

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

HEAVY USE AREA PROTECTION

(Ac.)

CODE 561

DEFINITION

The stabilization of areas frequently and intensively used by people, animals or vehicles by establishing vegetative cover, surfacing with suitable materials, and/or installing needed structures.

PURPOSE

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

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to agricultural, urban, recreational and other frequently and/or intensively used areas requiring treatment to address one or more resource concerns.

CRITERIA

Legal Criteria

All planned activities shall comply with all Federal, state and local laws, rules and regulations. Impact to cultural resources, wetlands and Federal and state protected species shall be evaluated and avoided or minimized to the extent practicable during planning, design and implementation of this conservation practice in accordance with established National and Georgia policy.

General Criteria Applicable to 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. Use a minimum design wheel load of

4000 pounds for areas that support vehicular traffic.

Foundation. Evaluate all site foundations for soil moisture, permeability, texture and bearing strength based on the design load and planned frequency of use.

Where necessary, prepare the foundation by removal and disposal of materials that are not adequate to support the design loads. Remove all loose, wet, organic or other unsuitable materials to the depths, widths and lengths required by the design. Dispose of waste materials in designated areas.

Use a base course of gravel, crushed stone, other suitable material and/or geotextile on all sites that need increased load bearing strength, drainage, separation of material and soil reinforcement. Refer to Table 3 for geotextile requirements.

On sites with porous foundations (high permeability rate), with a need to protect ground water from contamination, provide an impervious barrier.

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 the thickness and compressive strength of concrete according to the expected loading and use. In lieu of a site specific design, for areas that will be subject to light use, pave with a minimum of 4 inches of concrete over a subgrade of adequate bearing capacity. For installations where it is necessary to limit the permeability of the concrete, refer to GA NRCS Conservation Practice Standard, Waste Storage Facility

(313) and ACI 360R-06, Design of Slabs-on-Ground, for design criteria for slabs on grade.

Bituminous Concrete Pavement. Refer to *AASHTO Guide for Design of Pavement Structures* or the Georgia Department of Transportation 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. Compact the surface with a heavy steel wheel roller until the bituminous concrete is thoroughly compacted and roller marks are eliminated.

Other Cementitious Materials. Other cementitious materials such as soil cement, 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. Develop site specific mix designs based on the properties of the material with compressive strengths necessary for the expected use and loading on the heavy use area.

Aggregate. Design fine or coarse aggregate surfaces at least 4-inches thick. If the surface will be compacted, choose a well graded aggregate. Use graded aggregate base meeting Georgia Department of Transportation Standards, graded stone or fine aggregate as surface treatments for areas such as watering facilities, hay rings, walkways, paddocks and loafing areas. Smooth and compact the surface material to a uniform grade.

Sprays and Artificial Mulches. When utilizing sprays of asphalt, oil, plastic, manufactured mulches, and similar materials, follow the manufacturer's recommendations for design requirements.

Other. Surfacing materials, such as limestone screenings, cinders, tanbark, bark mulch, brick chips, shredded rubber and/or sawdust, shall have a minimum layer thickness of 4 inches.

Structures. Design any structures associated with the heavy use area including roofs, according to appropriate GA NRCS standards,

if available; use National NRCS standards if GA NRCS standards are not available. Where NRCS standards do not exist, design structures according to the requirements of the particular construction material and accepted engineering practice. Base environmental design loads for buildings associated with heavy use areas on criteria in ASCE 7 - Minimum Design Loads for Buildings and Other Structures: ASCE/SEI 7-05.

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 runoff from entering the heavy use area. Shape the treatment area to prevent water from ponding on the heavy use area surface.

Vegetative Measures. Where appropriate, stabilize all areas disturbed by construction with vegetation as soon as possible after construction. Refer to GA NRCS Conservation Practice Standard, Critical Area Planting (342). If vegetation is not appropriate for the site, use other measures to stabilize the area.

