

**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. ***Unless otherwise specified, base course thickness shall be a minimum of six (6) inches of course aggregate, such as ASTM C33 or AASHTO M43: No. 57, No. 1 or No. 3 or similar material. The base course thickness shall be the greater of two (2) times the largest aggregate diameter or the minimum thickness. A properly designed geotextile shall be installed under the***

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Conservation practice standards are reviewed periodically and updated if needed obtain the current version of this standard, contact your Natural Resources Conservation Service [State Office](#) or visit the [Field Office Technical Guide](#). ***Note: Bold italics information added or changes made in the National Standard by WV.***

**base material.** 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*.

**Concrete thickness shall be a minimum of four (4) inches in accordance with the requirements in Conservation Practice (CP) Waste Storage Facility (313); Slabs on Grade section. Concrete surfaces shall be roughened for increased traction where used by livestock.**

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.

**Aggregate such as ASTM C33 or AASHTO M43: No. 67 or No. 8, WV DOH Class 10 Aggregate (Crusher Run) or similar material is appropriate for surface material.**

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.

***Fabricated and roofed structures shall be designed in accordance with CP Waste Storage Facility (313).***

**Drainage and Erosion Control.** Include provisions in the design for surface and subsurface drainage, as needed. Include 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**

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

***Livestock Heavy Use Areas (LHUA) provide a protected surface from the animal's hoof action, reducing excessive erosion, sediment movement or nutrient transport to surface or subsurface water.***

***CNMP. LHUA's shall be planned in accordance with a Comprehensive Nutrient Management Plan (CNMP) and associated conservation practices. The CNMP documents the "conservation system" within the conservation plan that is unique to animal feeding operations and shall be developed before a LHUA structure is designed. This will include the producer's decisions concerning the management of the livestock, livestock manures and waste products, movement, loafing areas, etc.***

***Reference the conservation resources "Planning Guide for Livestock Heavy Use" for additional LHUA planning guidelines. NRCS conservation practice (CP) standards: Critical Area Planting (342); Fence (382); Prescribed Grazing (528); Filter Strip (393); Roof Runoff Structure (558); Trails and Walkways (575); Waste Transfer (634); Waste Storage Facility (313); Vegetated Treatment Area (635); Watering Facility (614); Windbreak /Shelterbelt Establishment (380); or Access Control (472) shall be used as companion practices, when needed, to meet the intended purpose of the heavy use area protection.***

***Livestock Heavy Use Areas (LHUA). Feed Pads or Lots designed for cattle, sheep, horses etc. may or may not be roofed. They are designed for 100 % confinement or where livestock have pasture access (not confined) in association with CP Prescribed Grazing (528).***

***LHUA Equine All-Weather Lots (not roofed, not grazed exercise or holding area), shall be gravel surfaced lots designed in conjunction with prescribed grazing pastures. Lots shall be used when the prescribed pastures are not available for use. Lots are especially useful in times of pasture establishment, maturing vegetation or during very wet or drought conditions.***

**Location. The location of LHUA shall:**

- ***Be above the 100 year-24-hour floodplain delineation. This does not apply to heavy use areas around watering facilities.***
- ***Divert all surface water away from the feed pad, lot and/or vegetated treatment area.***

- *Be located as far as possible from springs and wells and no closer than 100 feet.*
- *Not be placed closer than ten (10) feet from the top or toe of a defined bank.*
- *Be buffered by terrain or a windbreak/ shelterbelt when a separation distance (visual or odorous) is a concern.*

**Roofs.** *A roof may be installed for the purpose of diverting rainfall away from a feed pad, when other practices are not practical or cost effective. The roof and supporting structure shall be designed and installed in accordance to CP Waste Storage Facility (313).*

**Curbing.** *Curbing shall be installed in areas necessary to:*

- *Contain manure or prevent clean water from entering an area. Curbs shall be a minimum of twelve (12) inches high except where equipment needs to cross.*
- *Divert waste to a Manure Transfer System or Waste Storage Facility.*
- *Contain solids while allowing liquids to discharge to a Vegetated Treatment Area (VTA) thru a slotted or open curb (normally 4" wide and spaced every 10 feet).*

**Size.** *The LHUA's square footage shall be sized according to the number and size of livestock and the area necessary for feed rings, watering facilities, equipment and necessary feed bunker length as needed (Reference Table 1).*

### **LHUA's**

#### **All Livestock Heavy Use Areas**

- *Are designed for livestock use during the winter months and/or mud season.*
- *Temporarily contain waste.*
- *Have a protected transition area (concrete, gravel, etc.) such as from the access lane to the pad access/egress gate.*
- *Store dry and liquid manure and accumulated waste in accordance with CP Waste Storage Facility (313), unless otherwise noted.*
- *Where livestock are not confined and have unlimited access to feed pads, planning considerations shall be given to reduce or eliminate waste accumulation near and around the LHUA.*

*In addition to the above bullets;*

#### **Roofed Feed Pads:**

- *Shall be surfaced with concrete unless other materials such as asphalt, gravel or wood chips are approved by SCE.*
- *Shall provide watering facilities to confined livestock on the pad.*

