4/7/2020

KSD

Your water. Our neighbors.

SSTS Design

Stillwater School Bus Facility

11530 Hudson Boulevard North,
Lake Elmo, MN 55042

PID # 36.029.21.43.0004

Version 1.1

Kloeppner Services & Designs, LLC
MPCA LICENSE # 4043

763.843.4114
CONNECT@KSD-MN.COM

SSTS Design Summary Report

4/7/20

On March 26th, 2020 a site evaluation was conducted at 11530 Hudson Blvd N, Lake Elmo, MN 55042 in Washington County to evaluate a location for a new the Subsurface Sewage Treatment System (SSTS) for the Stillwater School Bus Facility. The PID number for the lot is 36.029.21.43.0004. A Type III SSTS with new sewage tanks and two (2) mounds will be used to treat the wastewater from the offices and bathrooms.

Prior to submitting for permit from the local unit government or county, please review and sign all pages which require a signature.

Stillwater School Bus Facility

The Stillwater School Bus Facility is primarily used to store and maintain the buses for Stillwater School District – ISD 834. The facility has a main building with offices for staff and stalls maintenance. The building has bathrooms, breakrooms and utility sinks which are all connected to the sewer line exiting the Southwest corner of the building. No drains from the bus stalls, or other drains in the building, are connected to the sewer.

Estimated Wastewater Source

The staff consists of 12 full-time employees working 8-hour shifts five days a week. The 12 full-time employees are combination of office staff and mechanics. There are 200 bus drivers which have access to bathrooms and a breakroom at the North-end of the building. The bus drivers are only onsite to pick-up and drop-off the buses. Additional visitors (~5 per day) are also added to the total potential usage of sewage for this design.

Bus drivers or office staff will not be present during the weekend days. This will provide an opportunity for the system to "catch up," if the flows exceed expect levels for any unforeseen reason.

Variances & Easements

The new SSTS will not require any variances or infringe upon any easements.

SSTS Configuration

The SSTS will use two (2) septic tanks to reduce the raw influent by 44% before dispersal into two (2) zones for final treatment of wastewater. Dual pumps will divide a maximum, timed-dose flow of 1,008 gallons daily into two (2) 600 ft^2 Mound Absorption Beds (10' x 60'). The pumps will alternate cycles throughout the day to allow for maximum treatment and absorption.

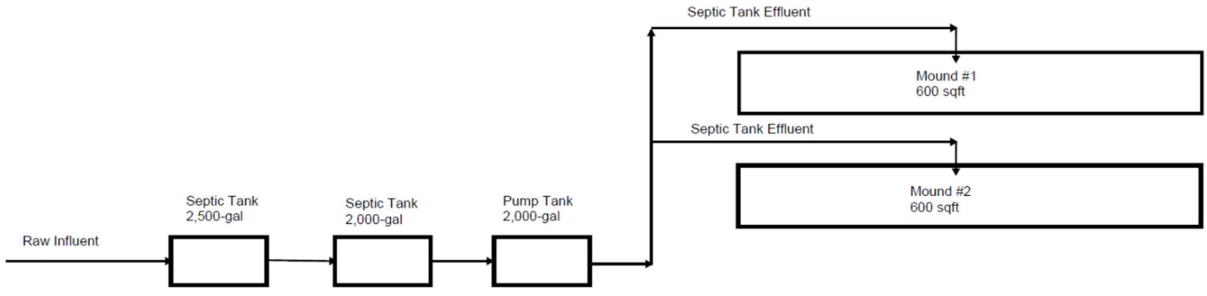


Figure 1

Design Flow
The Design Flow for the system is 1,440-gallons-per-day (GPD). The Average Daily Flow is calculated as 70% of the Daily Flow - 1,008 GPD.

The Design Flow was calculated using the following estimate flow values determined by MN Chapter 7081 for determining flows for Other Establishments.

***7081* Specified Type of Establishment**	**Unit**	**# of Units**	**Design Flow per Unit (See Table I)**	**Total Avg Daily Flow**
Office	employee	12	15.00	180
Office	visitor	5	4.00	20
Public lavatory	user	200	5.00	1000
			Total Flow 7081 Establishments (gpd)	1200
			Safety Factor 20% (gpd)	240
			Total Flow	**1440**

To provide optimal treatment of the sewage through the Soil Absorption Area, the Maximum Daily Flow will be restricted to 1,008 GPD. Weekly flow totals above 1,008 GPD (-gallons) will require a Septic Maintainer to remove the excess from the Pump Tank to avoid overloading the STA and a back-up of the sewage.

