

WASTE TRANSFER {634}

NRCS Waste Management Standards Overview Meeting [Aug. 2012]

634 Team Members

Name	Affiliation	Title
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Overview



- Standard Updated
- New Specification for 634
- New Companion Document for 634

What's in a Name?

	Existing	New
Name	Manure Transfer	Waste Transfer
Definition	Manure conveyance system	Byproducts from agricultural operations
Purposes	Animal manure	All things waste

What's in a Name?

Wastewater	Manure Processing Derivatives	Contaminated Runoff	Leachate
<ul style="list-style-type: none">• milkhouse• milking parlor washwater• leachate• similar waste <p>**wastewater from holding area is considered manure</p>	<ul style="list-style-type: none">• result of treatment or processing• examples: flush water, separated sand, separated manure solids, digested liquids, etc	<ul style="list-style-type: none">• water that has touched barnyard, animal lot, feed storage• generally has manure, sediment, feed or other material in it	<ul style="list-style-type: none">• water that has percolated through a pile of manure, processing derivatives, or animal feed

What's in a Name?

Existing	New {tank is not used}		
Tank	Reception Structure	Hopper	Channel
<ul style="list-style-type: none"> • never defined • used throughout standard 	<ul style="list-style-type: none"> • collection vessel used to hold waste and facilitate its transfer 	<ul style="list-style-type: none"> • sole purpose to feed waste into a transfer pump • >6,000 gallon capacity are reception structures 	<ul style="list-style-type: none"> • narrow structure • immediate transfer to reception structures, hoppers, w.s.f • include modified gutters

What's in a Name?

Pressure Rating	Transfer System Pressure Rating	Working Pressure
for pipe	pipe, pipe fittings, other appurtenances	max. designed operating pressure of the transfer system
max. pressure the pipe can withstand without failure determined by the manufacture	lowest pressure rating of any of the items listed above	72% of the transfer system pressure rating

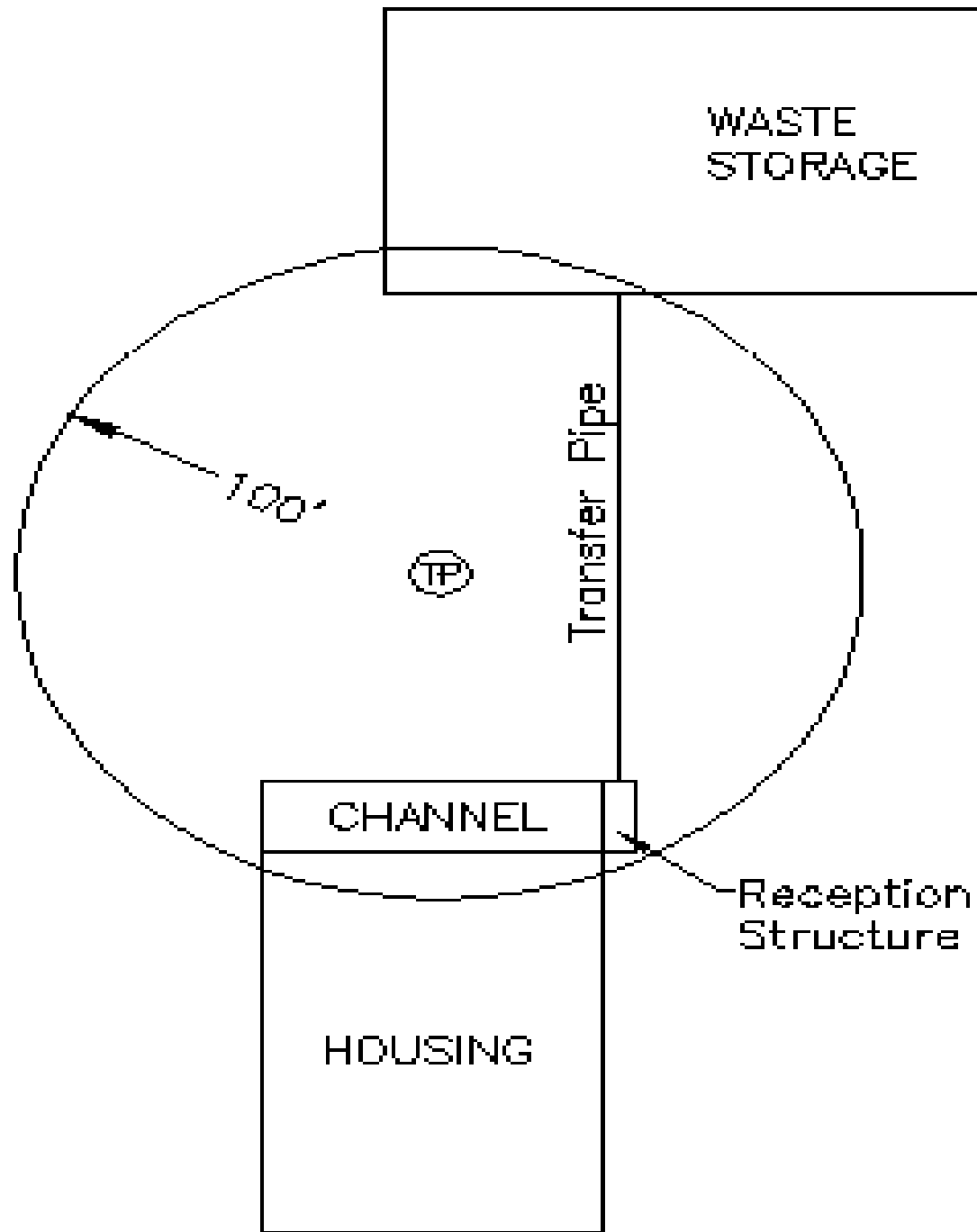
General Criteria

	Existing	New
Conditions Where Applicable		<ul style="list-style-type: none">• Permanently installed conveyance system• Does not apply to gutters (<i>defined as existing open troughs – think of stanchion barns</i>)
Management Assessment	Refer to 313	Components Listed
Site Assessment	Refer to 313	Components Listed

