

NATURAL RESOURCES CONSERVATION SERVICE
STATE OF OHIO
CONSERVATION PRACTICE STANDARD

LIVESTOCK USE AREA PROTECTION

PRACTICE CODE 757i (ACRE)

DEFINITION

Protecting areas used for livestock feeding and watering, loafing, exercising, or confinement by surfacing with suitable materials, and installing control structures, if necessary.

PURPOSE

To protect soil and water quality, and stabilize pastures, feeding areas, loafing areas, exercise corrals, livestock traffic lanes or facility areas frequently or intensely used by livestock.

CONDITIONS WHERE PRACTICE APPLIES

Areas where soil requires special treatment to protect it from compaction, pugging, erosion or other deterioration caused by livestock use.

PLANNING CRITERIA

Management Requirements. Livestock heavy use area protection (pads) installed under this standard shall be planned and designed for a 10-year minimum functional design life. For materials other than concrete, pad durability will be impacted by the amount of manure accumulation, cleaning frequency, cleaning methods, presence of frozen material, and moisture conditions of the pad surface. Cleaning will require care to prevent removal of the pad surface, or the operator will need to plan on frequent maintenance (resurfacing) to maintain the minimum required base thickness.

Location. To minimize the potential for contamination of streams, pads should be located outside of flood plains. However, if site restrictions require location within a flood plain, protect the pad from inundation and damage from a 25-year flood event, or larger if required by laws, rules, or regulations.

If the pad is located within 100 ft of a watercourse that is likely to receive flow during the period the pad is in use, runoff and manure management measures will be incorporated into the design to prevent stream degradation from erosion and/or polluted runoff.

Locate the pad a minimum 300 ft from neighboring residences and at least 1000 ft from: 1) a well head protection area, 2) a public water well area, or 3) a well producing over 100 gallons per minute (gpm).

The Federal Emergency Management Agency (FEMA) has designated Established Regulatory Floodways in the floodplains of some Ohio rivers and streams. Do not locate facilities within an Established Regulatory Floodway.

Section IV, FOTG Standard 757i

Drainage, Erosion, and Pollution Control. Provisions shall be made for needed surface and subsurface drainage on and around the livestock heavy-use area, and for disposal of runoff without causing erosion or pollution of waters of the State. Planning decisions shall be documented in the design folder.

Manure Management. If accumulated manure on the pad needs to be scraped for livestock management objectives, or to prevent environmental degradation, while in use, then a manure management system must be developed.

Additional Considerations. Other components such as waste storage structures, pasture management, winter feeding planning, livestock watering systems, roof runoff management, fencing, buffer strips, access roads, and diversions shall be considered in the overall conservation plan and incorporated into the design as needed. Livestock stream crossings needed as part of a livestock use area are to follow this standard.

DESIGN CRITERIA

Sizing. For cattle feeding pads within a grazing area, where livestock have free roam of the pasture, the recommended pad size is from 75 to 100 ft² per feeding space. The minimum pad dimension for feeding with one 8½' diameter hay ring is 32'x32'.

Where cattle need to be periodically "locked on" to a pad as part of a winter feeding plan for pasture protection, the recommended pad size is from 60 to 75 ft² per head. In this circumstance, cattle are not expected to be confined to the pad more than 30 cumulative days during any 12-month period.

For confined feeding operations (feedlots), the area is to be sized upon recommendations from Midwest Plan Service or livestock industry publications.

Design Usage. Areas that support vehicular traffic shall be designed for a wheel load of at least 4,000-lb. Concrete or asphalt should be considered in areas subjected to frequent vehicular traffic, particularly in steep areas where tire spinning could degrade less durable surface materials.

Cleaning Frequency. If planning criteria requires the area to be cleaned of manure or waste feed more frequently than three times each year, the surface material needs to be concrete or asphalt. If the planning criteria allow cleaning the area three times each year or less, the area may be surfaced using other acceptable materials.

For confined beef feedlots, the maximum recommended cleaning interval is two weeks.

Surface Materials

- **Paved Surfaces.** The subgrade must be reasonably uniform without abrupt changes from hard to soft. The upper 12" of the subgrade shall be of uniform material and compacted to a uniform density throughout. All fill material used in the preparation of the subgrade shall be similar to the in-place material and shall be compacted to the density of the in-place material.
- **Asphalt Pavement.** The thickness of the asphalt courses and base material, the kind and size of aggregate, the type of proportioning of bituminous materials, and the mixing and placing of these materials shall be in accord with good highway practice for the expected loading.