Wastewater Strength
The expected raw influent wastewater is classified as Other Establishment: At-Risk. The reason for the At-Risk classification is due to the potential elevated concentrations of Biological Oxygen Demand (BOD), Total Suspended Solids (TSS) and Fats, Oils and Grease (FOG). This classification of the Wastewater will make the SSTS a Type III and may require an operating permit from Washington County.

The estimated waste strengths to determine system loading rates and septic tankage are:

- 400 mg/L BOD (max. 1,000 mg/L)
- 100 mg/L TSS (max. 550 mg/L)
- 20 mg/L FOG

The estimated concentrations for BOD are based on typical BOD mg/L for a "Office (of 200 – 400 mg/L) from Table: "Estimate of Waste Strengths from Other Establishments." See Appendix.

The level of Fats, Oil & Grease will be very low for this facility. The small breakroom does not prepare food or use a lot of grease.

Septic Tankage
The required septic tankage to settle the raw influent for a 3-day retention time to achieve a 44% reduction of the BOD concentration is 4,320 gallons in two tanks. The designed septic tankage is 4,500 gallons in two tanks to help manage Peak Flows and retain a target of 44% reduction of BOD of the raw influent.

The second tank must have an effluent filter (screen) installed at the outlet. The effluent filter must be rated for a daily flow of 1,500 GPD and must reduce the TSS to < 60 mg/L TSS.

No grease tanks will be used due to the low amount of Fats, Oils & Grease entering the system.

The 2,000-gallon tank for the pumps will also serve as a Surge Tank to manage Peak Flows for the Timed-Dose controlled flow. It is recommended that the tank have a large hatch-door for access to the pumps.

Soil Treatment Area & Absorption Area

The expected effluent concentrations after the Primary Septic Tankage is 223 mg/L BOD, 34 mg/L TSS and < 20 mg/L FOG. To properly size the Soil Treatment Area (STA), the BOD concentration was used to calculate the size of the STA using the maximum organic load (1.88 Pounds BOD/sqft/day). The minimum square feet required, for a controlled daily flow of 1,008 GPD, is 1,103 ft^2. To account for potential hydraulic overload from excessive flow (> 1,008 GPD) or increased organic load above 400 mg/L BOD, the Absorption Area will be a total of 1,200 ft^2. This is a safety factor of 109%.

The 1,200 ft^2 Absorption Area will be split into two (2) Zones. Each Zone will be a Type III Mound of 10' x 60' (600 ft^2) with 12 inches of washed mound sand. Eight (8) doses of 80 gallons will distribute 1,008 gallons per day to the entire STA. Each dose will alternate between the two zones equally throughout the day.

The reason a Type III system will be required is due a lack of space available throughout the lot for a Type I due to disturbed soil from parking lots, large berms surrounding the property and retention ponds used for stormwater management.

The location of the new Soil Treatment Area is currently under a parking lot and has a 3,000-gallon holding tank in the footprint. To make sure this system will treat the effluent and not create a ponding effect in the soil below the mounds, all disturbed soil, compacted soil and components (tank & piping) must be excavated. The excavated area must be backfilled with only washed mound sand to a depth below the disturbance and in direct contact with Medium Sand naturally occurring in the soil. This will likely be a large of material.

The Manhole used to the connect the sewer line for the North end of the building and the sewer leaving the building, must be abandoned. The manhole may need to be removed to provide enough room for the three new septic tanks.

Management Plan

The ongoing management of the system is required to properly operate this system. The tanks must be pumped at regular intervals based on the sludge and scum levels of all tanks. See Management Plan for more details.

The management of the system must meet all requirements detailed in the permit from Washington County.

Mitigation Plan

If system is unable to meet standards for the Operating Permit for this design, we recommend hiring Kloeppner Services & Design, LLC (KSD) to assess the cause of the compliance issue. KSD will be able to provide a potential cause and help to provide a solution to meet any perimeters not incompliance for the permit.

Construction Notes

Ordinance 206, 6.1 Building Permit requirements

No construction shall be allowed by any local unit of government until the permit required for the subsurface sewage treatment system has been issued.

Ordinance 206, 9.11 Site Protection

Prior to and during construction or lot improvements, the proposed initial and replacement soil treatment and dispersal areas shall be protected from disturbance, compaction, or other damage by use of stakes and silt fence or snow fence.