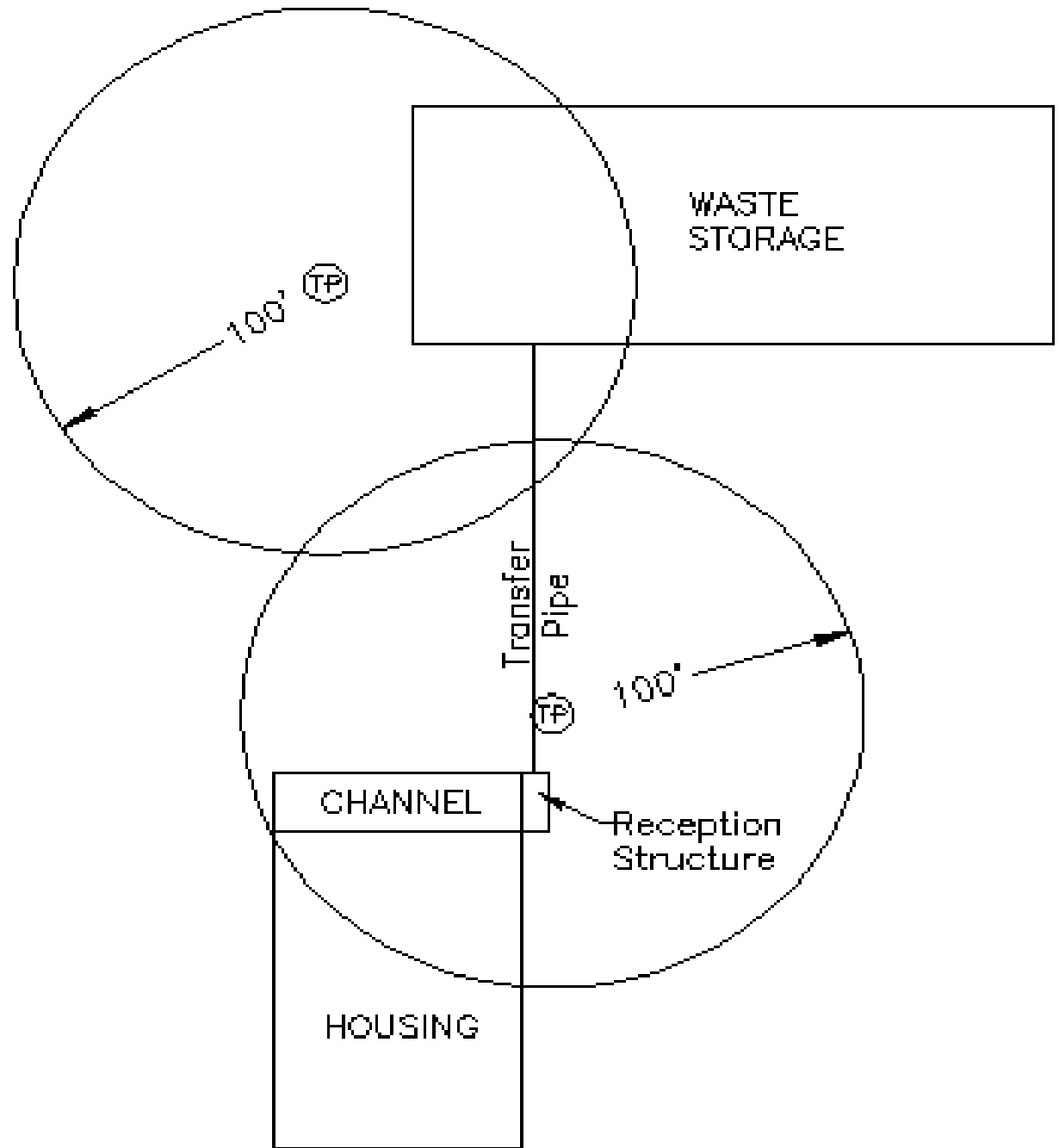
General Criteria

	Existing	New
Soil Investigations	<p><u>Tanks Only</u></p> <ul style="list-style-type: none">• 1 per 40'• +1 per add. 80'• no more than 100' from footprint	<p><u>Reception Structures, Channels, and Transfer Pipe</u></p> <ul style="list-style-type: none">• no portion >100' from soil investigation• extend deep enough to ensure required separation distance is achieved• complete more if soil varies significantly• each soil investigation can be used for multiple components• logs follow new 313 criteria

Example 1



Example 2



General Criteria

NEW SECTION

Separation from Subsurface Saturation or Bedrock

- ❑ criteria consistent with 313
- ❑ separation measured from closest distance from any point on the inside surface of the component to the feature from which separation is required
- ❑ Perched Conditions
 - drained via gravity
 - system located outside the component footprint
 - drain to surface outlet
- ❑ Bedrock
 - No blasting
 - Treat fractures or voids
 - Min. 1% positive grade away from component

General Criteria

NEW SECTION

Floodplain

- protect reception structures, channels, and hoppers from 25 yr 24 hr rainfall
 - inundation
 - structural damage
 - instability

- transfer components affected by 25 yr 24 hr rainfall
 - designed for loading (buoyancy/uplift) {companion document}
 - evaluated for additional protections (backflow, watertight connections, auto. shutoffs)
 - keep vents, power supplies, shutoffs out of water

General Criteria



Safety

- ▣ Safety fences – refer to Fence (382) Standard
- ▣ design of tank cover, criteria listed
- ▣ ventilation of enclosed areas now required

General Criteria

NEW SECTION

Failure Analysis

- ❑ evaluate entire design
- ❑ address issues
 - during the design phase
 - O&M
 - Emergency Response Plan
- ❑ be sure to document the analysis and decisions made

[Failure Analysis Example](#)

General Criteria

Construction Plans and Specifications

Existing	New	
Vague	Specific	
<ul style="list-style-type: none">• only required an inspection plan	<ul style="list-style-type: none">• must include maximum design working pressure• transfer system pressure rating	<ul style="list-style-type: none">• location map• plan view• profiles• cross sections• details and specs to ensure it can be built correctly

General Criteria

NEW SECTION

Engineering Design Documentation

- ❑ follow Statement of Work (efotg)
- ❑ includes all data, computations, assumptions
- ❑ must prove you have met the standard

Statement of Work

General Criteria

NEW SECTION

Quality Assurance Plan {formally known as Inspection}

- required for each construction plan
- specifically lists required items
 - site info.
 - key Parties
 - testing/Observations/etc.

