INDIVIDUAL SEWAGE TREATMENT SYSTEM (ISTS)
MONITOR AND DISPOSAL CONTRACT
HOLDING TANK

1. General Provisions

A. Purpose

The purpose of this contract is to define the obligations of the Property Owner and a Licensed Pumper with respect to compliance of Minnesota Pollution Control Agency - Chapter 7080 Rules pertaining to ISTS—specifically 7080.0172, Subp. 3. HOLDING TANKS

B. Obligation

The Owner of Property described as 69215 350th Place Hill City, MN 55748 has received approval for the installation of a holding tank, on said property, under Permit #_____which is subject to the requirements set forth in 7080.0130, subparts 1 and 4 including that the holding tank have a suitable cleanout pipe, be 1500 gallons in size, be located in accessible area for maintenance and have an alarm device to minimize chance of sewage overflow. The property owner shall be required to immediately establish and maintain a contract with a licensed pumper for proper disposal and treatment of the sewage. The contract is to be maintained until the holding tank is properly abandoned.

The Licensed Pumper shall guarantee the removal of the tank contents prior to overflow or any discharge, to an appropriate facility established for that purpose.

The schedule for maintenance shall be as follows:
Property owner will call for pumping when alarm device turns on or on a regular schedule as agreed.

The fee schedule (dollar amount and dates of payments) shall be as follows:
(as agreed between pumper and home owner)

C. Contract Agreement

Property Owner/Address:

Pumper - Name/Address/License #: 785 - BUNES SEPTIC SERVICE, INC.
@ ~~20289~~ 20293 Bluebird Drive - Grand Rapids, Mn. 55744

The above parties hereby agree to carry out all their obligations beginning this date 04/15/2024 and to be continuous, unless terminated by either party, with or without cause, upon 60 days written notice. [Notice shall also be given to the County Zoning Office.]

D. Signatures

Property Owner

Mike Casey Bunes Septic Service Inc.
Licensed Pumper

UNIVERSITY OF MINNESOTA

Septic System Management Plan for Holding Tank Systems

The goal of a septic system is to protect human health and the environment by properly treating wastewater before returning it to the environment. Your holding tank system is designed to store your used water before it is recycled back into our lakes, streams and groundwater.

This **management plan** will identify the operation and maintenance activities necessary to ensure compliance with applicable rules and regulations. Some of these activities must be performed by you, the homeowner. Other tasks must be performed by a licensed septic maintainer. However, it is YOUR responsibility to make sure all tasks get accomplished in a timely manner.

The University of Minnesota's *Septic System Owner's Guide* contains additional tips and recommendations designed to extend the effective life of your system and save you money over time.

Proper septic system design, installation, operation and maintenance means safe and clean water!

Property Owner: Jason Strasser

Property Address: 69215 350th Place Hill City, MN 55748 Property ID: 12-1-070100

System Designer: Walker Maasch License #: 4199

System Installer: TBD License #:

Service Provider/Maintainer: Bunes Septic Service Phone: 218-259-1542

Permitting Authority: Aitkin County Environmental Services Phone: 218-327-2857

Permit #: Date Inspected:

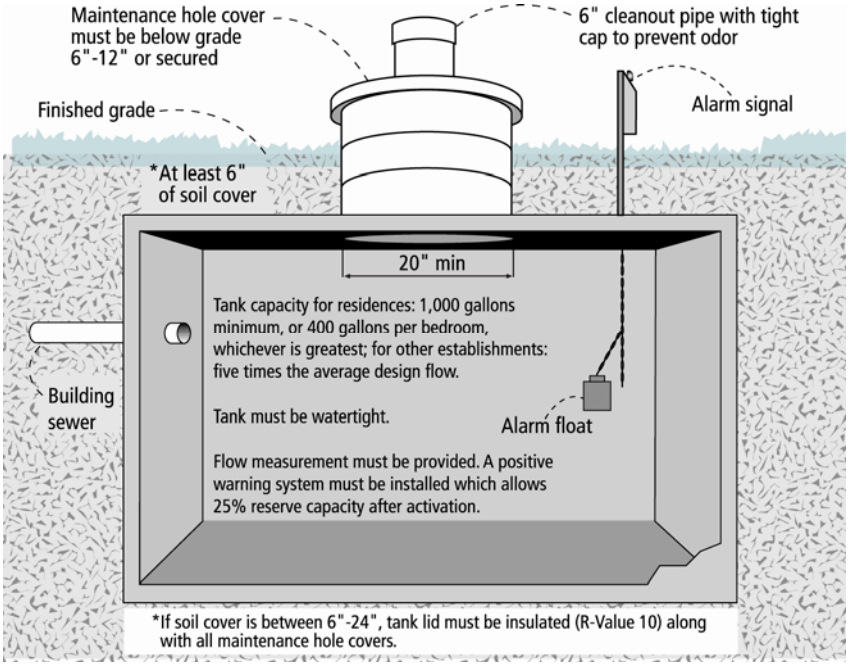
Keep this Management Plan with your Septic System Owner's Guide. The Septic System Owner's Guide includes a folder to hold maintenance records including pumping, inspection and evaluation reports. Ask your septic professional to also:

- Attach permit information, designer drawings and as-builts of your system, if they are available.
- Keep copies of all pumping records and other maintenance and repair invoices with this document.
- Review this document with your maintenance professional at each visit; discuss any changes in product use, activities, or water-use appliances.

For a copy of the *Septic System Owner's Guide*, call 1-800-876-8636 or go to http://shop.extension.umn.edu/

http://septic.umn.edu

Your Holding Tank



Dwelling Type	Well Construction
Number of bedrooms: 3	Well depth (ft): Deep well
System capacity/ design flow (gpd): 450	❑ Cased well Casing depth: _____
Anticipated average daily flow (gpd): 450	❑ Other (specify): _____
Comments_____	Distance from septic (ft): 55'
In-home business? ___ What type? _____	Is the well on the design drawing? ◉ Y ○ N
Number of occupants _____	

Holding Tank	
○ One tank: *Tank volume:* _____ *gallons*	❑ Flow measurement device: Alarm pedestal
◉ Two tanks: *Tank volume:* 1,500 *gallons*	❑ Location: Float installed in pump tank side
❑ Tank is constructed of Concrete	❑ Alarm ✔ visual ✔ audible
	❑ Reserve %: 25
❑ Service contract held by: Bunes Septic Service	
✔ Service contract is attached to this management plan	

Homeowner Management Tasks

These op*eration and maintenance ac*tivities are your responsibility. *Use the chart on page 6 to track your activities.*

Identify the service intervals recommended by your system designer and your local government. The tank assessment for your system will be the **shortest interval of these three intervals**. Your pumper/maintainer will determine if your tank needs to be pumped.

Tank capacity ÷ (# of occupants X 50 Gallons/day) = # of days between cleaning

OR

Within 24 hours of alarm signal

System Designer: check every _____ days

Local Government: check every _____ days

My tank needs to be emptied every 30 days

Seasonally

- *Monitor alarm daily – make sure the alarm has not signaled.* Alarms signal when your holding tank is nearly full; contact your maintainer.
- *Measure* and note your average daily water usage on page 5. Conserving water saves you money!
- *Leaks.* Check (listen, look) for leaks in toilets and dripping faucets. Repair leaks promptly.

Annually

- Establish a contract for tank cleaning services with a state licensed maintenance business.
- *Caps.* Make sure that all caps and lids are intact and in place. Inspect for damaged caps at least every fall. Fix or replace damaged caps before winter to help prevent freezing issues.
- *Water conditioning devices.* See Page 5 for a list of devices. When possible, discharge clear water sources to another location. Program the recharge frequency based on *water demand (gallons)* rather than *time (days)*. Recharging too frequently will result in increased pumping costs.
- *Review your water usage rate.* Review the Water Use Appliance chart on Page 5. Discuss any major changes with your pumper/maintainer.