MR 7080.2100, Subpart 1. F

Electrical installations must comply with applicable laws and ordinances including the most current codes, rules, and regulations of public authorities having jurisdiction and with part 1315.0200, which incorporates the National Electrical Code.

As-Built Drawing

The Licensed Installer must provide an As-Built of the final location of all components. The attached Site Plan is only for reference and should not be considered as final survey or location of system components.

Soil Erosion & Protection from Freezing

Seed and grass must be established throughout the excavated areas to maintain proper protection from soil erosion and freezing. If paved material is used to cover the pipes or tanks, installation should be used to avoid freezing.

Materials & Specifications

11530 Hudson Blvd N, Lake Elmo – Stillwater School Bus Facility

KSD
Your water. Our neighbors.

Tankage – Concrete

- 2,500-Gallon W2500-MR (Wieser Concrete)
- 2,0000-Gallon W2000-MR (Wieser Concrete)
    - Install Commercial Effluent Filter
- 2,0000-Gallon W2000-MR (Wieser Concrete) Surge / Pump Tank
    - Hatch for Pumps
    - Duplex Pumps

Commercial Effluent Filter

- Rated for 1,500 GPD
- Must reduce TSS below 60 mg/L
- Service Intervals - 12 months

Duplex Pumps (ea. Pump)

