

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**MANURE TRANSFER**

(No.)

**CODE 634**

**DEFINITION**

A manure conveyance system using structures, conduits, or equipment.

**PURPOSE**

To transfer animal manure (bedding material, spilled feed, process and wash water, and other residues associated with animal production may be included) through a hopper or reception pit, a pump (if applicable), a conduit, or hauling equipment to:

- A manure storage/treatment facility,
- A loading area, and
- Agricultural land for final utilization.

**CONDITIONS WHERE PRACTICE APPLIES**

The manure transfer component is a part of a planned manure management or comprehensive nutrient management system.

This practice applies where a conveyance system is necessary to transfer animal manure and wastewater from the source to a storage/treatment facility or a loading area. It also applies to the transfer of animal manure from the storage/treatment facility to an area for utilization. This includes hauling manure from one geographical area with excess manure to a geographical area that can utilize the manure in an acceptable manner.

This practice does not include land application or other use of manure. Criteria for land application of manure are included in Conservation Practice Standards [590, Nutrient Management](#), or [633, Waste Utilization](#).

**CRITERIA**

**General Criteria Applicable to All Purposes**

Manure transfer components shall comply with all federal, state, and local laws, rules, and regulations.

**Structures.** All structures, including those that provide a work area around pumps, shall be designed to withstand the anticipated static and dynamic loading. Structures shall be designed to withstand earth and hydrostatic loading in accordance with Conservation Practice Standard [313, Waste Storage Facility](#). The minimum thickness of component elements of concrete structures shall also be in accordance with Conservation Practice Standard [313](#). Covers, when needed, shall be designed to support the anticipated dead and live loads.

Reception pits are for the temporary storage of waste to facilitate collection and transfer. The pits shall be sized to contain a minimum of one full day's manure and/or wastewater production. For reception pits collecting runoff, the reception pit shall be sized to also contain at least the volume of runoff from the 25-year, 24-hour storm. Additional capacity shall be added as needed for freeboard (0.5 foot minimum) and emergency storage.

Openings to structures to receive manure from alley scraping shall be a minimum of 9 square feet with one dimension no smaller than 4 feet. The opening shall be equipped with a grate designed to support the anticipated loads.

When curbs are needed in conjunction with structures, they shall be constructed of either concrete or treated wood. Curbs shall be of sufficient height to ensure total manure flow into the structure and be adequately anchored.

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service or download it from the electronic Field Office Technical Guide (eFOTG).

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Push-off ramps leading to a reception pit can be level or inclined toward the pit. The maximum slope of the ramp shall be 5 percent.

Picket dams may be constructed of wood, metal, concrete, or any other durable material. Wood material shall be treated to prolong its life. Metal material shall be painted or otherwise treated to resist corrosion. The picket dam shall be porous with a ½-inch minimum opening size.

**Pipelines.** Pipelines include conveyance pipelines, culverts, and inlets to waste storage facilities or waste treatment lagoons. Design of pipelines shall be in accordance with sound engineering principles considering the type of load on the pipe, exposure, etc. The minimum pipeline capacity from collection facilities to storage/treatment facilities shall be the maximum peak flow anticipated on a daily basis.

The minimum pipeline capacity from storage/treatment facilities to utilization areas shall ensure the storage/treatment facilities can be emptied within the time limits stated in the management plan for manure utilization.

Underground pipelines used for transferring waste to an irrigation system shall meet the requirements of Conservation Practice Standard 430, Irrigation Water Conveyance.

For minimum and maximum fill height over the pipeline, see Table 1 in Conservation Practice Standard [620, Underground Outlet](#).

Aboveground pipelines used for transferring waste to a utilization area shall be designed to meet the demands of a harsh environment. The pipeline can be rigid pipe or flexible hose and shall be ultraviolet-resistant. The flexible hose can either have a flat cross section or retain its shape when empty and shall be intended by its manufacturer for agricultural uses. Couplings to connect lengths of hose shall be leakproof and attached to the hose during the manufacturing process. The design of the flexible hose shall take into account the elongation of the hose by pressurization and also include other design requirements of a pressurized pipeline. The flexible hose shall have a minimum pressure rating, as stated by the manufacturer, of 70 pounds per square inch (psi).

Reels used for storage and/or relocation of flexible hose shall be manufactured specifically for that purpose.

All pipes shall be designed based on the type of material and total solids content and shall convey the required flow without plugging. Gravity flow pipelines shall have a 6-inch minimum diameter and a minimum slope of 0.5 percent. Flow velocities shall be sufficient to minimize settling of solids in the pipeline. A minimum velocity of 2.0 feet per second is recommended.

Clean-out access shall be provided for gravity pipelines at a maximum interval of 200 feet for lines carrying non-bedded manure. For pipelines carrying bedded manure, the maximum interval shall be 150 feet. Gravity pipelines shall not have horizontal curves or bends except minor deflections (less than 10 degrees) in the pipe joints unless special design considerations are used.

Where slurry manure is transferred in a gravity system, a minimum of 4 feet of head is required on the pipe system.

