA

- As-built survey.
- As-built plans including dimensions, types and quantities of materials installed, and variations from design. Include justification for variations.
- Locations of appurtenant practices.
- Adequacy of vegetation and/or ground cover.
- Complete as-built section of Cover Sheet.

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.

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