- GPM – 25
- TDH – 16
- Installer Choice of Pump Model

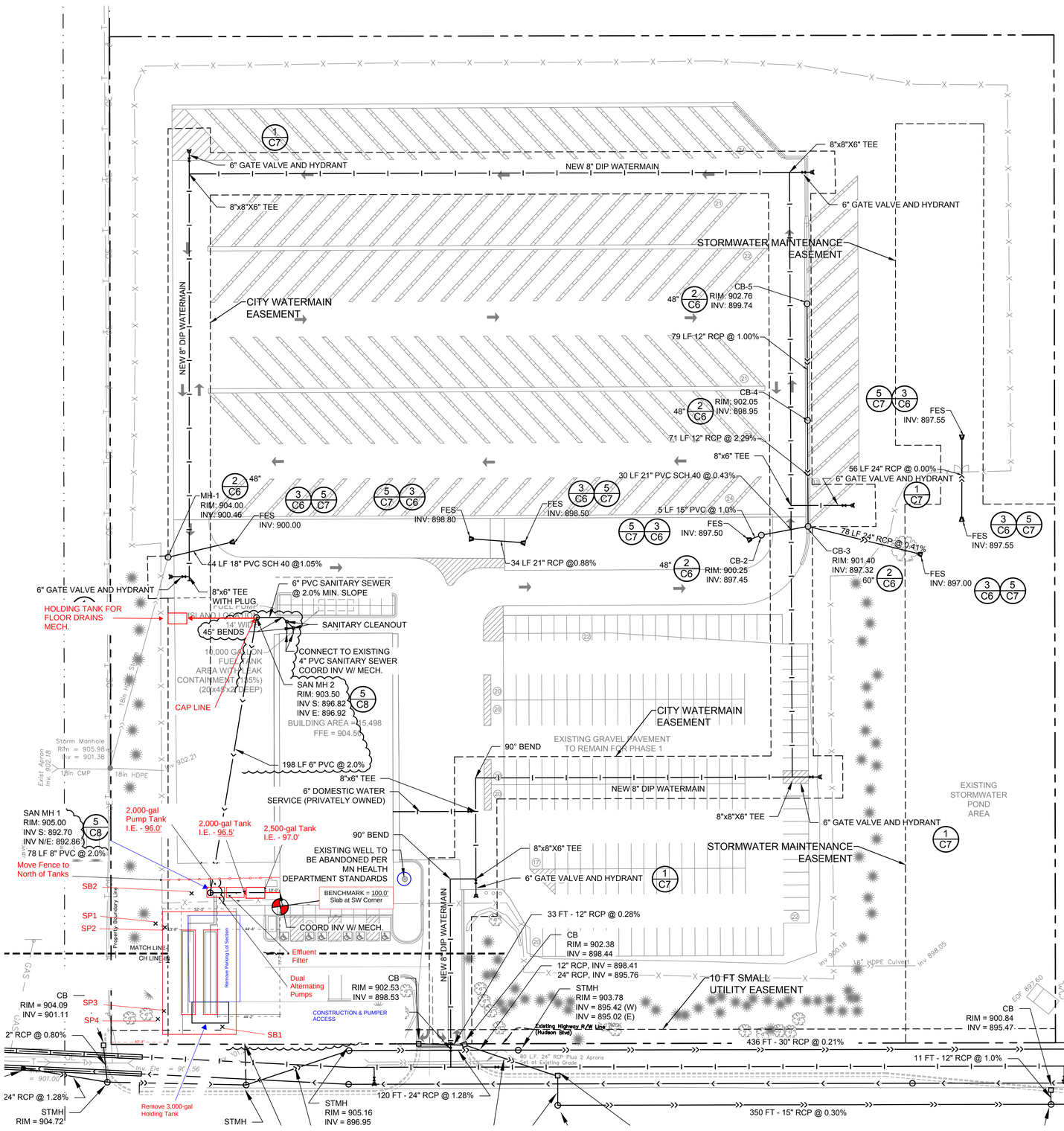
Control Panels & Alarms

- High Level Alarm installed above Effluent Filter
- Timed-Dose Control Panel for Alternating Duplex Pumps
    - High Level Alarm
    - Timer On/Off
    - Event Counter

Dispersal Area – Two Mounds

- Soil Treatment Area – 1,200 sqft
- Zones – 2
- Mound (zone) – 10’ x 60’
    - End Feed Manifold
    - Laterals – 3
    - Length of Laterals – 58 feet
    - Rockbed depth – 6 inched + 3” to cover pipe
    - Washed Mound Sand – 12” sand
    - Backfill – 6” mixed soil
    - Topsoil – 6” black dirt
- Washed Sand for Backfill of Disturbed Soils – 10’ x 60’ x 6’
    - Additional sand for excavated area above Holding Tanks

*****Note: All materials for sewer lines, supply lines, rock, backfill material calculations are only estimates of actual amounts which may be used for construction of this design.



NOTE: UTILITY WORK OUTSIDE PROPERTY LINES IS APART OF FOUR CORNERS STREET AND UTILITY IMPROVEMENTS. IT IS NOT APART OF THE STILLWATER BUS FACILITY IMPROVEMENTS.*

P:\Projects\Projects - 2017\12176010 - Stillwater Bus Facility Evals\C. Design\Drawing Files\12176010 - C4.dwg

LEGEND

- GATE VALVE & BOX
- WATER SHUTOFF
- LIGHT POLE
- STORM MANHOLE
- CATCH BASIN
- CURB INLET
- FLARED END
- SANITARY MANHOLE
- HYDRANT
- CTV — CABLE UNDERGROUND LINE
- OE — ELECTRIC OVERHEAD LINE
- UE — ELECTRIC UNDERGROUND LINE
- FO — FIBER OPTIC UNDERGROUND LINE
- G — NATURAL GAS UNDERGROUND LINE
- SANITARY SEWER PIPE
- STORM SEWER PIPE
- T — TELEPHONE UNDERGROUND LINE
- WATERMAIN PIPE
- DT — DRAINTILE PIPE