During each visit by a pumper/maintainer

- Ask if your pumper/maintainer is licensed in Minnesota.
- Make sure that your pumper/maintainer has clear access to the holding tank and completely empties the tank
- Ask your pumper/maintainer to accomplish the tasks listed on the Professional Tasks on Page 4.

Professional Management Tasks

These are the operation and maintenance activities that a pumper/maintainer performs to help ensure long-term performance of your system. Professionals should refer to the O/M Manual for detailed checklists for tanks, pumps, alarms and other components. Call 800-322-8642 for more details.

- ❑ Written record provided to homeowner after each visit.

Plumbing/Source of Wastewater

- ❑ Review the Water Use Appliance Chart on Page 5 with homeowner. Discuss any changes in water use and the impact those changes may have on the frequency of maintenance.
- ❑ Review and document water usage rates with homeowner.

Holding Tanks

- ❑ *Maintenance hole lid*. A riser is recommended if the lid is not accessible from the ground surface. Insulate the riser cover for frost protection.
- ❑ *Liquid level*. Check to make sure the tank is not leaking.
- ❑ *Inspection pipes*. Replace damaged caps.
- ❑ *Alarm*. Verify that the alarm works and that there is at least 25% reserve capacity.
- ❑ *End of year seasonal property pumping*. Remind homeowner of most frequent causes of tank and building sewer freeze-ups. Ensure that there are no "micro-sources" of water such as a high efficiency furnace or other dripping devices. Determine a logical winter water use plan that will not result in need for emergency visit(s).

All other components – inspect as listed here:

Water-Use Appliances and Equipment in the Home

Appliance	Impacts on Holding Tank	Management Tips
Garbage disposal	• Uses water and increases pumping frequency and expense.	• Use of a garbage disposal is not recommended. • Minimize garbage disposal use. Compost instead.
Washing machine	• Uses water and increases pumping frequency and expense.	• Choose a front-loader or water-saving top-loader, these units use less water than older models. • Wash only full loads. • Do laundry off site.
Dishwasher	• Uses water and increases pumping frequency and expense.	• Wash only full loads.
Large bathtub (whirlpool)	• Uses water and increases pumping frequency and expense.	• Take short showers to conserve water.
Clear Water Uses	**Impacts on Holding Tank**	**Management Tips**
High-efficiency furnace	• Drip may result in frozen pipes during cold weather.	• Re-route water into a sump pump or directly out of the house. Do not route furnace recharge to your holding tank.
Water softener Iron filter Reverse osmosis	• Uses water and increases pumping frequency and expense.	• These sources produce water that is not sewage and should not go into your holding tank. • Reroute water from these sources to another outlet, such as a dry well, drain tile or old drainfield. • When replacing, consider using a demand-based recharge vs. a time-based recharge. • Check valves to ensure proper operation; have unit serviced per manufacturer directions
Surface drainage Footing drains	• Uses water and increases pumping frequency and expense.	

Maintenance Log

Track maintenance activities here for easy reference. See list of management tasks on pages 3 and 4.

Activity	Date accomplished/measured water usage									
Check daily for a period of time and weekly once average use is determined:										
Water usage rate (gallons per day)										
Leaks: check for plumbing leaks										
Annually:										
Establish and maintain contract for holding tank pumping services										
Water use appliances – review use										

Water Meter Reading and Tank Evacuation Schedule			
Date	**Water Meter Reading (in gallons)**	**Tank Contents Removed?**	**Total Gallons Removed**

Notes: The tank should be pumped as often as needed--typically around the time when the tank reaches 75% of the full capacity.

Mitigation/corrective action plan:

"As the owner of this SSTS, I understand it is my responsibility to properly operate and maintain the sewage treatment system on this property, utilizing the Management Plan. If requirements in this Management Plan are not met, I will promptly notify the permitting authority and take necessary corrective actions.

