

**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.

Where necessary, 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 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.

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*.

Minimum design criteria shall meet the requirements of the Maine engineering standard drawings for Concrete Slabs on

Grade typically use for Heavy Use Areas, Waste Storage Facilities, and other concrete slab applications

Bituminous Concrete Pavement. Refer to the AASHTO Guide for Design of Pavement Structures or the applicable State highway department's specification for design criteria for bituminous concrete paving.

Follow ME-ENG-ASPHALT detail for asphalt pads that will be subject to heavy loading or frequent 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 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.

For surfaces with heavy equipment use, the Access Road criteria as per the Maine engineering standard drawing Access Road One Way Traffic; ME-ENG-AR1 shall be used to determine the minimum aggregate thickness.

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.

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

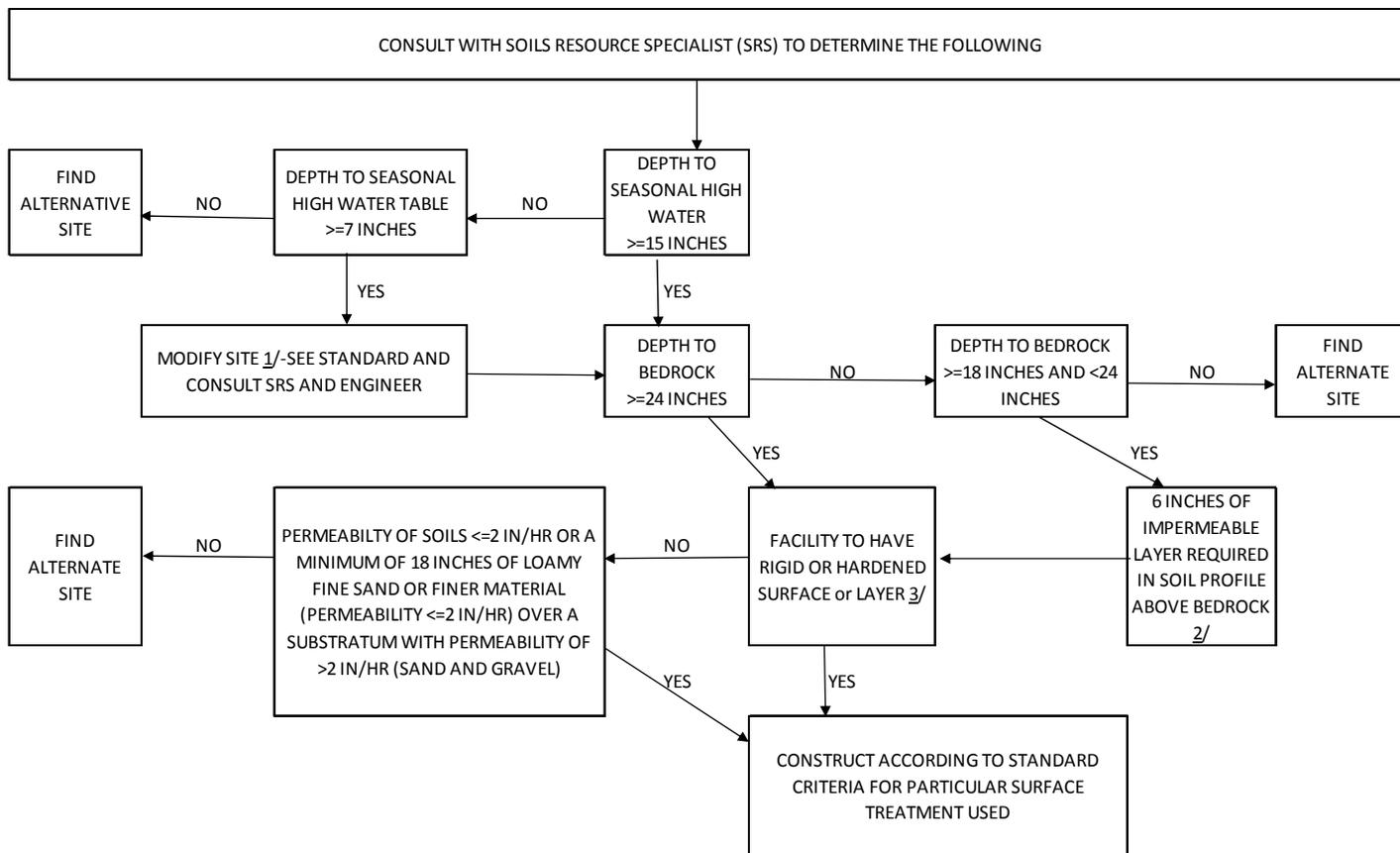
Structures. When a roof is needed to address the resource concern, use NRCS CPS *Roofs and Covers (Code 367)*. For non-waste applications, design structures according to the accepted engineering practice.

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.

