

**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, by surfacing with suitable materials, and/or by installing needed structures.

PURPOSE

Reduce soil erosion.

Improve water quantity and quality.

Improve air quality.

Improve aesthetics.

Improve livestock health.

CONDITIONS WHERE PRACTICE APPLIES

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

CRITERIA

All planned work shall comply with federal, state, and local laws and regulations. Laws and regulations of particular concern include those involving land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

Measures shall be taken to limit the generation of particulate matter.

Safety measures shall be incorporated into the design of the heavy use area protection.

Design Load. Design ground loads will be based on the type of traffic, (vehicular, animal, or human) anticipated on the heavy use area. The minimum design load for areas that support vehicular traffic will be a wheel load of 4,000 lbs.

Foundation. All site foundations shall be evaluated for soil moisture, permeability,

texture, and bearing strength in combination with the design load and anticipated frequency of use.

A base course of gravel, crushed stone, other suitable material, and/or geotextile shall be provided on all sites with a need for increased load bearing strength, drainage, separation of material and soil reinforcement. Natural Resources Conservation Service (NRCS), National Engineering Handbook (NEH), Parts 642 and 643 (formerly, NEH, Section 20), and AASHTO M-288 (latest edition), provide guidance in quality specification and geotextile selection.

An impervious barrier shall be provided on sites with a porous foundation (high permeability rate), where there is a need to protect ground water from contamination.

Foundation preparation shall consist of removal and disposal of soil and other material that are not adequate to support the design loads.

Drainage and Erosion Control. Provide surface and subsurface drainage, as needed. Remove runoff without causing erosion or water quality impairment. Exclude unpolluted run-on water from the treatment area.

Structures. All structures shall be designed according to appropriate NRCS standards and specifications or National Engineering Handbook recommendations.

Ground Surface Treatment. The surface treatment shall meet the following criteria:

Bituminous Pavement. The thickness of the pavement course, kind, and size of aggregate, type of proportioning of bituminous materials, and the mixing and placing of these materials shall be in accordance with SD Department of Transportation criteria for the expected loading.

Concrete. The quality and thickness of concrete and the spacing and size of

Conservation practice standards are reviewed periodically and updated if needed. The current version of this standard is posted on our website at www.sd.nrcs.usda.gov or may be obtained at your local Natural Resources Conservation Service.

reinforcing steel shall be appropriate for the expected loading.

Other Cementitious Materials. Soil cement, roller compacted concrete, and coal combustion by-products (flue gas desulphurization sludge and fly ash) may be used as surface material if designed and installed to withstand the anticipated loads and surface abrasion.

Sprays and Artificial Mulches. When utilizing sprays of asphalt, oil, plastic, manufactured mulches, and similar materials, the manufacturer's recommendations shall be incorporated into the design.

Vegetative Measures. Fertilizing, soil preparation, seeding, mulching, sodding, and vegetation management shall be according to the planned use and appropriate SD conservation practice standard.

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

ADDITIONAL CRITERIA FOR AREAS UTILIZED BY LIVESTOCK

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.

SD NRCS conservation practice standards Critical Area Planting (342); Fencing (382); Prescribed Grazing (528a); Filter Strip (393); or Use Exclusion (472) shall be used as companion practices, when needed.

Waste management must be provided where needed. If the use area will produce a pollution hazard to Waters of the United States, or will otherwise be subject to Clean Water Act regulations, a Nutrient Management Plan shall be implemented for the area.

General criteria for livestock fabricated shelter.

Fabricated shelters shall be located in areas where the herd is likely to congregate during typical storms. The site should be accessible by vehicle.

Shelters designed for both wind and drifting snow must be constructed with a solid face to divert drifting snow around ends of the barrier (Figure A).

Uninterrupted shelter length should be 10 to 15 times shelter height. (A minimum length is

needed to protect from eddy currents (whirlwinds) at shelter ends. If the shelter is too long, drifting snow is forced up, over the shelter into the protected area.)