Property Owner Signature: Date

Management Plan Prepared By: Walker Maasch Certification # 9835

Permitting Authority: Aitkin County Environmental Services

University of Minnesota Onsite Sewage Treatment Program

Preliminary Evaluation Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

1. Contact Information

v 03.15.2023

Property Owner/Client:	Jason Strasser	Date Completed:	3/4/2024
Site Address:	69215 350th Place Hill City, MN 55748	Project ID:	D24010
Email:	jhstras@gmail.com	Phone:	763-528-8907
Mailing Address:	1191 142nd Avenue Andover, MN 55304	Alt Phone:	
Legal Description:	Lot 1 Ebel Shores		

Parcel ID:	12-1-070100	SEC:	2	TWP:	52	RNG:	26

2. Flow and General System Information

A. Client-Provided Information

Project Type: ☐ New Construction ☑ Replacement ☐ Expansion ☐ Repair

Project Use: ☑ Residential ☐ Other Establishment:

Residential use: # Bedrooms: 3 Dwelling sq.ft.: Unfinished sq.ft.:

Adults: # Children: # Teenagers:

In-home business (Y/N): No If yes, describe:

Water-using devices: *(check all that apply)*

☐ Garbage Disposal/Grinder	☑ Dishwasher	☐ Hot Tub*
☐ Sewage pump in basement	☐ Water Softener*	☐ Sump Pump*
☑ Large Bathtub >40 gallons	☐ Iron Filter*	☐ Self-Cleaning Humidifier*
☑ Clothes Washing Machine	☐ High Eff. Furnace*	☐ Other:

* Clear water source - should not go into system

Additional current or future uses:

Anticipated non-domestic waste:

The above is complete & accurate:

Client signature & date

B. Designer-determined Flow and Anticipated Waste Strength Information

Attach additional information as necessary.

Design Flow: 450 GPD Anticipated Waste Type: Residential

Maximum Concentration BOD: 170 mg/L TSS 60 mg/L Oil & Grease 25 mg/L

3. Preliminary Site Information

A. Water Supply Wells

#	Description	Mn. ID#	Well Depth (ft.)	Casing Depth (ft.)	Confining Layer	STA Setback	Source
1	Drilled well						
2							
3							
4							

Additional Well Information:

University of Minnesota Onsite Sewage Treatment Program

Preliminary Evaluation Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

Site within 200' of noncommunity transient well (Y/N)	No	Yes, source:	
Site within a drinking water supply management area (Y/N)	No	Yes, source:	
Site in Well Head Protection inner wellhead management zone (Y/N)	No	Yes, source:	
Buried water supply pipes within 50 ft of proposed system (Y/N)	No		
B. Site located in a shoreland district/area?	Yes	Yes, name:	Hill Lake
Elevation of ordinary high water level:	ft	Source:	
Classification:	Tank Setback: ft.	STA Setback:	ft.
C. Site located in a floodplain?	No	Yes, Type(s):	N/A
Floodplain designation/elevation (10 Year):	N/A ft	Source:	N/A
Floodplain designation/elevation (100 Year):	N/A ft	Source:	N/A

D. Property Line Id / Source: ☐ Owner ☐ Survey ☑ County GIS ☐ Plat Map ☐ Other:

E. ID distance of relevant setbacks on map: ☑ Water ☐ Easements ☑ Well(s) ☑ Building(s) ☐ Property Lines ☑ OHWL ☐ Other:

4. Preliminary Soil Profile Information From Web Soil Survey (attach map & description)

Map Units: Slope Range: %

List landforms:

Landform position(s):

Parent materials:

Depth to Bedrock/Restrictive Feature: in Depth to Watertable: in

Map Unit Ratings

Septic Tank Absorption Field- At-grade:

Septic Tank Absorption Field- Mound:

Septic Tank Absorption Field- Trench:

5. Local Government Unit Information

Name of LGU: Aitkin County Environmental Services

LGU Contact:

LGU-specific setbacks:

LGU-specific design requirements:

LGU-specific installation requirements:

Notes:

University of Minnesota Onsite Sewage Treatment Program

Field Evaluation Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

1. Project Information

v 03.15.2023

Property Owner/Client: Jason Strasser | Project ID: D24010

Site Address: 69215 350th Place Hill City, MN 55748 | Date Completed: 3/4/2024

2. Utility and Structure Information

Utility Locations Identified ☐ Gopher State One Call # ____ ☐ Any Private Utilities: ____

