NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

HEAVY USE AREA PROTECTION

(sq. ft.)

CODE 561

DEFINITION

Heavy Use Area Protection is used to stabilize a ground surface that is frequently and intensively used by people, animals, or vehicles.

PURPOSE

Heavy Use Area Protection is used:

- To provide a stable, non-eroding surface for areas frequently used by animals, people or vehicles
- To protect or improve water quality

CONDITIONS WHERE PRACTICE APPLIES

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

CRITERIA

General Criteria for All Purposes

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.

All loose, wet, organic, or other undesirable materials shall be removed to depths, widths, and lengths as required by the design. All waste materials shall be disposed of in designated areas.

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 Natural Resources Conservation Service (NRCS), National Engineering Handbook, Part 642; Design Note 24, Guide for Use of Geotextiles; or other State-approved reference for geotextile selection.

If there is the potential for ground water contamination from the heavy use area, select another site or provide an impervious barrier. Make provisions to treat contaminated surface runoff from the impervious area.

Filter fabric. A non-woven geotextile fabric shall be installed under all treatment areas unless foundation is on rock. The geotextile fabric will be placed in the toe trenches of watering ramps. A minimum 12-in. overlap shall be used at all joints. The fabric should be held in place with metal staples provided by the manufacturer. Staples are generally laced every 5 feet within the fabric surface and 3 feet along overlaps. Stone is then placed on the geotextile fabric. Construction equipment should not operate directly on the fabric surface.

NRCS, Mississippi

October 2015

REQUIRMENTS FOR

NON-WOVEN GEOTEXTILE

Property	Test Method	Minimum
Tensile	Grab Test 120lbs. ASTM D 4632	Strength
Puncture	ASTM D 4833	60 lbs.

Surface Treatment. Select a surface treatment that is stable and appropriate to the purpose of the heavy use area. Surface treatments must meet the following requirements according to the material used.

Concrete. Design slabs-on-ground subject to distributed stationary loads, light vehicular traffic, or infrequent use by heavy trucks or agricultural equipment in accordance with American Concrete Institute (ACI) *Guide for the Design and Construction of Concrete Parking Lots (ACI 330R)*. Design slabs-on-ground subject to regular or frequent heavy truck or heavy agricultural equipment traffic in accordance with ACI *Guide to Design of Slabs-on-Ground (ACI 360R).* Design liquid-tight slabs in accordance with ACI *Code Requirements for Environmental Concrete Structures, Slabs-on-Soil (ACI 350, Appendix H).*

Design concrete structures in accordance with NRCS National Engineering Manual (NEM), Part 536, *Structural Engineering*.

Bituminous Concrete Pavement. Refer to 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 by-products (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 non-toxic 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 non-vehicular use, install a minimum combined thickness for aggregate surfacing and base course of 6 inches for livestock and 4 inches for other applications.

Surface materials for livestock paddock areas shall be crusher run stone, or graded stone as conditions warrant, with a maximum size of 2 inches. All surface material shall be smoothed uniformly and compacted.

For other applications, use Agricultural Engineering 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. Select vegetation that can withstand the intended use. Establish the vegetation in accordance with the criteria in NRCS CPS *Critical Area Planting (Code 342)* or the appropriate State reference.

Drainage and Erosion Control. Include provisions in the design for surface and subsurface drainage, as needed. Include provisions for disposal of runoff without causing erosion or water quality impairment. To the extent possible, prevent surface water from entering the heavy use area.

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.

Additional Criteria for Livestock Heavy Use Areas

For areas such as watering troughs, portable hay rings, feeding troughs, or mineral boxes, the treatment area shall extend a minimum of 10 ft. outside the limits of the facility.

For walkways the minimum treatment width shall be 8 ft. (cattle only). A width of 15 ft. is generally used for cattle/vehicles type walkways. All walkways shall be fenced.

