

**ONATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
Rhode Island**

**MANURE AND WASTEWATER TRANSFER
(No.)**

Code 634

DEFINITION

An installation to convey animal manure, bedding, process and wash water, and other residues associated with agricultural production.

PURPOSE

To convey agricultural waste.

CONDITIONS WHERE PRACTICE APPLIES

The manure transfer structure is a component of an overall waste management system.

A manure transfer structure is needed to move agricultural waste to facilitate farm management and minimize contamination threats to surface and groundwater.

CRITERIA

Reception Pit

The reception pit shall meet the requirements of Waste Storage Facility Standard No. 313 for structural loadings, service life and durability, and structural design.

The inlet to the reception pit shall be compatible with the cleaning equipment. When manure is scraped with a front-end loader or an alley scraper a grate shall be provided. The maximum slot width between the grate cross-bars shall be six inches. The minimum open area of the grate shall be nine square feet with at least one dimension no smaller than four feet. The grate shall support the anticipated loads.

A cover that will support the anticipated live and dead loads and provide safety for animals and humans shall be provided. Permanent barriers such as gates or bars may be installed in lieu of a cover, if such barriers insure adequate safety for human and animal traffic.

The reception pit inlet shall be a minimum of five feet above the maximum design storage

elevation of the waste storage facility when the pipe length is 100 feet or less. The reception pit inlet shall be a minimum of four feet above the top of the transfer pipe.

The volume of the reception pit above the maximum design storage elevation of the waste storage facility shall be at least the anticipated daily volume of manure.

The outlet of the reception pit shall be constructed to minimize the head loss at the outlet of the transfer pipe.

Gravity Transfer Pipe

The gravity transfer pipe is a conduit used to transfer manure and liquid waste by gravity from the reception pit to a waste storage facility. The transfer pipe shall be at least 25 feet from a well and one foot or more above bedrock and groundwater. It shall meet or exceed the following specifications:

<u>Pipe Material</u>	<u>Specification</u>
Polyvinyl Chloride (PVC)	ASTM-D 3033
	ASTM-D 3034
	ASTM-F 679
Reinforced Concrete Ductile Iron -	ASTM-C 76
	AWWA-C 151
	AWWA-C 115
Steel	ASTM-A 53
	ASTM-A 134
	ASTM-A 135
	ASTM-A 139

All transfer pipe shall be installed with watertight couplings. Gaskets shall be the type recommended by the pipe manufacturer for watertight conditions. Steel pipe may be welded.

Transfer pipe shall withstand all anticipated liveloads, and dead-loads. The minimum earth cover over the pipe shall be three feet. The minimum internal pressure rating of the pipe and fittings shall be five times the maximum anticipated head.

The maximum length of pipe shall be 150 feet for bedded manure and 200 feet for manure with no bedding.

Transfer pipe used for manure shall not be installed with curves or bends. Deflections of less than five degrees at pipe joints are permitted.

The transfer pipe outlet invert elevation shall be within two feet of the waste storage facility bottom elevation. The pipe outlet shall have a sufficient cover of manure to prevent freezing. The end section of pipe shall be anchored to prevent horizontal movement and floatation.

The minimum pipe diameters for dairy manure are:

Minimum Head ¹ ft.	Amount of ² Bedding lb/day/head	Pipe Diameter ³	
		Reinforced Concrete in.	PVC Steel/Ductile in.
5	none	24	18
	2-3	30	24
6	none	21	15
	2-3	27	21

¹ Head is the elevation difference from the reception pit inlet to the maximum design storage elevation of the waste storage facility.

² Two to three pounds per day per head of chopped or short hay or straw is the maximum amount of bedding. Long hay or straw bedding does not flow. Heavy material such as sand is permissible, but clean out of the waste storage facility must include complete cleanout of sand at the end of the manure transfer pipe.

³ The above minimum diameters are for pipe lengths of 100 feet or less. For lengths greater than 100 feet increase the head by three feet or the diameter by six inches for each additional 50 feet of length.

The minimum transfer pipe diameter for swine wastes shall be six inches for pipe slopes of 1.0 percent or more and 10 inches for pipe slopes from 0.5 percent to 1.0 percent.

Gravity Outlet Pipe

The outlet pipe is a conduit used to convey manure from the waste storage facility to a spreader or hauling unit.