Locate and Verify (*see Site Evaluation map*) ☐ Existing Buildings ☐ Improvements ☐ Easements ☐ Setbacks

3. Site Information

Vegetation type(s): Grass | Landscape position: Back/ Side Slope

Percent slope: 0 % | Slope shape: Linear, Linear | Slope direction: ____

Describe the flooding or run-on potential of site: Mild flooding potential

Describe the need for Type III or Type IV system: ____

Note: ____

Proposed soil treatment area protected? (Y/N): ____ | If yes, describe: ____

4. General Soils Information

Filled, Compacted, Disturbed areas (Y/N): ____

If yes, describe: ____

Soil observations were conducted in the proposed system location (Y/N): ____

A soil observation in the most limiting area of the proposed system (Y/N): ____

Number of soil observations: ____ | Soil observation logs attached (Y/N): ____

Percolation tests performed & attached (Y/N): ____

5. Phase I. Reporting Information

	Depth		Elevation		
Limiting Condition*:		in		ft	**Most Restrictive Depth Identified from List Below*
Periodically saturated soil:		in		ft	Soil Texture:
Standing water:		in		ft	Percolation Rate: min/inch
Bedrock:		in		ft	Soil Hyd Loading Rate: gpd/sq.ft
Benchmark Elevation:	100.0	ft			Elevations and Benchmark on map? (Y/N): Yes

Benchmark Elevation Location: Top of alarm pedestal

Differences between soil survey and field evaluation: ____

Site evaluation issues / comments: ____

Anticipated construction issues: ____

University of Minnesota Onsite Sewage Treatment Program

Design Summary Page

MINNESOTA POLLUTION CONTROL AGENCY

1. PROJECT INFORMATION

v 03.15.2023

Property Owner/Client:	Jason Strasser	Project ID:	D24010
Site Address:	69215 350th Place Hill City, MN 55748	Date:	03/04/24
Email Address:	jhstras@gmail.com	Phone:	763-528-8907

2. DESIGN FLOW & WASTE STRENGTH

Attach waste strength data/estimated strength for Other Establishments

Design Flow: 450 GPD — Anticipated Waste Type: Residential

BOD: 170 mg/L TSS: 60 mg/L Oil & Grease: 25 mg/L

Treatment Level: C *Select Treatment Level C for residential septic tank effluent*

3. HOLDING TANK SIZING

Minimum Capacity: Residential =1000 gal or 400 gal/bedroom, Other Establishment = Design Flow x 5.0, Minimum size 1000 gallons

Code Minimum **Holding Tank** Capacity: 1000 Gallons with 1 Tanks or Compartments

Recommended **Holding Tank** Capacity: 1500 Gallons with 2 Tanks or Compartments

Type of High Level Alarm: Audio (Set @ 75% tank capacity)

Comments: Alarm pedestal with float should be installed.

4. SEPTIC TANK SIZING

A. Residential dwellings:

Number of Bedrooms (Residential): 3

Code Minimum **Septic Tank** Capacity: Gallons with Tanks or Compartments

Recommended **Septic Tank** Capacity: Gallons with Tanks or Compartments

Effluent Screen & Alarm (Y/N): Model/Type:

B. Other Establishments:

Waste received by: GPD x Days Hyd. Retention Time

Code Minimum **Septic Tank** Capacity: Gallons with Tanks or Compartments

Recommended **Septic Tank** Capacity: Gallons with Tanks or Compartments

Effluent Screen & Alarm (Y/N): Model/Type:

*** Other Establishments Require Department of Labor and Industry Approval and Inspection for Building Sewer ***

5. PUMP TANK SIZING

Soil Treatment Dosing Tank		Other Component Dosing Tank:	
Pump Tank Capacity (Minimum):	500 Gal	Pump Tank Capacity (Minimum):	Gal
Pump Tank Capacity (Recommended):	500 Gal	Pump Tank Capacity (Recommended):	Gal
Pump Req:	27.0 GPM	Pump Req:	GPM
Total Head	18.0 ft	Total Head	ft
Supply Pipe Dia.	2.00 in	Supply Pipe Dia.	in
Dose Vol:	100.0 gal	Dose Vol:	Gal