[QA Plan Example](#)

General Criteria

Operation and Maintenance

Existing	New	
refer to 313	Specific	
	<ul style="list-style-type: none">• must be reviewed with landowner/operator• specific for each component• detail maintenance items	<ul style="list-style-type: none">• general system overview• safety and emergency response• operating procedures, pump start up/downs• maintenance item schedule

O&M Example

Specific Criteria

Reception Structures, Channels, Hoppers, Pumps

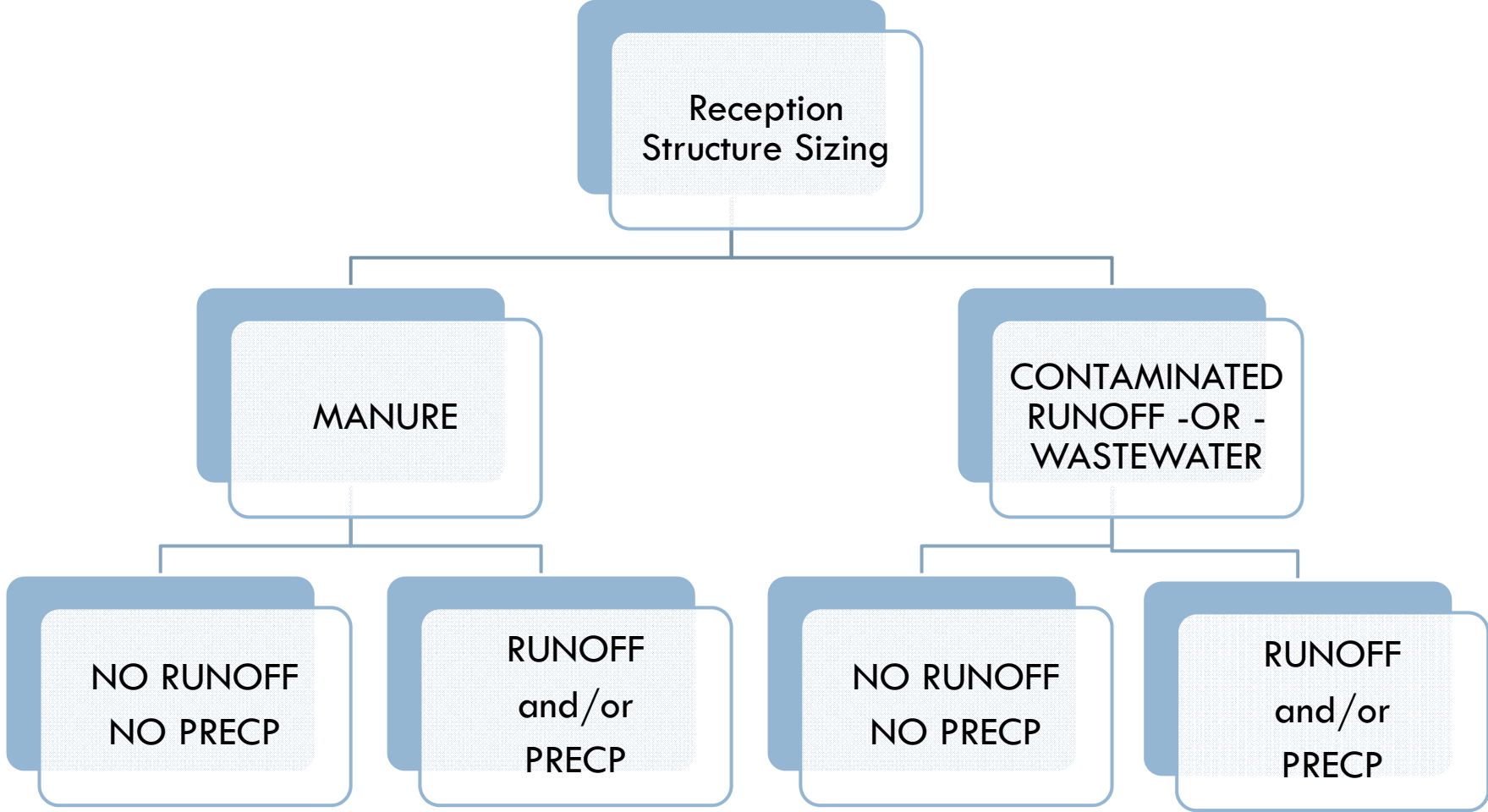
	Existing (tanks and pumps)	New
Liquid tight	“they”	Joints and appurtenances
Openings to Structures from Scrape Alleys		National criteria Min. area, min. dimension, designed grate
Cast in Place	Refer to 313	Some criteria listed
Prefab Structures		<ul style="list-style-type: none">•Listed in Database (online only)•No structural mods (ex. no attaching pumps to tank walls)
Manhole		Base must be monolithic riser and floor

Specific Criteria

Reception Structures, Channels, Hoppers, Pumps

	Existing (tanks and pumps)	New
Pump		Must follow Pumping Plant Standard
W.S.F. Penetration		Must follow 634 <u>SPECIFICATION</u>
Solid Liquid Separation		Basins/tanks/etc must be designed following the 632 Standard

Specific Criteria



EXAMPLE "A"

"B"

"C"

"D"