#### **Uncovered (no roof) Feed Pads Serving Ten (10) Animal Units or Less:**

- *Shall be surfaced with concrete unless other materials such as asphalt, gravel or wood chips are approved by SCE.*
- *Shall have a minimum 2% grade.*
- *May be designed so liquid waste and runoff can be treated in accordance with CP Vegetated Treatment Area (635).*
- *Shall remove solid waste weekly and store solids according to CP Waste Storage Facility (313).*

***Equine Exercise Lots Serving Ten (10) Units or Less:***

- *Shall not be used as an arena or riding area.*
- *Shall be surfaced with gravel when used as an exercise lot.*
- *Shall have a minimum 2% grade to a maximum 6% grade.*
- *May be designed so runoff can be treated in accordance with CP Vegetated Treatment Area (635).*
- *Shall remove solid waste daily and store solids according to CP WSF (313).*

***Other Uncovered (no roof) Feed Pads or Lots shall:***

- *Have a minimum 2% grade.*
- *Collect and store all runoff and liquid, solid, and waste in accordance with CP Waste Storage Facility (313) and CP Manure Transfer (634).*

**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 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.

***Encourage the use of multiple feed pads to reduce excessive use of adjoining pastures and improve pasture rotation. If the herd is maintained in groups on separate parts of the farm, then more than one LHUA may be planned.***

***Fencing may be needed to confine livestock, control access to the stabilized pad, separate animals from vegetated treatment area, or where vegetation requires protection.***

**TABLE 1 – RECOMMENDED SPACE REQUIREMENTS FOR LIVESTOCK HEAVY USE AREAS \*****TABLE 1-A SPACE REQUIREMENTS FOR BEEF CATTLE 100% CONFINED (24 HR/DAY)  
SQUARE FEET (SF) PER HEAD**

| TYPE OF AREA  | CALVES<br>400 – 800<br>LBS. | BRED HEIFERS, STEERS OR<br>COWS<br>800 – 1200 LBS. | COWS<br>1,300 LBS. |
|---|-----------------------------|--|--------------------|
| Roofed Concrete Feed Pad<br>(SF/Head)               | 25                          | 35   | 50                 |
| Paved Lot ; open- no roof<br>(SF/Head)              | 50                          | 60   | 75                 |
| Not Paved Lot; open-no roof with<br>mound (SF/Head) | 300-600                     | 400-800  | 500-800            |
| Trough Width ( Linear feet/cow)                     | 1.7                         | 2.0  | 2.5                |

Trough Area Length (length of animal or 4.0')  
Center Feed Width (hay or bunkers) : 5 – 8 LF (when accessed from both sides)

**TABLE 1-B SPACE REQUIREMENTS FOR BEEF CATTLE NOT 100% CONFINED  
ROOFED OR NOT ROOFED  
SQUARE FEET (SF) PER HEAD**

| TYPE OF AREA                               | CALVES<br>400 – 800<br>LBS. | BRED HEIFERS,<br>STEERS OR COWS<br>800 – 1200 LBS. | COWS,<br>BULLS 1300<br>LBS. AND<br>OVER | COW/CALF |
|--|-----------------------------|--|---|----------|
| Concrete Feed Pad (with<br>pasture access) | 20                          | 25   | 30 Cows<br>40 Bulls                     | 45       |
| Trough Width (LF/animal)                   | 1.7                         | 2.0  | 2.5                                     | 2.5      |

Trough Area Length (length of animal or 4.0')  
Center Feed Width (hay or bunkers) : 5 – 8 LF (when accessed from both sides)

**TABLE 1-C SPACE REQUIREMENT FOR EQUINE LOT/EXERCISE  
(MAX. 10 AU) -NOT ROOFED 100% CONFINED WITH ACCESS TO SHELTER  
SQUARE FEET (SF) PER HEAD**

| Type of Area   | Horses  | Watering Facility                                      |
|--|---|--|
| Lot Surfaced with Gravel (2 -6%<br>slope)  | 400 SF /horse; (min. width 12<br>feet/horse)                              | Do not add to total design area.                       |
| Exercise Lot (2 -6% slope)<br>Not Surfaced; i.e. sandy soil (well<br>drained) or natural rocky surface | 500 minimum SF<br>1000 SF/Horse High Density<br>2500 SF/Horse Low Density | Do not add to total design area.                       |
| Dry Lot Pen-No Exercise<br>Surfaced with Gravel (min. width 12')                                       | 192 SF /horse and used by one<br>horse.                                   | 4 ft. x 6 ft. concrete apron for<br>automatic waterer. |