*** Flow measurement device must be incorporated for any system with a pump: Elapsed Time Meter and/or Event Counter ***

University of Minnesota Onsite Sewage Treatment Program

Design Summary Page

MINNESOTA POLLUTION CONTROL AGENCY

6. SYSTEM AND DISTRIBUTION TYPE

Project ID: D24010

Soil Treatment Type:		Distribution Type:	
Elevation Benchmark:	100.0 ft	Benchmark Location:	Top of alarm pedestal
MPCA System Type:	Type II	Distribution Media:	
Type III/IV/V Details:			

7. SITE EVALUATION SUMMARY:

Describe Limiting Condition:

Layers with >35% Rock Fragments? (yes/no) ____ If yes, describe below: % rock and layer thickness, amount of soil credit and any additional information for addressing the rock fragments in this design.

Note:

	Depth		Depth		Elevation of Limiting Condition	
Limiting Condition:		inches	####	ft		ft
Minimum Req'd Separation:	36	inches	3.0	ft		
Code Max System Depth*:	#VALUE!	inches	####	ft	Elevation	ft

Critical for system compliance

Distribution Elevation >Code Max Depth

*This is the maximum depth to the bottom of the distribution media for required separation. Negative Depth (ft) requires a mound.

Designed Distribution Elevation: ____ ft Minimum Sand Depth: N/A inches

A. Soil Texture: B. Organic Loading Rate (optional): ____ lbs/sq.ft/day **0**

C. Soil Hyd. Loading Rate: ____ GPD/ft^2 D: Percolation Rate: ____ MPI

E. Contour Loading Rate: ____ Note:

F. Measured Land Slope: 0 % Note:

Comments:

8. SOIL TREATMENT AREA DESIGN SUMMARY

Trench:

Dispersal Area	sq.ft	Sidewall Depth	in	Trench Width	ft
Total Lineal Feet	ft	No. of Trenches		Code Max. Trench Depth	in
Contour Loading Rate	ft	Minimum Length	ft	Designed Trench Depth	in

Bed:

Dispersal Area	sq.ft	Sidewall Depth	in	Maximum Bed Depth	in
Bed Width	ft	Bed Length	ft	Designed Bed Depth	in

Mound:

Dispersal Area	sq.ft	Bed Length	ft	Bed Width	ft
Absorption Width	ft	Clean Sand Lift	ft	Berm Width (0-1%)	ft
Upslope Berm Width	ft	Downslope Berm	ft	Endslope Berm Width	ft
Total System Length	ft	System Width	ft	Contour Loading Rate	gal/ft

University of Minnesota Onsite Sewage Treatment Program

Design Summary Page

MINNESOTA POLLUTION CONTROL AGENCY

Project ID: D24010

At-Grade:

Dispersal Area		sq.ft	Bed Length		ft	Bed Width	ft
Upslope Berm		ft	Downslope Berm		ft	Finished Height	ft
System Length		ft	Endslope Berm		ft	System Width	ft

Level & Equal Pressure Distribution Soil Treatment Area

No. of Laterals			Lateral Diameter		in	Lateral Spacing	ft
Perforation Spacing		ft	Perforation Diameter		in	Drainback Volume	gal
Min Dose Volume		gal	Max Dose Volume		gal	Total Dosing Volume	gal

Non-Level and Unequal Pressure Distribution Soil Treatment Area

	Elevation (ft)	Pipe Size (in)	Pipe Volume (gal/ft)	Pipe Length (ft)	Perf Size (in)	Spacing (ft)	Spacing (in)
Lateral 1							
Lateral 2							
Lateral 3							
Lateral 4							
Lateral 5							
Lateral 6							