Example A

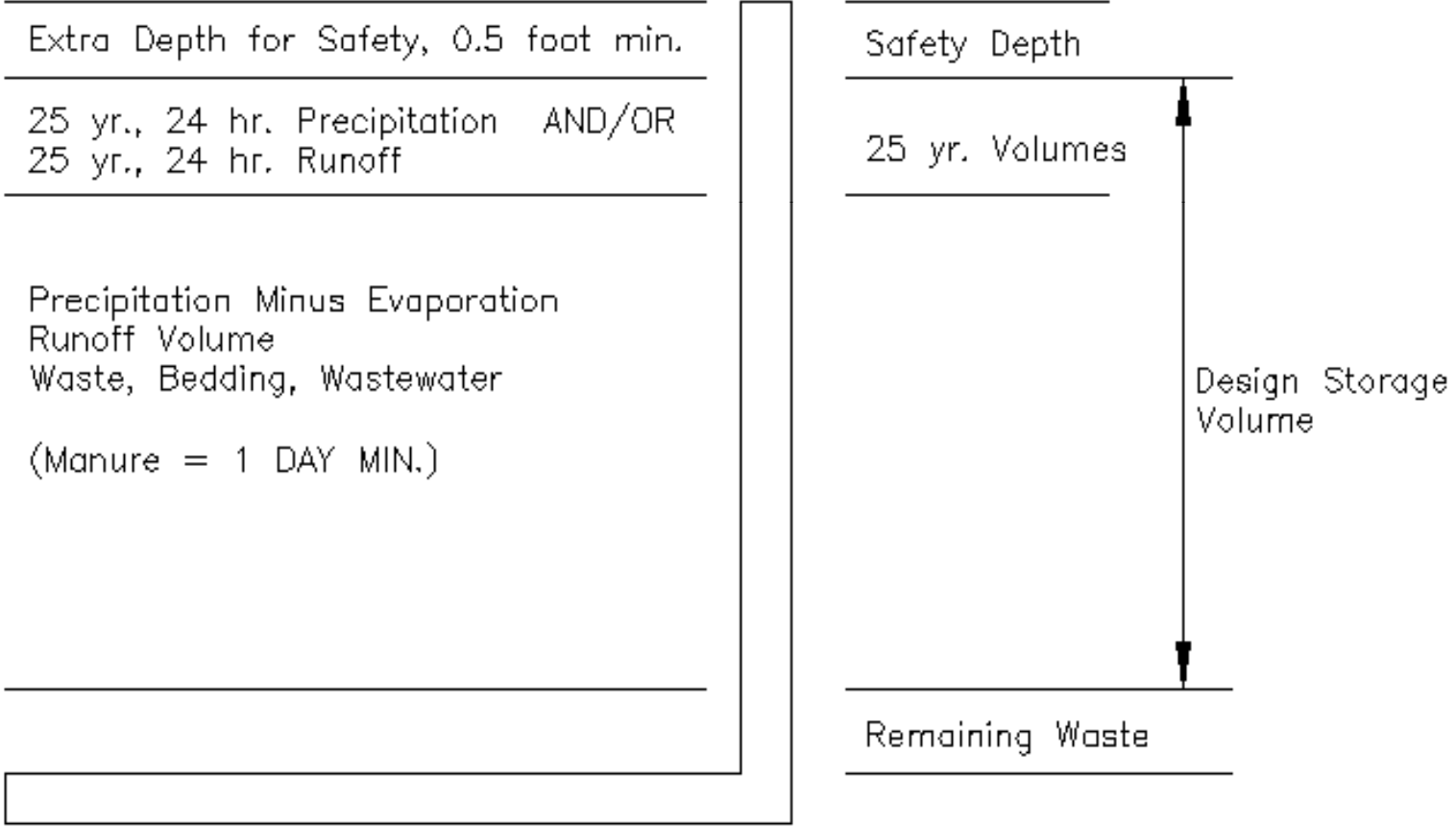
Manure Only



*Under floor structures should have 1' extra depth of safety.