Additional Criteria for Livestock Heavy Use Areas

The treated area can include all areas where livestock congregate and cause surface stability problems. This includes feeding areas, portable hay rings, watering facilities, feeding troughs, mineral boxes and other facilities where livestock concentrations cause resource concerns.

Use GA NRCS Conservation Practice Standards Waste Transfer (No.) (634), Critical Area Planting (342), Fencing (382), Prescribed Grazing (528), Filter Strip (393), Vegetated Treatment Area (635), Access Control (472) or other similar standards as companion practices, when needed to meet the intended purpose of the heavy use area protection.

Include provisions in the design of the heavy use area to collect, store, utilize and/or treat manure and contaminated runoff.

Treatment Area. See Tables 1 and 2 for treatment area size requirements.

Watering Ramps. Only use water ramps in streams and ponds when no other practical livestock water source is available or can be reasonably developed. Install ramps with an entrance slope of 5:1 or flatter and side slopes of 2.5:1 or flatter. Install diversions or shape the top of the ramp to prevent surface water from entering the ramp.

Install ramps in streams perpendicular to stream flow where the streambed is stable. Construct a toe trench on the upstream and downstream edges of ramps installed in streams. Extend ramps into the stream 5 feet or to the center of the stream, whichever is less.

Extend ramps installed into farm ponds far enough into the pond to insure livestock access to water during drought conditions.

Fencing. Install fencing as necessary to control all animal traffic. Fence all walkways unless special conditions exist. Install permanent fencing at watering ramps to restrict livestock access to the water source to only the ramp location. Install all fence in accordance with GA NRCS Conservation Practice Standard, Fence (382).

Geotextile. Install woven or non-woven geotextile, meeting the material requirements listed in Table 3, under all treatment areas using 4" rock unless the foundation is rock.

Place the geotextile in the toe trenches of watering ramps. Backlap the geotextile over the trench in the upstream toe of watering ramps placed in streams. Use a minimum 12-inch overlap at all joints.

Surface Treatment. Use graded aggregate base meeting Georgia Department of Transportation Standards, graded stone, fine aggregate, or concrete as surface treatments for areas such as watering facilities, hay rings, walkways, paddocks and loafing areas. Smooth and compact the surface material to a uniform grade. Install surface material a minimum of 4 inches thick.

Use rock riprap, graded stone, or surge stone as surface treatment for watering ramps. Determine the rock size to be used for water ramps in streams using stream velocities and soil conditions at the site. Determine the

design velocity using the 2-year, 24-hour storm event.

Additional Criteria for Recreation Areas

Heavy use protection in recreation areas that are accessible to the public must meet the requirements of the Americans with Disabilities Act.

CONSIDERATIONS

Heavy use areas can have a significant impact on adjoining land uses. These impacts can be environmental, visual and cultural. Care should be taken when selecting the type of treatment to ensure that it is compatible with adjoining areas. Consider such things as proximity to neighbors, utilities, cultural resources, environmentally sensitive areas, the slope of the land and distance between the heavy use area and any nearby water body/water course, and the land use where the stabilization will take place. Stabilization techniques used in a cattle feeding area may not be appropriate for a recreation area.

By its very nature, a heavy use area will be subject to intensive use. If vegetation will be part of the stabilization technique, consider the durability of the vegetation. Choose plant species that can withstand the expected use. Additional techniques such as geogrids, other reinforcing techniques or planned periods of rest and recovery may need to be employed to ensure that vegetative stabilization will succeed.

Heavy use areas will be intensely used by animals, people or both. Consider the safety of the users both human and animal 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 hooves.

Heavy use area protection often involves paving or otherwise reducing the permeability of the heavily used area. This 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. During the planning and design, consider the effects to ground and surface water.

Heavy use areas are places where animals, people or vehicles are concentrated. The resulting manure, sediments, bacteria, petroleum products and trash that might accumulate on the heavy use area can result in degraded runoff water quality. During planning and design consider how these pollutants will be handled to reduce offsite impacts.

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.