Minimum Dose Volume: gal

Maximum Dose Volume: gal

Total Dosing Volume: gal

9. Organic Loading and Additional Info for At-Risk, HSW or Type IV Design

Organic Loading to Soil Treatment

A. Starting BOD Concentration = Design Flow X 0.7 X Starting BOD (mg/L) X 8.35 ÷ 1,000,000

gpd X mg/L X 8.35 ÷ 1,000,000 = lbs. BOD/day (Organic Loading Design)

B. Organic Loading to Soil Treatment Area: (enter loading value in 7B)

mg/L X gpd X 0.7 X 8.35 ÷ 1,000,000 ÷ sq.ft = lbs./day/sqft

HSW Technology Strength Reduction

A. Starting BOD Concentration = Design Flow X Starting BOD (mg/L) X 8.35 ÷ 1,000,000

0 gpd X 1000 mg/L X 8.35 ÷ 1,000,00(= 0.00000 lbs. BOD/day (HSW Technology Design)

B. Target BOD Concentration = Design Flow X Target BOD (mg/L) X 8.35 ÷ 1,000,000

gpd X mg/L X 8.35 ÷ 1,000,00(= lbs. BOD/day (HSW Technology Design)

Lbs. BOD To Be Removed: lbs. BOD/day (HSW Technology Design)

Pretreatment Technology: *Must Meet or Exceed Target

Disinfection Technology: *Required for Levels A & B

10. Comments/Special Design Considerations:

Design is for a holding tank with a 2-compartment tank. The two compartment tank is being installed in case a drainfield is added in the future. There will also be a dump station for an RV, but it's not for year-round hookup.

I hereby certify that I have completed this work in accordance with all applicable ordinances, rules and laws.

Walker Maasch	Walker Maasch	4199	3/4/2024
(Designer)	(Signature)	(License #)	(Date)

University of Minnesota Onsite Sewage Treatment Program

Tank Buoyancy Worksheet

Minnesota Pollution Control Agency

1. Tank Specifications

Project ID: D24010 v 03.15.2023

A. Tank Manufacturer: W. W. Thompson Concrete Products Tank Model: 1,500-Gallon Combo Tank

B. Outside Tank Dimensions and Specifications: Tank Use: Septic/Dosing Combo

Length:	146	in	Width:	67	in	Height:	59	in	Diameter:		in
Length:	12.2	ft	Width:	5.6	ft	Height:	4.9	ft	Radius of Tank:		in

2. Outside Volume of Tank

Rectangular Tank

A. Area of Tank = Length (ft) X Width (ft)

12.2 ft X 5.6 ft = 67.9 sq.ft

B. Volume of Tank = Area of Tank (2.A) X Height (ft)

67.9 sq.ft X 4.9 ft = 334.0 cu.ft

Circular Tank

A. Area of Tank = πr^2 = (3.14 X (Radius of Tank)^2)

3.14 X ( ) ft)^2 = sq.ft

B. Volume of Tank = Area of Tank X Height (ft)

sq.ft X ft = cu.ft

3. Force of Tank Weight (F_{TW})

Weight of Tank (provided by manufacturer) 13500 lbs

4. Force of Soil Weight Over Tank (F_{SW})

A. Depth of Cover Over Tank: 28 in 2.3 ft

B. Weight of Soil Per Cubic Foot: 90 lbs/cu.ft

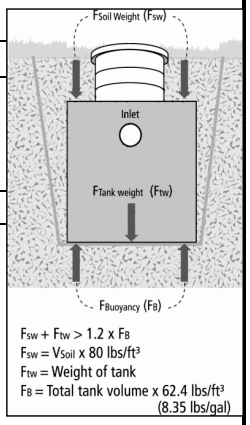
C. Volume of Soil Over Tank = Depth of Cover(4A) (ft) X Area of Tank(2A) (ft^2)

2.3 ft X 67.9 sq.ft = 158.5 cu.ft

D. Weight of Soil Over Tank = Volume of Soil Over Tank(4C) X Weight of Soil Per Cubic Foot

158.5 cu.ft X 90 lbs/cu.ft = 14,265.4 lbs *Note: Assumes saturation does not get over the lid of the tank*