For loafing areas the following shall apply:

Animal	Minimum treatment area per animal (ft. sq.)
Diary Cattle	200
Beef Cattle	150
Horse	150
Sheep & Goats	10

Treatment areas for watering ramps shall have a minimum bottom width of 10 ft. and a maximum bottom width of 20 feet. Ramps shall have a slope of 5 to 1 or flatter toward the stream with side slopes of 2.5 to 1 or flatter. Protection for watering ramps shall extend into the pond or stream to protect the pond or stream bottom.

Include other practices to collect, store, utilize, or treat manure and contaminated runoff where contaminated runoff will cause a resource concern.

Additional Criteria for Recreation Areas

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

Fencing. Fencing shall be installed as necessary to control all animal traffic. Watering ramps shall be permanently fenced to prevent livestock access to the stream or pond except at the access ramps. Fencing shall be built in accordance with Conservation Practice Standard - Fence (382).

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 livestock avoid the use of sharp aggregates that might injure livestock.

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.

Installation of heavy use area protection on muddy sites can improve animal health. 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 waterbodies 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 CPS *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.

For areas that will need to be cleaned frequently by scraping, loose aggregate or other non-cementitious materials may not be the best choice. Consider a more durable surface such as concrete.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for Heavy Use Area Protection that describe the requirements for installing the practice according to this standard. As a minimum the plans and specifications shall include:

1. A plan view showing the location and extent of the practice. Include the location and distances to adjacent features and known utilities.
2. Typical section(s) showing the type and required thickness of paving or stabilization materials.
3. A grading plan, as needed.
4. Where appropriate, plans for required structural details.
5. Method and materials used to stabilize areas disturbed by construction.
6. Construction specifications with site specific installation requirements.

OPERATION AND MAINTENANCE

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

1. Periodic inspections – annually and immediately following significant rainfall events.
2. Prompt repair or replacement of damaged components especially surfaces that are subjected to wear or erosion.
3. For livestock heavy use areas, include requirements for the regular removal and management of manure, as needed.
4. For vegetated heavy use areas, restrict use as needed to protect the stand and to allow vegetative recovery.

REFERENCES

American Concrete Institute. 2006. Design of Slabs-on-Ground. ACI Standard 360R-06. Farmington Hills, MI.

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

USDA-Natural Resources Conservation Service. 2014. Agricultural Engineering Note 4, *Earth and Aggregate Surfacing Design Guide*, Washington, DC.

Natural Resources Conservation Service
Construction Specifications

HEAVY USE AREA PROTECTION

1. SCOPE

This item shall include all plans, specifications, construction operations, and vegetation required for the installation of heavy use areas. Construction operations shall be done in such a manner that soil erosion and air, water, and noise pollution will be minimized and held within legal limits as specified by state regulations.

2. CLEARING AND GRUBBING

All trees, stumps, roots, brush, weeds, and other objectionable material will be removed from the work area as required for proper installation of the planned and designed measure. Disposal shall be by burning, burying at approved locations, or removing from the site and stacking. All burning shall conform to state laws and regulations.

3. CONSTRUCTION

Where surface treatment of the area is required, prescribed construction procedures shall be followed.

If subgrade is required, it shall be brought to the required elevations by the removal of unsuitable material and by necessary grading, filling, and leveling. The subgrade surface shall be compacted according to design specifications. All soft spots discovered during compaction operations will be removed and replaced with suitable material.

After subgrade preparation in urban and recreational areas, the base course will be laid, mixed as necessary to provide a pulverized, homogeneous mixture, and thoroughly compacted, first with a sheepsfoot roller and then with a rubber-tired or pneumatic-tired roller.

Geotextile will be non-woven type of the grade specified and installed according to manufacturer's or design specifications. Equipment will not be allowed to operate directly on top of the geotextile fabric without a cushion of gravel or stone.

4. PROTECTION

Vegetation or heavy use area treatment shall be applied as shown in the plans and specifications. Vegetation will include seedbed preparation, liming, fertilizing, seeding, and either mulching or netting when needed and specified.