Separation Distances. . Locate heavy use areas used by livestock, silage feed or cull potato storage on soils that are 24 inches over bedrock and 15 inches to seasonal high water table. For sites on the original ground surface the soil shall have a maximum permeability of 2 inches/hour in the C Horizon or a minimum of 18 inches of loamy fine sand or finer material with a permeability of ≤ 2 inches/hour over the C Horizon. Avoid placing heavy use areas on soils that are less than 18 inches to bedrock nor soils that are less than 7 inches to the seasonal high water table (hydric soils) or hydraulically restrictive layer. These separation distances and soils criteria are also shown in Figure 1. Soils that do not meet the criteria in Figure 1 can be modified. Possible modifications are listed in Figure 1.

Figure 1: Separation distances and soils criteria for areas utilized by livestock, silage feed and cull potatoes.



1/ - Modifications to the site to meet seasonal high water table separation distance criteria shall address buoyant forces, pond seepage and non-encroachment of the water table by contaminants. These modifications may include lowering the water table by the use of perimeter drains, building up the soil profile to increase the separation distance, or increasing setback distances from resource concerns.

2/ - Impermeable layer used to meet bedrock separation distance criteria shall use material such as clay, concrete, or other impermeable liners.

3/ - Typically concrete or asphalt surface.

Consult with a Soil Resource Specialist to locate proposed heavy use areas and determine any modifications needed to meet separation distances and soils criteria.

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.

The treated area shall extend an appropriate distance from facilities such as portable hay rings, water troughs, feeding troughs, mineral boxes and other facilities where livestock concentrations cause resource concerns.

The size of heavy use areas utilized by livestock is dependent on the landowner’s operation including type and number of animal, confinement periods, and/or the intended use. Heavy use protection areas should be kept as small as practicable.

Provisions shall be made to collect, store, utilize and/or treat manure accumulations and contaminated runoff in accordance with other NRCS conservation practice standards.

Roof structures can be used if no other practical or cost effective methods exist to address resource concerns associated with runoff from heavy use areas. Support documentation by a soil resource specialist and engineer or equivalent expertise is necessary to justify a roof. Rational shall be based on soil limitations and proximity to resource concerns.

Wall and curbs placement and height shall be based only on the structural needs of the heavy use area, roof, and management of the waste and runoff associated with the heavy use area.

NRCS conservation practice standards Critical Area Planting (342); Fencing (382); Prescribed Grazing (528); Vegetated Treatment Area (635); Roofs and Covers (367); or Use Exclusion (472) or any other pertinent practice

standard can be used as companion practices, when needed to meet the intended purpose of the heavy use area protection.

Evaluate the purpose of the barnyard and size according to Table 1. Larger areas shall be supported by adequate documentation. Additional space for feeding and watering facilities may be justified.

Table 1: Heavy Use Area Size			
Dairy			
Weight (lbs.)	250-400	>400-1000	>1000 - 1400
Paved Area (sf/head)	30 - 40	40 - 60	60 - 75
Beef			
Weights (lbs. or type)	Cow/Calf	600 - 1000	>1000
Paved Area (sf/head)	60 - 75	40 - 50	50 - 60
Horses			
Paved area, 60-80 SF per AU			
Sheep and Goats			
Paved area, 25-35 SF per head			
Swine			
Paved area, 20-50 SF per AU			
For All Animal Types			
Up to 100 SF per AU allowed for total confinement conditions			
Up to 20 SF per AU allowed for temporary holding areas			

Up to 500 SF per AU allowed for unpaved areas

Additional Criteria for Areas use for Silage Feed or Cull Potato Storage

Acceptable surface treatments for silage feed or cull potato storage facilities include an impervious soil barrier, bituminous pavement, or concrete.

The surface treatment area needed for silage feed or cull potato storage will be based on the area needed to collect and direct leachate to a transfer or storage facility. This could include the area occupied by the silage or cull potatoes and additional area needed for collection. The floor area occupied by the silage or cull potatoes is based on the needed storage volume for livestock being fed or the amount of potatoes stored. The additional area needed for collection is based on the collection, transfer, and storage methods and equipment used to handle the silage or cull potato leachate. Sites can be relocated if resource concerns can be more economically addressed. All leachate concerns will be addressed according to practice standard Waste Treatment (629). NRCS conservation practice standards Manure Transfer (634), Waste Storage Facility (313), Subsurface Drain (606), Vegetated Treatment Area (635), Diversion (362), or any other pertinent practice standard that can be used as companion practices may also apply to the collection and treatment of silage or cull potato leachate. Relocating the structure can be used where the high water table and bedrock separation distances cannot be met as specified in Figure 1.

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.

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 heavy 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)*, 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. When appropriate, sizing calculations.
6. Method and materials used to stabilize areas disturbed by construction.
7. 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. This may be included in the overall nutrient management plan.
4. For silage or cull potato storage areas, include requirements for the regular removal and management, as needed.
5. 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.