Feed Area Length (length of animal or 6.0')  
Feed Area Width =6.0' (min.)  
Center Feed Width (hay or bunker) : 5 – 8 LF (when accessed from both sides)

| TABLE 1-D RECOMMENDED SPACE REQUIREMENTS FOR SHEEP (CONFINED OR NOT CONFINED)<br>SQUARE FEET (SF) PER HEAD   |                                    |  |                           |   |
|--|------------------------------------|--|---------------------------|---|
| Type of Area   | Feeder<br>30 – 110 lbs.            | Ewes with<br>Lambs   | Dry Ewes 150-<br>200 lbs. | Rams<br>180-300 lbs.  |
| Roofed Feed Pad  | 10                                 | 15   | 16                        | 30  |
| Open Lot ; Surfaced, with<br>access to shelter   | 10                                 | 20   | 16                        | 30  |
| Open Lot -Not Surfaced   | 25                                 | 40   | 35                        | 35  |
|  |                                    |  |                           |   |
| Trough Width: LF per animal  | 1.0                                | 1.5  | 1.5                       | 1.0   |
| Feed Area Length (length of animal or 4.0')  |                                    |  |                           |   |
|  |                                    |  |                           |   |
| TABLE 1-E OTHER RECOMMENDED SPACE REQUIREMENTS   |                                    |  |                           |   |
| Feed Width   | Hay Ring –<br>Dia. = 7' 10"        | Automatic Watering Facility  |                           | Center Aisle Width for<br>Tractor or Feed<br>Wagon                |
| Center Feed Width<br>5 – 8 Linear Feet<br>(when accessed<br>from both sides)   | 50 square feet                     | 4 ft. x 6 ft. concrete apron for each<br>automatic waterer   |                           | 10 – 12 LF (not<br>applicable to<br>equine lot/exercise<br>areas) |
| Feed Area Length<br>(length of animal or<br>4.0')  | 10 cows or<br>5 horses per<br>ring | Maximum 20 beef cows, 16 bulls, 40<br>ewes, 10 rams, 10 horses/bowl<br>or according to manufacturer. |                           |   |
| <p>Livestock Heavy Use Area feed pads or lots shall be sized according to the following:</p> <ol style="list-style-type: none"> <li>1. Select Table based on type of animal, confinement and if the area is roofed or not roofed.</li> <li>2. Use the information from Table(s) selected in Item 1 to determine the required square footage (SF) per animal based on type of operation.</li> <li>3. Use the information from Table(s) selected in Item 1 to determine the required minimum trough length or width for the number of animals (if appropriate).</li> <li>4. Determine additional square footage necessary for hay rings, watering facilities, feed bunks, equipment access, etc. from Table 1E.</li> </ol> |                                    |  |                           |   |
| <p><i>* References: MWPS- 6, MWPS-18, NDSU NM-1155, PSU –G-5 Sheep Design Criteria, Oregon State Univ.-Extension EC 1610-2007, All-Weather Horse Paddocks Ohio DNR</i></p>   |                                    |  |                           |   |

## 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.
7. ***Utility notification, construction specifications including method of material disposal,***
8. ***NRCS shall be notified prior to commencement of construction.***
9. ***All materials shall be inspected by NRCS personnel prior to installation.***
10. ***Use the most current version of Field Sheet 561 Series Heavy Use Area Protection drawings.***

## 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.

***Use the most current version of WV 561 Heavy Use Area Protection Operation and Maintenance Plan.***

## REFERENCES

***National Pollutant Discharge Elimination System (NPDES)***

**National Clean Water Act (CWA) Section 502(14)**

**West Virginia Department of Agriculture**

**WV Department of Health and Human Resources; 64CSR46, TITLE 64, Interpretive Rule  
Department of Health, Series 46**

**[EPA - Animal Feeding Operations Overview](#)**

**[WV DEP - Concentrated Animal Feeding Operations](#)**

**210-VI-EFH Amendment 45, WV5 Preparation of Engineering Plans**

**210-V-NEM Part 505 – Non-NRCS Engineering Services**

**WV NRCS Engineering Field Handbook**

**WV NRCS Conservation Resources “Planning Criteria for livestock Heavy Use Areas”**

**Agricultural Waste Characteristics of the Agricultural Waste Management Field Handbook,  
Chapter 4 (AWMFH)**

**CP 313 -Table A for livestock manure volumes (CF).**

**ASTM C33; Standard Specifications for Concrete Aggregates**

**AASHTO M43-05: Standard Specification for Sizes of Aggregate for Road and Bridge  
Construction.**

**North Dakota State Univ. Extension Service NM-1155, 10/2006**

**Oregon State Univ.-Extension EC 1610-07**

**The Midwest Plan Service (MWPS) - 6; Beef Housing and Equipment Handbook 4<sup>th</sup> Ed. 1987  
MWPS-18 Section 2; Manure Storages 2001**

**Using All-Weather Geotextile Lanes and Pads; MWPS Ag. Eng. Digest AED45, 07/99**

**All-Weather Horse Paddocks Ohio DNR, 2005.**

**Penn State Agricultural and Biological Engineering; Sheep Housing Design Criteria G-5, PSU/92**

**NRCS Web Soil Survey (Engineering Properties, Water Features, Flood Duration, Hydrologic Soil  
Group, Risk of Corrosion –concrete, Water Table Depth, Physical Soil Properties etc.):**

**[Web Soil Survey](#)**

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.