Wind speed should be reduced 60 – 80 percent in the protected area behind the barrier. Design the shelter following Tables 1 and 2.

Table 1. Minimum protected area needed

| | Beef cattle | Cow - calf | Sheep | Swine |
|-------------------------|-------------|------------|--------|---------|
| ft ² /animal | 25 - 35 | 40 | 8 - 10 | 15 - 20 |

Table 2. Protected area (see Figure A.)

| Barrier height, ft | Wing L, feet | Width D, feet | Drift free area, ft ² |
|--------------------|--------------|---------------|----------------------------------|
| 6 | 60 | 84.8 | 3,964 |
| 8 | 80 | 113.1 | 7,047 |
| 10 | 105 | 148.5 | 11,823 |
| 12 | 125 | 176.8 | 16,828 |
| 14 | 145 | 205.1 | 22,714 |

Panel covering shall be minimum nominal 1-inch lumber, 28-gage coated corrugated steel, or similar durability material. Boards or panels should be attached to the windward side of the shelter. Provide rub rails or other features as needed to protect the structure from animal damage.

Wood installed within eight inches of the ground must be pressure treated (or equal). Where a fabricated shelter is to be constructed of wood, the structure may be designed by an engineer, or sizes and spacing shown in Table 3 may be used.

Table 3. Minimum wood shelter design. (min. 8-inch poles, small end up)

| Barrier height, feet | Pole length, feet | Min. depth, feet | Pole spacing, feet | Girt Number & size |
|----------------------|-------------------|------------------|--------------------|--------------------|
| 6 | 8 | 3.5 | 10 | 3, 2x8 |
| 8 | 10 | 3.5 | 10 | 4, 2x8 |
| 10 | 12 | 4 | 8 | 5, 2x6 |
| 12 | 14 | 4 | 6 | 6, 2x4 |

Criteria for fence (straight line) shelters.

Fence shelters may be designed either as solid barriers (described above) for snow and wind or as porous barriers designed primarily for wind.

Porous barriers must have approximately 80 percent solid and 20 percent open surface area (Figure B). Porous barriers must be mounted approximately 12 inches above the ground to reduce eddy currents (whirlwinds) and allow wind to move snow downwind of the protected area.

Fence barrier orientation should be approximately perpendicular to winter and early spring prevailing wind direction.

CRITERIA FOR CIRCULAR, SEMI-CIRCULAR, OR 90° V-SHAPED SHELTERS.

These shelters must have solid face panel covering as described above.

In areas with variable wind directions, semi-circular and 90° V-shaped shelters provide the best protection. These types display similar drifting patterns (Figure A) and provide a snow-free, reduced wind speed area for animals in protection zones. They provide the most protection without trapping animals behind snowdrifts. The V, or closed end, should point in the direction of winter and early spring prevailing winds.

Semi-circular shelters are generally the most economical (material cost per protected square foot). They also tend to be self-bracing due to their shape.

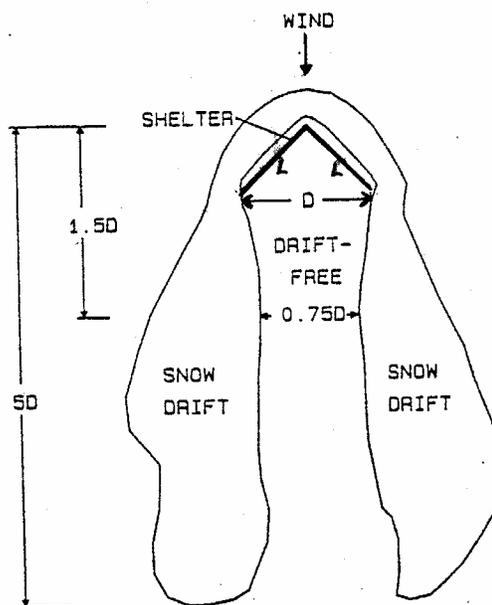


Figure A. Snowdrift Protection (Plan View)