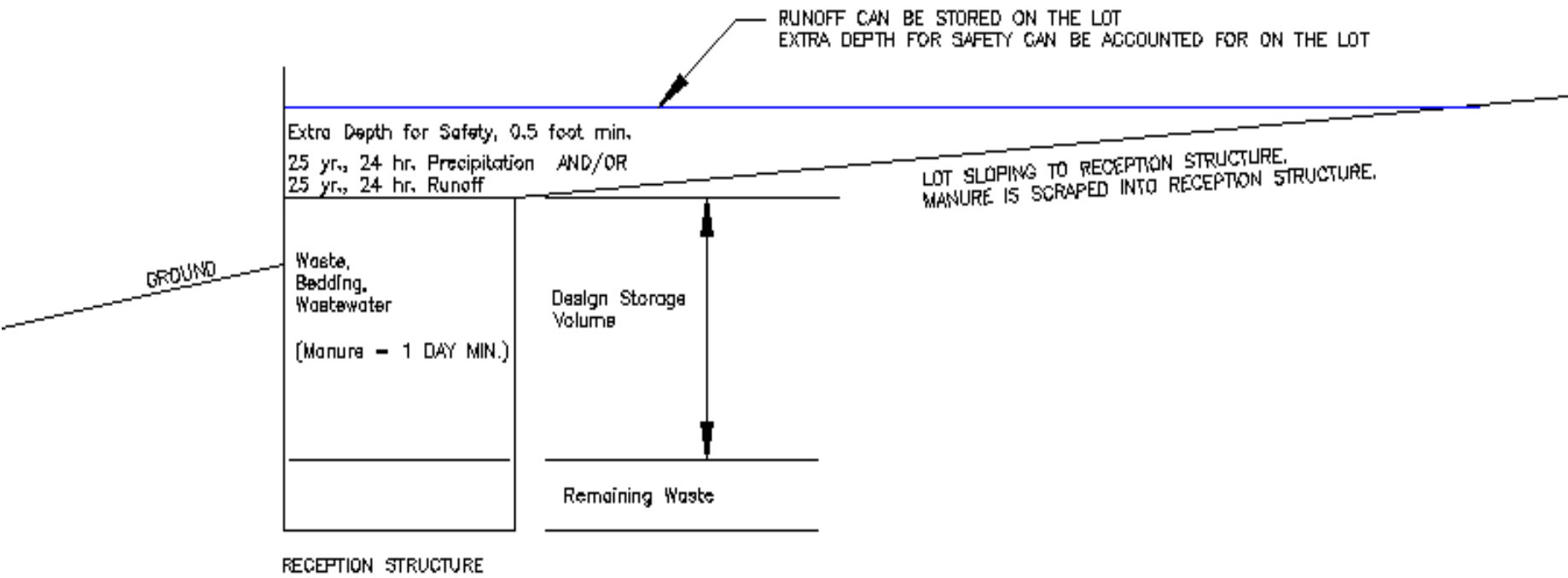
Example B

Manure + H₂O



Example B

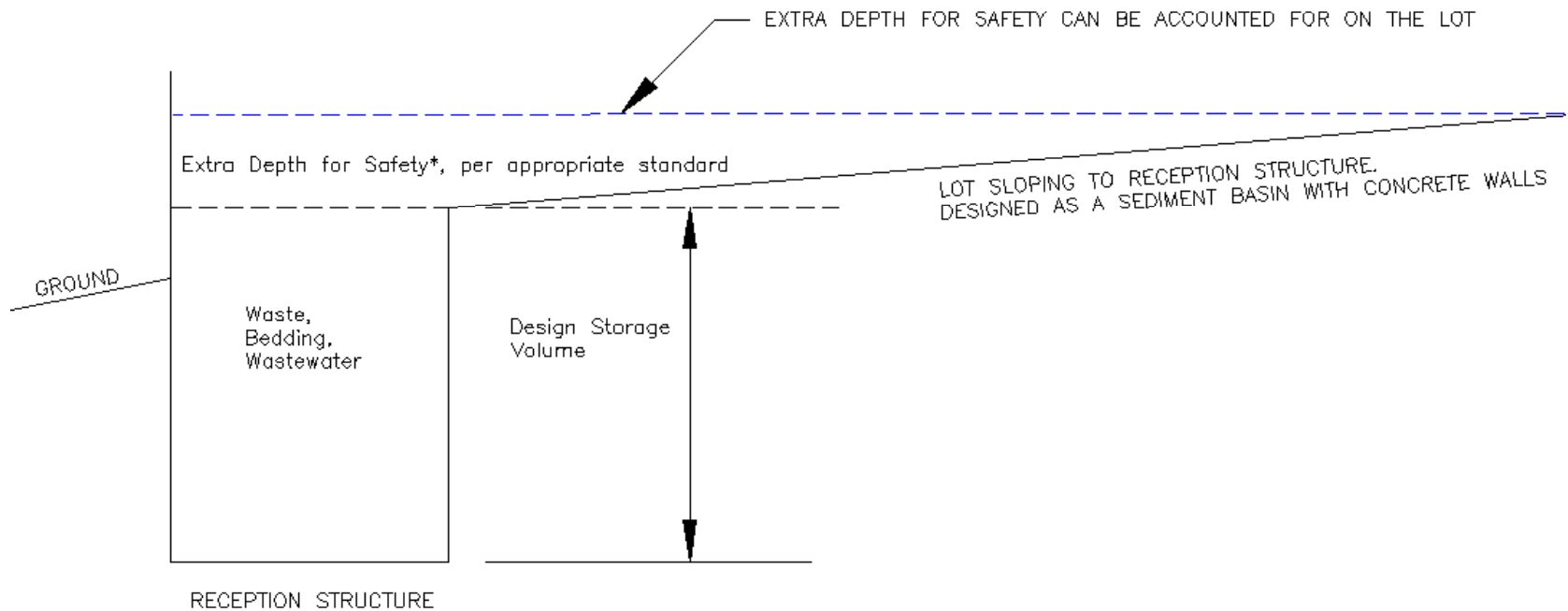
Manure + H₂O on LOT



Example C

Other Waste Only

Designed per the appropriate standards (i.e. sediment basin) typically barnyard or feed storage runoff system.

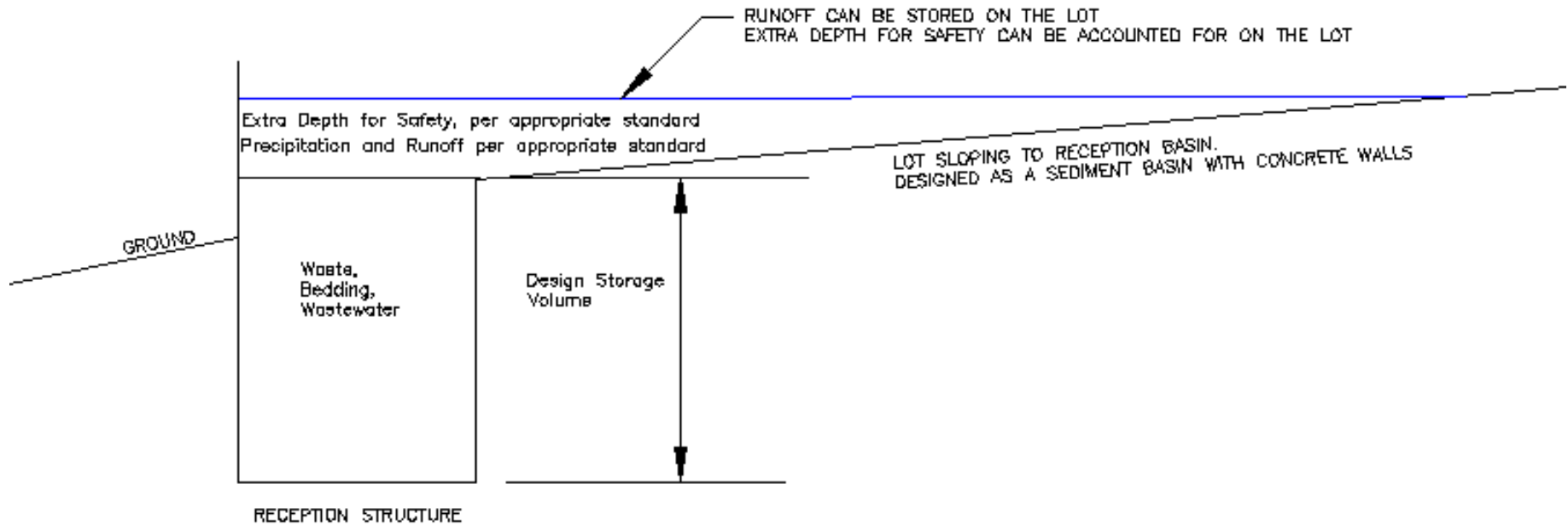


*Under floor structures should have 1' extra depth of safety.