Soil Type	Weight of Soil (lbs/ft^3)
Sandy	120
Loamy	100
Clay	90



$F_{SW} + F_{TW} > 1.2 \times F_B$
$F_{SW} = V_{Soil} \times 80$ lbs/ft^3
F_{TW} = Weight of tank
F_B = Total tank volume x 62.4 lbs/ft^3 (8.35 lbs/gal)

5. Buoyant Force (F_B)

Buoyant Force (F_B) = Outside Volume of Tank(2B) X Weight of Water Per Cubic Foot (62.4 lbs/ft^3) X 1.2 (Safety Factor)

334 X 62.4 lbs/cu.ft X 1.2 = 25,009.3 lbs

6. Evaluation of Net Forces

A. Downward Force = Force of Tank Weight (F_{TW})(3.) + Force of Soil Weight of Soil (F_{SW})(4.)

13500 lbs + 14265 lbs = 27,765.4 lbs

B. Net Difference = Downward Force(6A) - Buoyant Force Including Safety Factor (5.)

27765 lbs - 25009 lbs = 2,756.1 lbs

If the Net Difference is negative, counter measures will need to be taken to prevent the tank from floating out of the ground.

Comments/Solution:

The tank should be buried with at least 28" of soil on top of it to remain in the ground when emptied.

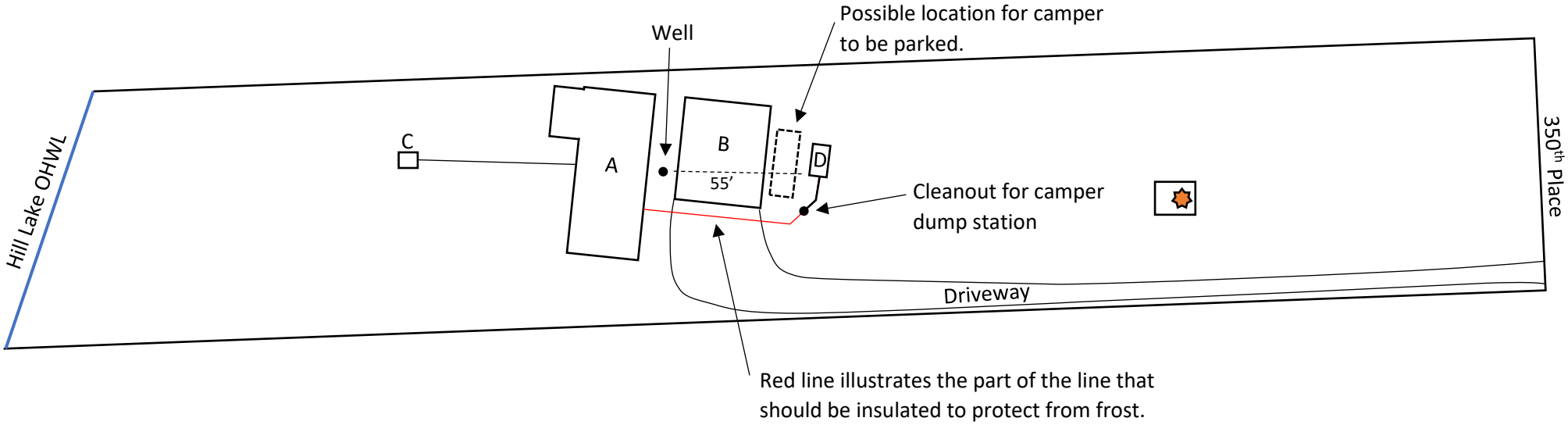
Jason Strasser – 69215 350th Place Hill City, MN 55748
PID: 12-1-070100

Elevations:

- Benchmark (Top of Existing tank alarm pedestal): 100’
- Ground @ combo tank: 97’

Map Key:

- **A:** House
- **B:** Garage
- **C:** Old septic tank (did not get properly abandoned—still has sewage in it)
- **D:** Septic/Pump tank combo



New holding tank will be more than 150’ from the OHWL of Hill Lake. The tank also must be more than 50’ from the well.