**Section IV, FOTG
Standard 757i**

- Concrete Slabs.** Design slabs considering the required performance and the critical applied loads. The subgrade material must be evaluated as to the suitability and denseness. A 4-inch thick layer of crushed gravel or limestone shall be provided as a uniform subbase. Where the subgrade is uniform and dense, a Type S-1 concrete slab is acceptable. Type S-2 concrete slabs shall be used where the subgrade material is non-uniform or has variable density, and it is not economical or feasible to improve the subgrade. The subgrade thickness in question is generally 12 inches, but could be more, depending on the soil profile. Type S-3 concrete slabs shall be used when the contraction joint spacing is to be more than 15 feet, when no contraction joints are wanted, when reduced seepage is required, or when a water-tight slab is required. Design Criteria for Type S-1, S-2 and S-3 concrete slabs is found in the NRCS Concrete Construction specification (210-VI-EFH, Amend OH-17, February 14, 2000).
- Aggregate Pads.** Aggregate pads consist of a geotextile fabric, overlain with aggregate base material, overlain with surface material. Where pads are installed on well drained soils and the sub-base will not be subjected to saturation (dry subgrade), the requirement for the geotextile underlayment may be waived by the NRCS Engineer.

Geotextile Fabric Minimum Average Roll Values (MARV):

- Minimum tensile strength (ASTM D 4632) – 120 lb
- Elongation at failure (ASTM D 4632) -- < 50% for woven; ≥ 50% for non-woven
- Minimum burst strength (ASTM D 3786) – 210 psi
- Minimum puncture strength (ASTM D 4833) – 60 lb
- Apparent opening size (ASTM D 4751)
 - ≤ # 40 U.S. Standard Sieve (AOS) ≥ # 100 U.S. Standard Sieve (≤0.42mm (AOS) ≥ 0.149mm)
- Permitivity (ASTM D 4491) ≥ 0.03 sec⁻¹ , ≤ 0.70 sec⁻¹
- Minimum ultraviolet light protection (% residual tensile strength, ASTM D4355) – 70%

The minimum compacted base thickness of crushed gravel or limestone, subjected only to livestock access, is 6 inches. Where the pad is subjected to vehicular traffic, an 8 inch compacted base is required.

The minimum thickness for limestone or crushed gravel screenings placed on top the base, for use as a surface, is 3 inches. This 3-inch layer is considered only as a sacrificial wear surface and not part of the structural base.

Table 1 can be used to configure stone pads using alternate base and surface materials.

Pad Material Configurations (minimum compacted thickness)						
Pad Material	Livestock only			Livestock & Vehicular Traffic		
	A	B	C	A	B	C
AASHTO M 43 # 1 or 2	4"	4"		6"	4"	
AASHTO M 43 # 57 or 67	2"			2"		
ODOT 304.02 or 411.02		2"	6"		4"	8"
Screenings (pad surface)	3"	3"	3"	3"	3"	3"

Table 1

For dry subgrade installations, without geotextile fabric, alternate "A" or "B" is to be used. When placing pad materials containing fines, compact by tracking with rubber tired equipment. Addition of water may be necessary to obtain adequate compaction.

Section IV, FOTG Standard 757i

FGD. Wet Flue Gas Desulfurization (FGD) material is available to areas near the Conesville (Coshocton Co) and Gavin (Gallia Co) coal-burning power plants operated by American Electric Power (AEP).

FGD installations for livestock heavy use areas were made in 1997, 1998 and 1999. FGD material is acceptable under this standard for installations where scraping more frequently than three times each year will not regularly occur.

Wet FGD generated by the AEP Conesville and Gavin plants is to be installed following OSU Extension Factsheet (AEX-332-99) and Ohio EPA Permit to Install (PTI), Application No. 07-0037 dated June 25, 1997.

Additional power generators may also have wet FGD available. To meet this standard, the FGD material must be manufactured in accordance with OSU Extension Factsheet AEX-332-99, and be approved by the Ohio EPA for its intended use. The FGD supplier is to furnish these certifications prior to delivery.