Gravity discharge pipes used for emptying a storage/treatment facility shall have a minimum of 2 gates or valves, 1 of which shall be manually operated.

Pipelines shall be installed with appropriate connection devices to prevent contamination of private or public water supply distribution systems and ground water.

**Other conduits.** Concrete-lined ditches and chutes shall be designed in accordance with Conservation Practice Standard [468, Lined Waterway or Outlet](#). A minimum design velocity of 1.5 feet per second shall be used.

**Pumps.** Pumps installed for manure transfer shall meet the requirements of Conservation Practice Standard [533, Pumping Plant](#). Pumps shall be sized to transfer manure at the required system head and volume. The type of pump shall be based on the consistency of the manure and the type of bedding used. Requirements for pump installations shall be based on manufacturer's recommendations.

**Safety.** The system design shall consider the safety of humans and animals during construction and operation.

Open structures shall be provided with covers or barriers such as gates, fences, etc.

Ventilation and warning signs shall be provided for manure transfer systems as necessary to warn of the danger of entry and to reduce the risk of explosion, poisoning, or asphyxiation.

Pipelines from enclosed buildings shall be provided with a water-sealed trap and vent or similar devices where necessary to control gas entry into buildings.

Barriers shall be placed on push-off ramps to prevent tractors or other equipment from slipping into waste collection, storage, or treatment facilities.

**Biosecurity.** Manure from diseased animals shall be handled in accordance with the recommendations of the state veterinarian.

Equipment leaving the farm shall be sanitized as appropriate to prevent the spread of disease.

#### **Additional Criteria in Support of Agricultural Land for Final Utilization**

**Waste utilization.** Manure shall be applied to the utilization area in amounts, uniformity, and rates consistent with the requirements of Conservation Practice Standard [590](#) or [633](#) (as appropriate) and at a time consistent with Conservation Practice Standard [590](#) or [633](#) (as appropriate).

Liquid or slurry manure shall be adequately agitated prior to transfer for the purpose of land application both on and off the farm.

Where manure is to be spread on land not owned or controlled by the producer, the manure management plan (as a minimum) shall document the amount of manure to be transferred, the nutrient content of the manure, the date of transfer, and who will be responsible for the environmentally acceptable use of the waste. Provisions shall be made to inform the receiver of the manure of the proper storage and/or utilization requirements.

**Hauling equipment.** Equipment used for hauling manure from one geographical area to another shall be capable of hauling the manure without spillage, leakage, or windblown losses during transport. Hauling equipment shall meet all applicable local, state, and federal laws regarding highway transportation.

Weight limits of roads used for hauling waste shall be followed.

## **CONSIDERATIONS**

### **General**

Consider economics (including design life), overall manure management system plans, and health and safety factors.

### **On-Farm Transfer**

In locating structures, utilize existing topography to the greatest extent possible to generate head on structures and reduce pumping requirements.

Consider the operating space requirements of loading and unloading of equipment in the vicinity of the manure transfer components.

Consider the subsurface conditions (for example, depth to bedrock, water table, etc.) when locating and designing structures.

Pipelines used for transferring manure should be flushed with clean water after use.

Caution should be taken when crossing watercourses to prevent discharge of wastewater to the surface waters. Buried pipelines could be encased in another pipe to provide additional protection in case of exposure. Aboveground pipe will need to be supported when crossing watercourses either inside another pipe or by other means. [Chapter 52 in National Engineering Handbook Part 636, Structural Engineering](#), has guidance on design of supports for aboveground pipe.

When applicable and compatible, consider the joint use of manure transfer pipelines with irrigation system design requirements.

The pipe pressure rating required may need adjustment based on manure temperature.

Consider corrosion resistance and water tightness in the selection of pipe material and joints.

Consider the potential for salt (struvite) deposits in smaller diameter pipes.

Consider the need for appropriate check valves, anti-siphon protection, and open air breaks in all pipelines.

Provisions should be made for removing solids from conveyance conduits such as concrete-lined ditches, etc.

### **Off-Farm Transfer/Transport**

Consider route selection and timing of manure transfer to minimize impact of nuisance odors on others.

Consider equipment type and covering of manure to minimize particulate matter generation during transport of manure.

Vehicles used to transfer manure should be sized to reduce the danger of rollover.

### **PLANS AND SPECIFICATIONS**

Plans and specifications for installing manure transfer systems shall be in accordance with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

### **OPERATION AND MAINTENANCE**

An operation and maintenance (O&M) plan must be prepared and reviewed with the landowner or operator responsible for the application of this practice. The O&M plan shall provide specific

instructions for proper O&M of each component of this practice and shall detail the level of repairs needed to maintain the effectiveness and useful life of the practice.

The O&M plan shall describe what actions will be taken to minimize flies and other insects during the transfer of manure.

For the hauling of manure from one geographical area to another, record keeping by the producer or his/her designated representative will be required and should include such items as follows:

- The type, nutrient content, and amount of manure transferred
- The solids percentage of the manure
- The date of the transfer
- The name and address of the source and destination of the manure
- The condition of the manure as left at the destination (spread, stockpiled and covered, etc.)