Surface erosion can be a problem on large heavy use areas that do not use a hard surface such as concrete. In these cases the designer may need to include measures on the area that reduce the flow length of runoff to reduce erosion problems.

To reduce the potential for air quality problems from particulate matter associated with heavy use areas, consider the use of GA NRCS Conservation Practice Standard Windbreak/Shelterbelt Establishment (380), or National NRCS Conservation Practice Standard, Herbaceous Wind Barriers (603) or the use of palliative treatments such as lignosulfonate, synthetic polymers, organic oils, or chloride compounds to control dust from bare heavy use areas.

Heavy use areas for livestock can vary widely in size depending on how the operator manages his livestock. Because heavy use areas can be expensive to construct and maintain, a significant consideration should be 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.

Byproducts from coal fired power plants such as fly ash and sludge from scrubbers can vary significantly. Therefore, their toxicity and cementation characteristics should be known

to ensure they are compatible with the intended use.

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.
2. Where appropriate, cross-sections showing the type and required thickness of paving or stabilization materials.
3. Where appropriate, plans for required structural details.
4. Where appropriate, vegetation establishment requirements.
5. Construction specifications that describe in writing site specific installation requirements for the heavy use area protection.

OPERATION AND MAINTENANCE

Prepare an operation and maintenance (O&M) plan for the operator. The minimum requirements to be addressed in the O&M plan are:

1. Periodic inspections, especially 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.
4. Where vegetation is specified, periodic mowing, liming, fertilization and control of vegetation.

REFERENCES

- American Association of State Highway and Transportation Officials. 2006. Standard Specification for Geotextiles Used for Highway Applications. AASHTO Standard M288. Washington, DC.
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- American Concrete Institute. 2008. Building Code Requirements and Specifications for Masonry Structures. The Masonry Standards Joint Committee. Farmington Hills, MI.
- American Concrete Institute. 2006. Design of Slabs-on-Ground. ACI Standard 360R-06. Farmington Hills, MI.
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- American Institute of Steel Construction Inc. 2005. Steel Construction Manual, 13th Edition. Chicago, IL.
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- The Asphalt Institute. 1975. Full Depth Asphalt Pavement for Private Driveways, Construction Leaflet No. 11. Lexington, KY.
- 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.
- Portland Cement Association. 1970. Thickness for Soil Cement Pavements. Skokie, IL.
- USDA-Natural Resources Conservation Service. 2008. National Engineering Handbook, Part 642. Washington, DC.
- USDA-Natural Resources Conservation Service. 1991. Guide for the Use of Geotextiles, Design Note Number 24. Washington, DC.

TABLE 1 – MAXIMUM TREATMENT AREAS BASED ON ANIMAL TYPE (SQ. FT./ANIMAL)

TYPE AREA	DAIRY CATTLE	BEEF CATTLE	HORSE	SHEEP
Loafing Area	200	150	150	10
Holding Pen	20	20	20	
Crowding Pen	12	12	12	

TABLE 2 – SPECIFIED WIDTHS (FT)

TYPE AREA	MINIMUM DIMENSION FOR SMALL RUMINANTS	MINIMUM DIMENSION FOR ALL OTHER ANIMALS	NOTES
Watering Facilities	8	15	The dimension is measured from all edges of the facility or trough.
Feed Rings	8	15	The dimension is measured from all edges of the facility or feed ring.
	MINIMUM WIDTH	MAXIMUM WIDTH	
Walkways	8	15	Minimum width is for livestock only. Maximum width is for livestock/vehicles.
Watering Ramps	10	20	

Note: The dimension is measured from the edge of the structure to the edge of the Heavy Use Area.

TABLE 3 – GEOTEXTILE REQUIREMENTS

PROPERTY	TEST METHOD	MINIMUM REQUIREMENT
Tensile Strength	Grab Test – ASTM D 4632	180 lbs
Mullen Bursting Strength	Diaphragm Test – ASTM D 3786	320 psi
Puncture Test	ASTM D 4833	80 lbs