Heavy Use Area Protection (561)

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

Practice Information

This practice is installed to protect and improve water quality by providing a stable, non-eroding surface for areas frequently used by animals, people, or vehicles.

Commonly used surface treatments include concrete, bituminous concrete, and gravel. In some places, it may be necessary to provide a roofed structure over the treated surface to achieve the desired resource protection.

This practice is often used to provide surface stability in areas where concentration of livestock is causing a resource concern. This includes feeding areas, portable hay rings, watering facilities, feeding troughs, and mineral areas. In these areas, provision must be made for the collection, storage, utilization, and treatment of manure and contaminated runoff.

It can also be used to make recreation areas accessible to people with disabilities.

This practice has a minimum expected life of 10 years. Maintenance requirements for the practice will depend upon the type of surface chosen by the producer and its intended use.

Routine maintenance will be needed to ensure that the facility operates as designed.

Common Associated Practices

Heavy Use Area Protection (561) may be installed as a stand-alone practice or may be applied with conservation practices to control surface water such as Diversion (362), Filter Strip (393), or Vegetated Treatment Area (635). It may also be necessary to use Access Control (472) or Fence (382) to modify traffic patterns around the area. Other commonly associated conservation practices include Roofs and Covers (367), Waste Storage Facility (313), Prescribed Grazing (528), and Watering Facility (614).

For further information, contact your local NRCS field office.
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.

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.

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.

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.

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.

**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.

NRCS, NHCP

September 2014
REFERENCES

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


NRCS, NHCP
September 2014
### Effects of NRCS Conservation Practices - National

**Heavy Use Area Protection**

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

<table>
<thead>
<tr>
<th>Soil Erosion</th>
<th>Effect</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Erosion - Sheet and Rill Erosion</td>
<td>2</td>
<td>Establishment of vegetative cover, surfacing with suitable materials, or installing needed structures will provide needed cover to protect areas from soil erosion.</td>
</tr>
<tr>
<td>Soil Erosion - Wind Erosion</td>
<td>2</td>
<td>The surface is protected from erosion by establishing vegetative cover, surfacing with suitable materials, and/or by installing needed structures.</td>
</tr>
<tr>
<td>Soil Erosion - Ephemeral Gully Erosion</td>
<td>2</td>
<td>The surface is protected from erosion by establishing vegetative cover, by surfacing with suitable materials, and/or by installing needed structures.</td>
</tr>
<tr>
<td>Soil Erosion - Classic Gully Erosion</td>
<td>0</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Soil Erosion - Streambank, Shoreline, Water Conveyance C</td>
<td>0</td>
<td>HUAs are not installed on streambanks</td>
</tr>
</tbody>
</table>

**Soil Quality Degradation**

| Organic Matter Depletion | 0 | If vegetation is used to protect the site, organic matter may be increased. If some other material is used to protect the site, organic matter will be decreased or unchanged. |
| Compaction | -1 | If non-vegetated material is used to protect the site, compaction of the site is normally mandated. If vegetation is used to protect the site, compaction may or may not change depending on methods used to establish vegetation. |
| Subsoil | 0 | Not Applicable |
| Concentration of Salts or Other Chemicals | 0 | Not Applicable |

**Excess Water**

| Excess Water - Seepage | 0 | Not Applicable |
| Excess Water - Runoff, Flooding, or Fearing | -1 | Impermeable surfaces will cause increased runoff. |
| Excess Water - Seasonal High Water Table | 0 | Not Applicable |
| Excess Water - Drifted Snow | 0 | Not Applicable |

**Insufficient Water**

| Insufficient Water - Inefficient Use of Irrigation Water | 0 | Not Applicable |
| Insufficient Water - Inefficient Moisture Management | 0 | Not Applicable |

**Air Quality**

| Emissions of Particulate Matter (PM) and PM Precursors | 0 | Not Applicable |
| Emissions of Ozone Precursors | 0 | Not Applicable |
| Emissions of Greenhouse Gases (GHG) | 0 | If used, vegetation removes CO2 from the air and stores it in the form of carbon in the plants and soil. |
| Objectionable Odors | 0 | Not Applicable |