The minimum outlet pipe diameter shall be 18 inches.

The bottom of the waste storage facility shall be sloped approximately two percent toward the inlet of the pipe. A sump one to two feet deep will be provided at the inlet.

The outlet pipe shall have a minimum slope of four percent. Two shut-off valves shall be installed on the pipe; one at the outlet end and one located below the frost line. The valves shall be operated by independent power sources i.e., one manual and one hydraulic; or one hydraulic operated by electric motor and one hydraulic operated by tractor. The valves shall be dual-acting, capable of applying pressure in both directions.

The end section of the outlet pipe shall be designed to support the anticipated loadings. The outlet end of the pipe shall be high enough to load the hauling equipment, but in no case shall it be less than eight feet above the loading platform. The loading platform shall support any anticipated hauling equipment.

Provide containment facilities for spillage and overflow from the gravity outlet pipe.

Pumps and Irrigation

(1) FROM SOURCE TO WASTE STORAGE FACILITY:

The pump provides mechanical energy to move manure and wastewater through a transfer pipe to a waste storage facility. The reception pit size and dimensions for the pump installation shall be as recommended by the pump manufacturer. The outlet from the pump shall provide a smooth transition to the transfer pipe. Pumps installed for manure and wastewater transfer shall meet the requirements of Practice Standard 533, Pumping Plant for Water Control. The type and size of pump shall be based partially upon the consistency of the manure and wastewater and shall be installed in accordance with the manufacturer's recommendations.

(2) FROM WASTE STORAGE FACILITY TO FIELD APPLICATION BY IRRIGATION:

Pumps installed for wastewater transfer to an irrigation system shall be designed in accordance with Practice Standard 533, Pumping Plant for

Water Control. Sprinklers, spray nozzles, and sprinkler systems shall meet the requirements for Practice Standard 442, Irrigation System, Sprinkler. Permanently installed mains and laterals shall meet the requirements for Practice Standard 430, Irrigation Water Conveyance.

Pump Transfer Pipe

The Transfer pipe shall be at least 25 feet from a well and one foot or more above bedrock and groundwater. All pipes shall have watertight couplings.

All transfer pipe installations shall meet or exceed the pump manufacturer's recommendations. The manufacturer's recommendations for sealing the joints shall be followed. Elbows or bends in the pipe alignment greater than five degrees shall be supported by thrust blocks.

All manure and wastewater transfer pipe and fittings shall have a minimum pressure rating of 125 psi.

Safety

Open structures shall be provided with covers or barriers such as gates or bars. Ventilation and warning signs shall be provided for waste transfer structures as necessary to prevent explosion, 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.

Vegetation

All areas disturbed by construction of the waste transfer structure shall be seeded in accordance with Critical Site Planting Standard (342). Shrub and tree screening or earth mounding shall be provided as appropriate for improving aesthetic conditions at the site.

CONSIDERATIONS

See the collection and transfer sections of Chapter 10 of the Agricultural Waste Management Field Handbook for additional considerations.

Discharge liquid wastes such as milking parlor wastes into the reception pit to provide a more

liquid consistency and improved flow conditions in the transfer pipe.

Gravity transfer pipes are subject to clogging by dry or frozen manure, too much bedding, debris falling into the reception pit, etc. Installing a steel cable inside the pipe during construction allows a tire or other device to be pulled through the clogged pipe.

Include durable curbs to contain the manure while loading a gravity drop structure.

Utilize topography to generate head to reduce pumping requirements.

Design the waste transfer structure to utilize the loading and unloading equipment that is available. Recommend the purchase of specialized equipment for loading and unloading as needed.

Design for compatibility for joint use of a waste transfer structure with a waste utilization irrigation system.

PLANS AND SPECIFICATIONS

Plans and specifications for waste transfer structure 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 protective cover or barrier for the reception pit shall be maintained to provide safety for animal and human traffic. The cover or barrier shall be replaced immediately after each cleaning.

Frozen or dried manure can cause clogging of the waste transfer structure. Frozen manure should be piled or stacked until thawed before loading into the waste transfer structure. Dried manure should have water added or be mixed with wetter manure before loading into the waste transfer structure.

Shields and other safety features shall be installed and maintained on manure pumps.

Care shall be exercised by equipment operators when loading and unloading to prevent damage to the waste transfer structure or other equipment.