Other power plants also produce dry FGD. OSU Extension does not currently have a factsheet for this material. Usage of dry FGD within this standard may be approved by NRCS Engineers, on a case by case basis, in consultation with appropriate OSU Extension personnel after OEPA permits are obtained.

Although FGD material used within this standard is acceptable for construction of pads, NRCS does not warranty the performance of the material. If installed FGD material does not perform as indicated in the maintenance section of AEX-332-99, the landowner is responsible for follow-up maintenance, which may include contacting the FGD supplier for an overlay.

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

Vegetative measures. Liming, fertilizer, seeding, and sodding shall follow vegetative standards appropriate to the area. If vegetation is not appropriate, other measures shall be used to prevent erosion.

Sprays of asphalt, oil, plastic, manufactured mulches, and similar materials shall be installed according to the manufacturer's recommendations.

EQUINE USE AREA PROTECTION

This section addresses special criteria for pads installed for equine loafing, travelways, exercising, or temporary confinement.

- Pads may be installed within 300 ft. of neighboring residents. Where pads are to be located within 50 ft. of a neighboring residence, the landowner is to provide evidence that the neighbor has been contacted and has no objection to the location.
- The recommended minimum pad size ranges from 40'x40' for a single horse up to 60'x60' for multiple horses on the pad at once. These minimum pad sizes consider the horses to be stabled the majority of the time and brought onto the pad periodically for exercise and training. Where horses are planned for confinement to the pad for long periods the recommended pad size needs to be increased as recommended by an equine specialist. Livestock feeding on the pad is not recommended unless measures are made to remove excess/discarded feedstock from the pad surface. Accumulated manure or waste hay will soften the pads.
- The pads shall be designed and maintained to minimize the potential of foot/h hoof damage by preventing contact with course aggregate.
- Aggregate pads consist of a geotextile fabric, overlain with a finished thickness of 6" of compacted AASHTO M 43 No. 9 or 10 limestone aggregate, as specified in the ODOT Construction and Material

Section IV, FOTG Standard 757i

Specifications, 703 Aggregate. Where required for weak subgrade conditions, 4 to 6" of AASHTO No. 1, 57, or ODOT 304 limestone aggregate may be used to stabilize the pad foundation.

- Pads are to be graded for positive drainage to prevent ponding and excessive velocities that could displace fines on the pad surface. Grades between 1 and 2% are recommended.

Fencing may be necessary to restrict animal access or for confinement purposes. Where fencing is necessary, consideration should be given to fencing that is highly visible and will not pose a safety hazard to the animal(s). Such fencing can include rail/board, rubber, high-tensile polymer, mesh, electric or combinations of these types. Minimum height for fencing shall be 60 inches to deter most horses from jumping over. The minimum height from the ground shall be no lower than 6 inches.

PLANS AND SPECIFICATIONS

Plans and specifications for livestock use area protection shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE. The landowner is to be given an O&M plan with the design that address the following considerations as appropriate:

Assumptions used to design the pad need to be reviewed if the herd size or livestock management methods change.

FGD and Aggregate pads will degrade over time with animal usage and cleaning, and may need periodic resurfacing to sustain a 10-year functional design life:

- FGD: Once the pad thickness wears down to 6 to 8 inches the FGD may begin to break up. The landowner is to coordinate with the FGD supplier to resurface the pad following AEX-332-99.
- Stone Pads: The 3" screening surface is considered to be a sacrificial wear surface. Once base material is exposed, the pad is to be resurfaced with additional screenings.

The area adjacent to the pad and installed runoff and pollution control measures are to be maintained for stability.

References

ACI. 1992. 360R. Design of Slabs on Grade. ACI, P.O. Box 9094, Farmington Hills, MI.

Midwest Plan Service. 1987, MWPS-6, *Beef Housing and Equipment Handbook*, Iowa State University, Ames, IA.

Midwest Plan Service. 1983, MWPS-1, *Structures and Environment Handbook*, Iowa State University, Ames, IA. (No longer in publication)

OSU Extension, 1997, AEX-304-97, *Using Geotextile Fabric in Livestock Operations*, The Ohio State University, Columbus, Ohio

OSU Extension, 1999, AEX-332-99, *Construction of Livestock Feeding and Hay Bale Storage Pads Using FGD Material*, The Ohio State University, Columbus, Ohio

NRCS, Ohio, Concrete Construction Specification (210-VI-EFH, Amend OH-17, February 14, 2000).