**Vegetation**

| Understory Plant Productivity and Health | 2 | Stabilizing high-traffic areas can reduce the amount of dust generated from human, animal and vehicular traffic. |
| Inadequate Structure and Composition | 0 | Not Applicable |
| Excessive Plant Pest Pressure | 4 | Management of the area controls undesired plants. |
| Fire and Wildlife - Excessive Biomass Accumulation | 0 | Not Applicable |

| Inadequate Habitat - Field | 0 | Not Applicable |
| Inadequate Habitat - Cover/Shelter | 0 | Not Applicable |
| Inadequate Habitat - Water | 2 | Not Applicable |
| Inadequate Habitat - Habitat Continuity (Space) | 0 | Not Applicable |

| Inadequate Food and Forage | 0 | Not Applicable |
| Inadequate Shelter | 0 | Not Applicable |
| Inadequate Water | 0 | Not Applicable |

| Inefficient Energy Use | 0 | Not Applicable |
| Farming/Ranching Practices and Field Operations | 0 | Not Applicable |

**CPAP Practice Effects**

<table>
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<tr>
<td>Moderate Improvement</td>
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</tr>
<tr>
<td>Slight Improvement</td>
<td>Slight Improvement</td>
</tr>
<tr>
<td>Substantial Improvement</td>
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</tbody>
</table>

Source: National Conservation Practices Physical Effects
Hal Gordon, WHTSO Economist, Portland, Oregon
May-13
Heavy Use Area Protection (561)

1. Stabilize ground surface that is frequently and intensively used by people, animals, or vehicles.

D.1 (+) A stable or non-eroding surface.

D.2 (+) Water quality

I.1 (+) Livestock health
I.2 (+) Productivity, and potential income
I.3 (-) Wear and tear on equipment
I.4 (+) Maintenance costs
I.5 (+) Dust control
I.6 (-) Erosion
I.7 (-) Downslope deposition
I.8 (-) On- and off-site maintenance costs
I.9 (+) Runoff from area
I.10 (+) Nutrients, organics and pathogens to ground and surface waters
I.11 (-) Contaminated runoff to ground and surface waters: sediment, nutrients, pathogens, and organics
I.12 (-) Noxious algal and weed growth
I.13 (+) Dissolved oxygen in surface waters
I.14 (+) Collection of animal manure for treatment
I.15 (-) Inorganic fertilizer inputs/costs
I.16 (-) Odors
I.17 (+/-) Net return

C.1 (+) Water quality and aquatic habitats
C.2 (+) Stream fauna, e.g., fish, invertebrates
C.3 (+) Recreational opportunities
C.4 (+/-) Income and income stability (individuals and community)
C.5 (+) Public/private health, safety, and aesthetics
C.6 (-) Dust control
C.7 (-) Livestock health
C.8 (-) Productivity, and potential income
C.9 (-) Wear and tear on equipment
C.10 (-) Maintenance costs
C.11 (-) Dust control
C.12 (-) Erosion
C.13 (-) Downslope deposition
C.14 (-) On- and off-site maintenance costs
C.15 (-) Runoff from area
C.16 (-) Nutrients, organics and pathogens to ground and surface waters
C.17 (-) Contaminated runoff to ground and surface waters: sediment, nutrients, pathogens, and organics
C.18 (-) Noxious algal and weed growth
C.19 (-) Dissolved oxygen in surface waters
C.20 (-) Collection of animal manure for treatment
C.21 (-) Inorganic fertilizer inputs/costs
C.22 (-) Odors
C.23 (-) Net return

Initial settings:
1. Established AFO needing a stable surface area for livestock, equipment or vehicles; or
2. Intensively used development area needing treatment to address an erosion or water quality problem

Windbreak/shelterbelt Establishment (380)
Dust Control from Animal Activity on Open Lot Surfaces (375)
Roofs and Covers (367)
Filter Strip (393)
Waste Storage Facility (313)
Nutrient Management (590)

LEGEND

Mitigating practice
Associated practice
# Created by
D Direct effect
I Indirect effect
C Cumulative effect
Pathway
Notes:
Effects are qualified with a plus (+) or minus (-). These symbols indicate only an increase (+) or a decrease (-) in the effect upon the resource, not whether the effect is beneficial or adverse.