

Manure Transfer (No.) 634

DEFINITION

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

PURPOSES

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

Where manure transfer is a component of a comprehensive nutrient management plan or planned agricultural waste management system.

Where manure is generated by livestock production or processing and a conveyance system is necessary to transfer manure from the source to a storage/treatment facility and/or a loading area, and/or from storage/treatment 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 NRCS conservation practice standard Nutrient Management (590).

CRITERIA

General Criteria Applicable To All Purposes

Manure transfer components shall be planned, designed, and installed to meet all federal, state, local, and tribal laws 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 NRCS conservation practice standard Waste Storage Facility (313). Covers, when needed, shall be designed to support the anticipated dead and live loads.

Reception pits shall be sized to contain a minimum of one full day's manure 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 and emergency storage.

Reception pits shall be installed above the water table where practicable. When it is necessary to install a reception pit within the water table, the reception pit shall be designed with a factor of safety of at least 1.2 for buoyant forces and shall meet all other requirements for a fabricated structure as defined in NRCS conservation practice standard Waste Storage Facility (313).

Openings to structures to receive manure from alley scrape collection shall be a minimum of 9 square feet (0.8 sq m) with one dimension no smaller than 4 feet (1.2 m). 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 pressure-treated wood. Curbs shall be of sufficient height to ensure total manure flow into the structure and be adequately anchored.

Pipelines. 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.

Pipelines used for transferring waste to an irrigation system shall meet the requirements of NRCS conservation practice standard Irrigation Water Conveyance, Pipeline (430).

All pipes shall be designed based on the type of material and total solids content and shall convey the required flow without plugging. Flow velocities shall be sufficient to minimize settling of solids in the pipeline. Except for recycle flush systems, pipelines shall be designed to have a minimum of 2 feet per second and a maximum of 6 feet per second velocity. Where ruminant manure is transferred in a gravity system, velocities can be reduced if a minimum of 5 feet of head is provided on the pipe system.

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 (1.2 m) of head is required on the pipe system.

Gravity discharge pipes used for emptying a storage/treatment facility shall have a minimum of two gates or valves, one 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 groundwater.

Openings where manure transfer pipes pass through a liner, wall, or other barrier shall be sealed to provide at least the same level of leakage protection provided by the liner, wall, or barrier. If the liner, wall, or barrier is a manufactured product, follow the manufacturer's recommendations for sealing the opening.

Pipe used to transfer manure shall meet or exceed the applicable specification listed in Table 1 below. Pipe used with manure pumps shall be consistent with the pump manufacturer's recommendations. Joints shall be watertight using rubber/elastomeric (gasket) seals or solvent-welded couplings/fittings.

TABLE 1 - PIPE SPECIFICATIONS	
Pipe Material	Applicable Specification(s)
Plastic (PVC)	ASTM: D3034; D1785; D2241; F679; F794
Plastic (HDPE)	AASHTO: M294 Type S
Concrete	ASTM: C76
Steel	ASTM: A52; A134; A135; A139

Pipelines for Non-Bedded Manure. The minimum diameter shall be 6 inches with a minimum of one-percent (1 percent) grade. Pipes for non-bedded manure shall enter at least 3 feet above the pond or structure bottom. Clean-out access shall be provided for gravity pipelines at a maximum interval of 200 feet (60 m). A clean-out shall be installed for pipes entering below the design volume elevation.

Pipelines for Bedded Manure. The minimum diameter shall be 24 inches and the grade shall not exceed five-percent (5 percent). Pipes for bedded manure shall enter at the pond or structure bottom. The head on the pipe shall be at least 5 feet from the inlet invert of the pipe to the design volume elevation in the storage facility. Clean-out access shall be provided for gravity pipelines at a maximum interval of 150 feet (45 m).

Other Conduits. Concrete lined ditches shall be designed in accordance with NRCS conservation practice standard Lined Waterway or Outlet (468). A minimum design velocity of 1.5 feet per second (0.5 m/sec) shall be used.

Pumps. Pumps installed for manure transfer shall meet the requirements of NRCS conservation practice standard Pumping Plant (533). Pumps shall be sized to transfer manure at the required system head and volume. 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.

Tractors or other vehicles used to tow manure spreaders or tank wagons shall be sized to reduce the danger of rollover.

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

Manure shall be applied to the utilization area in amounts, uniformity, rates, and at a time consistent with the requirements of NRCS conservation practice standard Nutrient Management (590), 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.

Manure transfer equipment shall have adequate capacity to ensure the emptying of storage/treatment facilities within the planned time periods.

Equipment used for hauling manure from one geographical area to another area shall be capable of hauling the manure without spillage, leakage, or wind-blown losses during transport. Hauling equipment shall meet all applicable federal, state, local, and tribal laws regarding highway transportation. Weight limits of roads used for hauling waste shall be followed.

CONSIDERATIONS

General

Consider the potential effects of installation and operation of manure transfer components on the cultural, archeological, historic, and economic resources.

On-Farm Transfer

Utilize existing topography to the greatest extent possible to generate head 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; i.e., depth to bedrock, water table, etc.; when locating and designing structures.

System for flushing pipelines with clean water, where appropriate.

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.

Consider provisions for removing solids from conveyance conduits such as concrete lined ditches, etc.

Potential for sand deposition in pipes when sand bedding is used.

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.

PLANS AND SPECIFICATIONS

Plans and specifications shall be prepared in accordance with the criteria of this standard and shall describe the requirements for applying the practice to achieve its intended use.

Support data documentation requirements are as follows:

- Inventory and evaluation records
 - Assistance notes or special report
- Survey notes, where applicable
 - Design survey
 - Construction layout survey
 - Construction check survey
- Design records
 - Physical data, functional requirements, and site constraints, where applicable
 - Soils/subsurface investigation report, where applicable
- Design and quantity calculations
- Construction drawings/specifications with:
 - Location map
 - “Designed by” and “Checked by” names or initials
 - Approval signature
 - Job class designation
 - Initials from preconstruction conference
 - As-built notes
- Construction inspection records
 - Assistance notes or separate inspection records
 - Construction approval signature
- Record of any variances approved, where applicable
- Record of approvals of in-field changes affecting function and/or job class, where applicable

OPERATION AND MAINTENANCE

An Operation and Maintenance (O&M) plan shall be developed for this practice. The O&M plan shall be consistent with the purposes of the practice, its intended life, safety requirements, and the criteria for the design.