Example D

Other Waste + H₂O

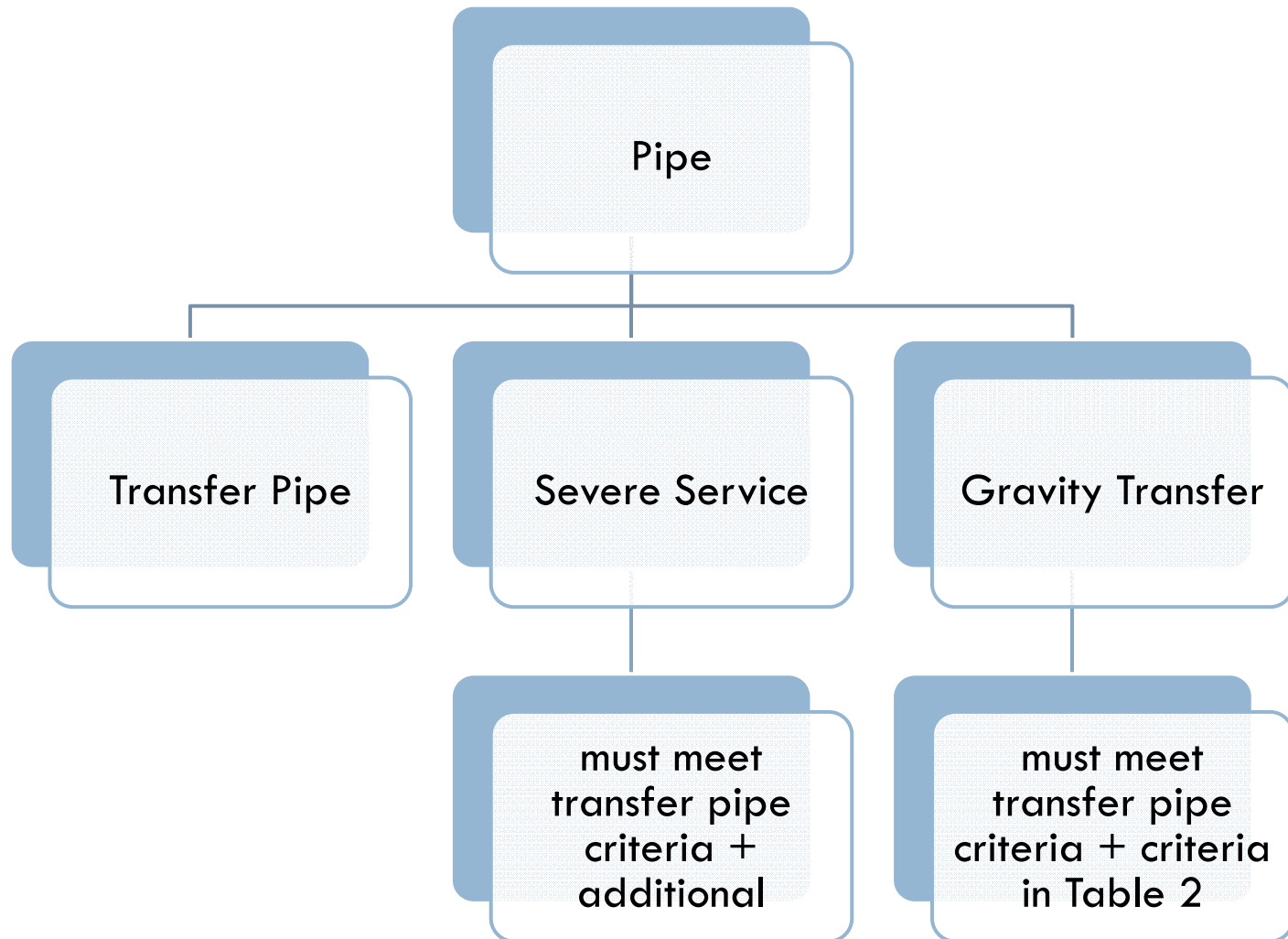
Designed per the appropriate standards (i.e. sediment basin) typically barnyard or feed storage runoff system.



Specific Criteria {Table 1}

Transfer Components	Bottom of Pump, Floor Surface, or Pipe Invert Relative to Bedrock	Bottom of Pump, Floor Surface, or Pipe Invert Relative to Subsurface Saturation	Well, Spring, and Reservoir Separation Distance ^{Note 1}
Pumps			
Pumps encased in concrete	≥ 6 inches	Bottom of pump maximum depth into saturation shall be 2 feet	≥ 50 feet
Pumps housed in a drywell ^{Note 2}	≥ 6 inches	Floor may be at the subsurface saturation level	≥ 50 feet
Reception Structures and Hoppers			
Capacity < 6,000 gallons	≥ 1 foot	Floor may be at the subsurface saturation level ^{Note 3}	≥ 50 feet
Capacity ≥ 6,000 gallons	≥ 2 feet	≥ 2 feet (≥ 1 foot for sumps) ^{Note 3}	≥ 100 feet
Channels			
(≥ 2 foot depth)	≥ 2 feet	≥ 2 feet (≥ 1 foot for sumps) ^{Note 3}	≥ 100 feet
Pipes			
All	≥ 6 inches	No restrictions	≥ 25 feet

Specific Criteria {pipes}



Specific Criteria {transfer pipe}

	Existing	New
Pipe Material	Table 2	Spec 634 {table 1}
Installation	Spec 15, 204	Spec 634
Thrust Control	1/2 yd concrete	Designed size {tools available}

CONCRETE THRUST BLOCK DESIGN

v. 7-2010

CLIENT: COUNTY: DATE:
 DSN BY: CHK BY: DATE:
 COMMENT:

$$A = \frac{98 H D^2 \sin\left(\frac{a}{2}\right)}{B}$$

Where:

- A = Area of thrust block required (ft²)
- H = Maximum working pressure (feet)
- D = Inside diameter of pipe (feet)
- B = Allowable bearing pressure of the soil (lb/ft²)
- a = Deflection angle of pipe bend (degrees)

INPUTS

Pipe Diameter (inches)

Maximum Working Pressure (psi)

Pipe Angle/Type of Fitting (enter elbow angle or chose type of fitting from pull down)

Allowable Soil Bearing Pressure (from soil tests or from Table 1 below) (lb/sq ft)

