

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD  
RHODE ISLAND**

**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 may be included) or other agricultural wastewater associated with animal production through a hopper or reception pit, a pump (if applicable), a conduit, or hauling equipment to:

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

**CONDITIONS WHERE PRACTICE APPLIES**

Where manure transfer is a component of a comprehensive nutrient management plan (CNMP).

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 surplus manure to a geographical area that can utilize the manure in an environmentally acceptable manner.

This practice does not include land application or other use of manure. Criteria for land application of manure are included in Rhode Island NRCS Standards 590, Nutrient Management or 633, Waste Utilization.

**CRITERIA**

**General Criteria Applicable to All Purposes**

**Laws and Regulations.** All Federal, state, and local laws, rules, and regulations, including local inland wetland agency regulations, governing the construction and use of this practice as well as setbacks from wells, surface water and property boundaries shall be followed. Planned work shall comply with all federal, state, and local laws and permit conditions and requirements. **The landowner shall obtain all necessary permits prior to construction or any land clearing activities.**

**Separation Distances.** Separation distances from residences and buildings, property lines, surface water bodies including wetlands, private wells or springs, and/or public wells shall be determined on a case by case basis in consultation with appropriate state or local regulatory agencies.

**Use the following separation distances for preliminary planning purposes only.**

Residences and businesses – Owner-Operator	250 feet
Residences and businesses - Other	500 feet
Property lines	250 feet
Public Roads	250 feet
Drinking Water Supply Lines	150 feet
Surface water bodies	250 feet
Private well or spring	150 feet
Public water supply well	500 feet
Above seasonal high water table	24 in.
Depth to bedrock	48 in.*
* May reduce with DEM concurrence if lined.	

**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 Rhode Island NRCS Standard 313, Waste Storage Facility. Covers, when needed, shall be designed in accordance with Rhode Island NRCS Standard 367, Waste Facility Cover 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.

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.

Openings to structures to receive manure from alley scrape collection 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 wood. Curbs shall be of sufficient height to ensure total manure flow into the structure and be adequately anchored.

**Gravity Transfer Pipelines.** 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. **Gravity outlet pipelines are not allowed under this standard.** 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
High Density Polyethylene (HDPE)	ASTM-D 3350
Steel	ASTM-A 53
	ASTM-A 134
	ASTM-A 135
	ASTM-A 139

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 pipe diameter for gravity transfer pipelines for manure shall be 24". The minimum pipe diameter for gravity transfer pipelines for water with minimal solids shall be 8".

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.

The minimum pipeline capacity from storage/treatment facilities to utilization areas shall ensure that wastes can be applied at rates consistent with those prescribed in the nutrient management plan.

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.

Pipelines used for transferring waste to an irrigation system shall meet the requirements of

Rhode Island NRCS Standard 430, Irrigation Water Conveyance, Pipeline.

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.

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 transfer pipelines shall have a 4" diameter pipe installed within 2 feet of the outlet of the reception pit to function as a vent.

Gravity pipelines shall not have horizontal curves or bends in the pipe joints except for minor deflections (less than 10 degrees) that are within ASTM tolerances for that particular pipe.

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

Pipes used for filling a storage/treatment facility shall have a minimum of two manually operated gates or valves. Where pumping up to storage, an additional check valve shall be installed at the pipe outlet.

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

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

**Other Conduits.** Concrete lined ditches shall be designed in accordance with Rhode Island NRCS 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 Rhode Island NRCS Standard 533, Pumping Plant. 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.

Pumps installed for wastewater transfer to an irrigation system shall be designed in accordance with Rhode Island NRCS Standard 533, Pumping Plant. Sprinklers, spray nozzles, and sprinkler systems shall meet the requirements of Rhode Island NRCS Standard 442, Irrigation System, Sprinkler. Permanently installed mains and laterals shall meet the requirements of Rhode Island NRCS Standard 430, Irrigation Water Conveyance.

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

***Warning signs, fences, ladders, ropes, bars, rails, and other devices shall be provided, as appropriate, to ensure the safety of humans and livestock.***

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.

### **Vegetation**

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

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

**Waste utilization.** Manure shall be applied to the utilization area in amounts, uniformity, rates, and at a time consistent with the requirements of Rhode Island NRCS Standards 590, Nutrient Management or 633, Waste Utilization 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, transfers shall be in accordance with the provisions of the Rhode Island DEM CAFO General Permit as amended.

**Hauling equipment.** 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 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, i.e., depth to bedrock, water table, etc., when locating and designing structures.

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

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

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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.

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

Where feasible, provide for discharge of 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.

#### **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.

Truck gross vehicle weight should be kept within legal limits for the roads being used as transport routes.

### **PLANS AND SPECIFICATIONS**

Plans and specifications shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. Plans and specifications shall include construction plans, drawings, job sheets or other similar documents. These documents shall as a minimum, specify the requirements for installing the practice and include the kind, quantity and quality of materials to be used.

To the extent practical, specifications shall conform to NRCS National Engineering Handbook Parts 642 and 643 (Section 20).

### **AS-BUILT DRAWINGS**

As built drawings shall be prepared showing all pertinent elements and elevations as actually installed. Copies of those as-built drawings shall be provided to the owner / operator upon construction completion.

### **OPERATION AND MAINTENANCE**

An Operation and Maintenance (O&M) Plan shall be prepared for, reviewed with, and signed by the landowner or operator responsible for the application of this practice. The O&M Plan shall provide specific instructions for proper operation and maintenance 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 operation and maintenance 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 shall be consistent with the provisions of the Rhode Island DEM CAFO General Permit as amended.
- 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.
- Biosecurity provisions shall be specified.