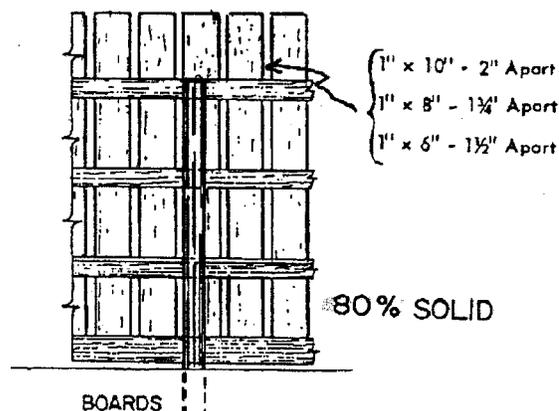


Figure B. 20% Porous 80% Solid Structure

ADDITIONAL CRITERIA FOR AREAS UTILIZED FOR RECREATION

The treated area shall be conducive to the overall recreation area and aesthetically blend with the general landscape and surroundings.

Areas used for public recreation must conform to the Americans with Disabilities Act.

CONSIDERATIONS

When stabilizing heavily used areas consider adjoining land uses and the proximity to residences, utilities, cultural resource areas, wetlands or other environmentally sensitive areas, and areas of special scenic value.

For heavy use areas conducive to protection by vegetation, consideration must be given to the effect(s) of treading and/or miring. The vegetative species selected should tolerate and persist under heavy use conditions. If practicable, consider increasing the size of the area and/or establishing a rest/non-use period to allow plant recovery and increase vigor.

Consider effects on the water budget, especially on volumes and rates of runoff, infiltration, and transpiration due to the installation of less pervious surfaces.

The transport of sediments, nutrients, bacteria, organic matter from animal manures; oils, chemicals and particulate matter associated with vehicular traffic; and soluble and sediment-attached substances carried by runoff should be considered in selection of companion conservation practices.

Consider using additional air quality conservation practices such as Windbreak/Shelterbelt Establishment (380) or Herbaceous Wind Barriers (603) to impede transport of particulate matter.

Consider locating the heavy use area away from water bodies or watercourses. Work in and/or discharges near streams, wetlands, or water bodies may require a permit from the United States Army Corps of Engineers, SD DENR, or local authority.

PLANS AND SPECIFICATIONS

Plans and specifications shall meet this standard and include requirements needed to achieve the purpose.

OPERATION AND MAINTENANCE (O&M)

An O&M plan shall be prepared for and reviewed with the owner/operator. The plan shall specify that the treated areas and associated practices are inspected annually and after significant storm events to identify repair and maintenance needs.

The O&M plan shall detail the level of repairs needed to maintain the effectiveness and useful life of the practice.

For livestock operations, the O&M plan for heavy use areas may be included as a part of the overall waste management plan. The O&M plan may include periodic removal and management of manure accumulations as appropriate.

Include practices that limit particulate matter emissions as appropriate.

REFERENCES

Jairell, R. L. and R. A. Schmidt. 1991. Taming Blizzards for Animal Protection, Drift Control, and Stock Water. Proceedings, The Range Beef Cow Symposium XII, Dec. 3-5, 1991, Fort Collins, CO, 11 pages.

Johnson, D. Windbreak/shelter Fences. 1975. Great Plains Beef Cattle Feeding Handbook, GPE-5200. P. 5200.1-4

Jones, D. D. and W. H. Friday. Wind and Snow Control for the Farmstead. Emergency Management in Agriculture AE-102, Purdue University Cooperative Extension Service. 11 pages

Meiman, P. 1993. Cost Analysis of Wind Protection Structures for Range Beef Cattle. Range Livestock Problem, University of Wyoming RGMG 4540-03. 15 pages.

For areas with aggregate surfaces that will be frequently scraped, consideration should be given to the use of concrete to lessen the recurring cost of aggregate replacement.