Area of Thrust Block Required sq ft

Min. Volume of Concrete** cu yd

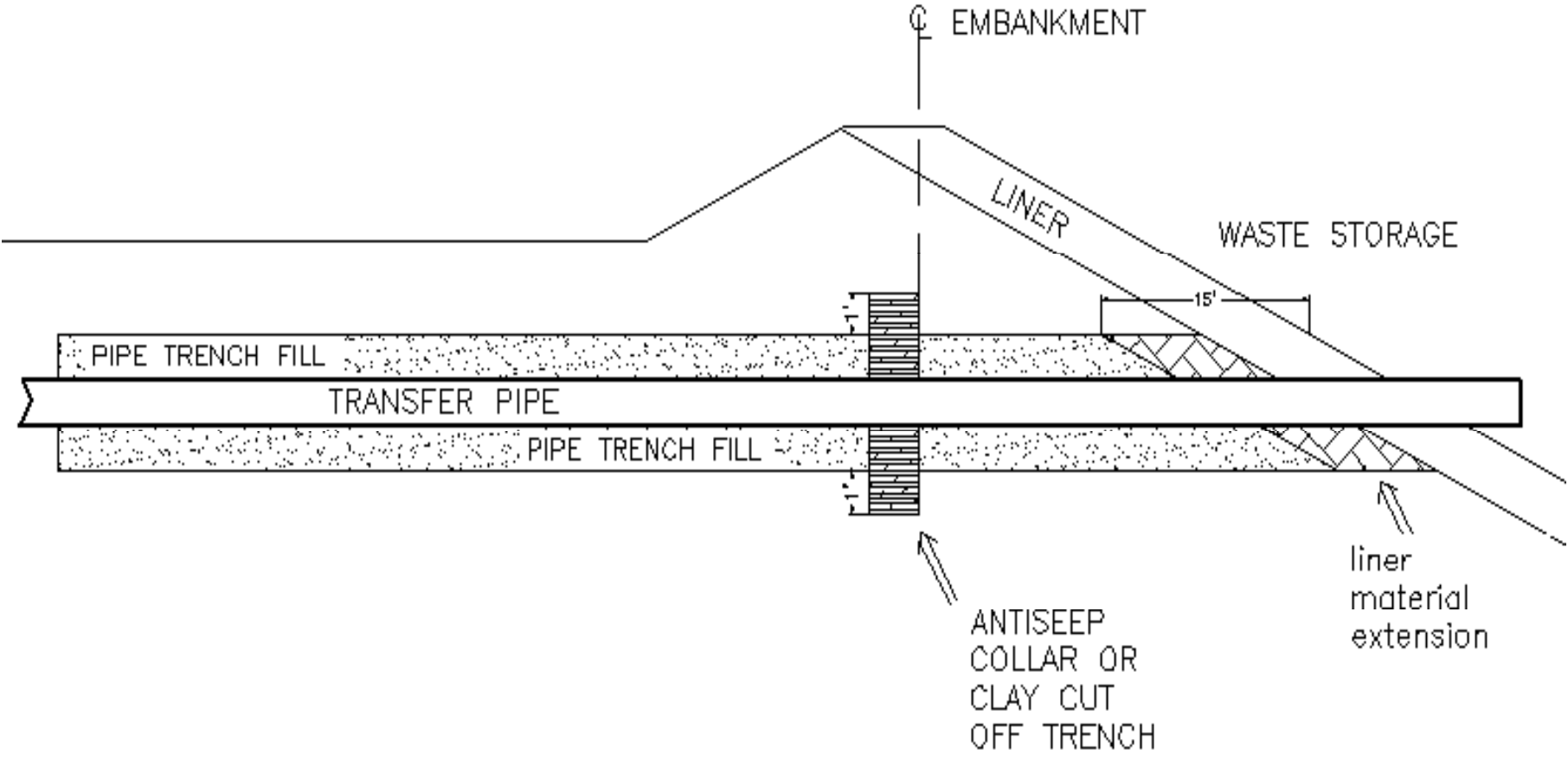
**Cast in place concrete requires minimum thickness of 8" around pipe.

Table-1 Allowable Soil Bearing Pressure

Natural soil material	Depth of cover to center of thrust block			
	2 ft	3 ft	4 ft	5 ft
	lb/ft ²			
Sound Bedrock	8,000	10,000	10,000	10,000
Dense sand and gravel mixture (assumed θ=40°)	1,200	1,800	2,400	3,000
Dense fine to coarse sand (assumed θ=35°)	800	1,200	1,650	2,100
Silt and clay mixture (assumed θ=25°)	500	700	950	1,200

Specific Criteria {transfer pipe}

	Existing	New
Liner Penetration		Additional criteria <ul style="list-style-type: none">• min. pipe length• concrete restraint• meet SPEC. 634
		Protect liners from preferential flow along pipe



Specific Criteria {transfer pipe}

	New
Flow Velocity	{national criteria} <ul style="list-style-type: none">• Pulsating 3-6 fps• May exceed 6 fps if system takes into account during design
Sunlight	Pipe must withstand UV throughout the design life <ul style="list-style-type: none">• UV resistant material or Protect the pipe
Marking	Mark “at risk” pipe by fences or markers
Clean Out	Required clean out access (except pipe to cropland)
Backflow	Required backflow prevention
Relief	Air Vents and Vacuum Reliefs, use as needed

Specific Criteria {transfer pipe}



Design Factors

- ▣ Pipe compatible with working pressure
 - Don't forget maintenance and cleaning pressures!

- ▣ Pipe working pressure shall be no less than the *Pump Shut Off Head* (a.k.a. the maximum pressure the pump can produce)

- ▣ look at all loads and pressures on the pipe and system, required capacity, etc.

Specific Criteria {severe service}



- Severe Service

- pressure pipes supplying flush water {to flume systems}
- pipe with air flushing/blowing risers
- pipes to cropland application

- NOT gravity pipes

Specific Criteria {severe service}



- Transfer Pipe Criteria PLUS
 - check valve near pumps
 - pressure relief valves near pumps
 - warning signs on all risers stating transfer system pressure rating
 - pipelines for irrigation shall follow Irrigation Water Conveyance, Pipeline Standard (430)
 - pressure testing pipes following Spec 634

Pipe Testing



Before Pressure Testing

- a. Solvent welded or heat fused joints cure.
- b. Severe service transfer pipe shall be flushed and cleaned.
- c. All thrust control structures shall be in place and cured
- d. Pipes shall be backfilled or otherwise restrained sufficiently. Braced and/or anchored at each end to prevent movement.
- e. The ends of the pipe shall be plugged, and a pressure gauge shall be attached to the upstream and downstream ends. All high points along the severe service transfer pipe shall be vented to permit the complete removal of all air within the pipe.

Pipe Testing



Filling

Slowly fill the restrained test section completely with clear water.

Initial Expansion Phase

Gradually pressurize the test section with water to the working pressure (as specified in the construction plans) plus 10 psi and maintain that pressure for three hours.

Test Phase

Immediately following the initial expansion phase, reduce test pressure back to working pressure, stop adding water and isolate test section. If test pressure remains steady (within 5% of the target value) for one hour, no leakage is indicated and the test section passes.

Depressurizing

Following the test phase, and prior to putting the pipe into service, gradually reduce pressure on the test section, drain out and properly dispose of all test water.

Specific Criteria {gravity transfer}



- follow Transfer Pipe Criteria PLUS
- no gravity outlets from w.s.f.
- no gravity outlets from load out areas without secondary containment
- gravity transfer from one storage to another shall have 2 shut off valves, {1 manual}
- no max. lengths

Specific Criteria {gravity transfer}

	Slower Flowing Wastes	Faster Flowing Wastes
Description	For wastes that tend to be slower flowing due to bedding, feed, or dryness (typically stanchion barns or thick slurries with higher viscosities).	For wastes that tend to be faster flowing due to additional liquids or lack of bedding (typically free stall barns, veal or hog facilities, and contaminated runoff with lower viscosities).
Minimum Pipe Diameter	24 inches	No minimum diameter
Minimum Head in Gravity Flow Systems (as measured from the Maximum Operating Level (MOL) of the Waste Storage Facility)	<p>Shall be a minimum of 4 feet below the bottom of the barn cleaner, scrape alley, etc.,</p> <p>For pipe over 100 feet in length an additional height equal to 1% of the transfer pipe length shall be included.</p>	<p>Liquid or semi-solid wastes shall have a minimum of:</p> <ul style="list-style-type: none"> • 2 feet below the scrape alley, barn cleaner, channel, etc. <u>and</u> • An additional height equal to 1% of the transfer pipe length <p>Diluted wastes shall have a minimum of:</p> <ul style="list-style-type: none"> • 1 foot below the scrape alley, barn cleaner, channel, etc. <u>and</u> • An additional height equal to 1% of the transfer pipe length
Minimum Volume of Reception Structure	One full day's manure production. A minimum of one-half a day's manure volume must be between the MOL of the waste storage facility and the bottom of the barn cleaner or scrape alley.	One full day's manure production.
Vent Pipe	A 6-inch diameter minimum vent pipe is required. Install within 10 ft. of the reception structure.	A 6-inch diameter minimum vent pipe installed within 10 ft. of the reception structure is required for reception structures with knife valves.

NEW SPECIFICATION

- lists pipe materials
- installation of pipe
 - ▣ laying the pipe
 - ▣ bedding the pipe
 - ▣ backfilling the pipe
- pressure testing
- table of approved pipe
- standard references of allowed and not unacceptable pipe



SPECIFICATION

Installation Type	Size	Material	Specification	Joint Specs	Fitting Spec. ^{Note 3}
GRAVITY PIPELINES (Including Abrasive Materials)	(4"-10")	HDPE Pipe	AASHTO M252, Type S	ASTM D 3212 / ASTM 2657	AASHTO M252
	(12"-48")	HDPE Pipe	AASHTO M294, Type S	ASTM D 3212 / ASTM 2657	AASHTO M294
	(8"-24")	HDPE Pipe	ASTM F 667	ASTM D 3212 / ASTM 2657	ASTM F 667
	(18"-48")	PVC Pipe	ASTM F 679	ASTM D 3212, & D 3139 & D 2672	ASTM F 679
	(3"-15")	PVC Pipe	ASTM D 3034 (SDR 35)	ASTM D 3212, & D 3139 & D 2672	ASTM D 3034
	(1/8"-36")	PVC Pipe	ASTM D 2241 (SDR 32.5)	ASTM D 3212, & D 3139 & D 2672	ASTM D 2241
<i>Any pipe listed below is also acceptable.</i>					
PRESSURE PIPELINES • < 70 psi max. working pressure • Non-Abrasive Materials	(1/8"-24")	PVC Pipe	ASTM D 1785 (Sch. 40)	ASTM D 3212, & D 3139 & D 2672	ASTM D 2464 & D 2466
	(1/8"-36")	PVC Pipe	ASTM D 2241 (SDR 26)	ASTM D 3212, & D 3139 & D 2672	ASTM D 2467
	(4"-12")	PVC Pipe	AWWA C900 (DR 25)	ASTM D 3212, & D 3139 & D 2672	Per manufacturer recommendation
	(14"-48")	PVC Pipe	AWWA C905 (DR 25)	ASTM D 3212, & D 3139 & D 2672	Per manufacturer recommendation
	(3.5"-54")	PE Pipe	ASTM F 714 (DR 17)	Per manufacturer recommendation / ASTM D 3261 / ASTM D 2657	ASTM D 2683
	(1/8"-42")	Steel	ASTM A 53 / ANSI/ASME B36.10 (Sch. 40)	Flanged: to ANSI B16.5 Threaded: to ANSI B 16.11 Butt-Weld	Flanged: to ANSI B16.1 Thread to ANSI B16.11 Butt-Weld
<i>Any pipe listed below is also acceptable.</i>					
PRESSURE PIPELINES ^{Note 4} • ≥ 70 psi max. working pressure • Abrasive Materials • Recirculation Systems	(1/8"-24")	PVC Pipe	ASTM D 1785 (Sch. 80)	ASTM D 3212, & D 3139 & D 2672	ASTM D 2467
	(1/8"-36")	PVC Pipe	ASTM D 2241 (SDR 21)	ASTM D 3212, & D 3139 & D 2672	ASTM D 2467
	(1/8"-36")	PVC Pipe	ASTM D 2241 (SDR 17)	ASTM D 3212, & D 3139 & D 2672	ASTM D 2467
	(4"-12")	PVC Pipe	AWWA C900 (DR 18)	ASTM D 3212, & D 3139 & D 2672	Per manufacturer recommendation.
	(14"-48")	PVC Pipe	AWWA C905 (DR 18)	ASTM D 3212, & D 3139 & D 2672	Per manufacturer recommendation
	(3.5"-54")	PE Pipe	ASTM F 714 (DR 11)	Per manufacturer recommendation / ASTM D 3261 / ASTM D 2657	ASTM D 2683
	(1/8"-42")	Steel	ASTM A 53 / ANSI/ASME B36.10 / 19 (Sch. 80)	Flanged: to ANSI B16.5 Threaded: to ANSI B 16.11 Butt-Weld	Flanged: to ANSI B16.1 Thread to ANSI B16.11 Butt-Weld
	(3"-64")	Ductile Iron	ASTM A746 / AWWA C150 / C151	AWWA C111 / C115	AWWA C110 or AWWA C153

Questions