UTILITY NOTES

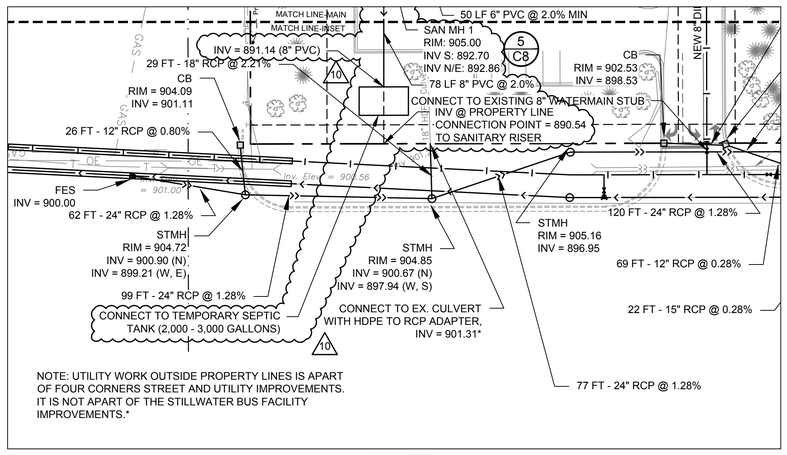
1. ALL WATERMAIN AND ACCESSORIES MUST BE CONSTRUCTED IN ACCORDANCE WITH THE CITY OF LAKE ELMO STANDARD SPECIFICATIONS AND DETAILS.
2. MANIPULATION OF EXISTING VALVES SHALL BE PERFORMED ONLY BY CITY PERSONNEL.
3. WATERMAIN SHALL BE DUCTILE IRON PIPE, ENCASED IN POLYETHYLENE, CLASS-52.
4. ALL FITTINGS SHALL COMPLY WITH CEAM SPEC. 2611.2.A1. ALL FITTINGS SHALL BE DUCTILE IRON PIPE WITH POLYETHYLENE ENCASEMENT. ALL CONNECTIONS SHALL BE INSTALLED UTILIZING COR-BLUE NUTS & BOLTS.
5. USE GATE VALVES FOR ALL APPLICATIONS UP THROUGH 12 INCHES.
6. GATE VALVES SHALL BE RESILIENT WEDGE AMERICAN FLOW CONTROL SERIES 2500 OR APPROVED EQUAL. GATE VALVES MUST COMPLY WITH CEAM SPEC 2611.2.C.2.
7. USE BUTTERFLY VALVES FOR ALL APPLICATIONS GREATER THAN 12 INCHES.
8. BUTTERFLY VALVES SHALL BE MUELLER LINESEAL III, OR APPROVED EQUAL. BUTTERFLY VALVES SHALL COMPLY WITH CEAM SPEC. 2611.2.C3.
9. BOLTS AND NUTS ON ALL VALVES AND HYDRANTS SHALL BE STAINLESS STEEL.
10. ALL HYDRANTS SHALL BE INSTALLED 5.0 FEET BACK OF CURB.
11. HYDRANTS SHALL BE WATEROUS "PACER," MODEL WB-67 OR APPROVED EQUAL, FITTED WITH FH 800 SERIES FLEX STAKE AND PAINTED RED.
12. HYDRANTS SHALL HAVE TWO OUTLET NOZZLES FOR 2-1/2 (I.D.) HOSE CONNECTIONS AND ONE 4" STORZ NOZZLE (MODEL WB-67) AND PENTAGON NUT END CAP.
13. THE CURB STOP SERVICE ASSEMBLY SHALL HAVE A MINIMUM 1-FT ADJUSTMENT RANGE AND SHALL EXTEND 6 INCHES ABOVE FINISHED GRADE FULLY EXTENDED.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING WATER TO HOMES AND BUSINESSES WHOSE WATER SUPPLY IS DISRUPTED DURING THE COURSE OF THE PROJECT.

STANDARD PLAN NOTES
WATERMAIN PLANS

MARCH 2017

CITY OF LAKE ELMO — STANDARD DRAWING NO. 200A — LAKE ELMO

For additional utility notes, see sheet C8.



NOTE: UTILITY WORK OUTSIDE PROPERTY LINES IS APART OF FOUR CORNERS STREET AND UTILITY IMPROVEMENTS. IT IS NOT APART OF THE STILLWATER BUS FACILITY IMPROVEMENTS.*

INSET

SEPTIC SYSTEM NOTES:

1. The estimated peak design flow is 1,440 gallons per day.
2. Soil Absorption Area (mound) will be divided into two zones of 10' x 60'.
3. Disturbed soil below the absorption area will be dugout and replaced with washed mound sand.
4. The flow to the mounds will be restricted to 70% of Design Flow. If flow exceeds 1,008 gallons in 24-hours, an Alarm will sound.
5. Dual Alternating Pumps will be used to Time-Dose the flow to the mounds.
6. The existing Manhole & 3,000-gallon Septic Tank will be removed.
7. Cap drain from Shop Floor to Manhole. Install new Holding Tank for flow.

THIS IS ONLY A SITE PLAN

ALL SEPTIC LOCATIONS AND MEASUREMENTS ARE ONLY ESTIMATES

AS-BUILT WILL NEED TO BE PROVIDED BY INSTALLER AFTER CONSTRUCTION

KSD — Kloeppner Services & Designs, LLC — Lic # 4043

LEGEND:
W = Well
SB = Soil Boring
SP = Soil Pit
= Benchmark

NORTH

Approved by: Jesse Kloeppner

Date - 4/6/20

NORTH
0 20 40 80

Larson Engineering, Inc.
3524 Labore Road
White Bear Lake, MN 55110
651.481.9120 (f) 651.481.9201
www.larsonengr.com

Client: STILLWATER AREA PUBLIC SCHOOLS
1875 SOUTH GREELEY STREET
STILLWATER, MINNESOTA 55082

Project Title: 2019 STILLWATER BUS FACILITY IMPROVEMENTS
STILLWATER AREA PUBLIC SCHOOLS
STILLWATER, MN 55082

I hereby certify that this plan, specifications or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the state of Minnesota.

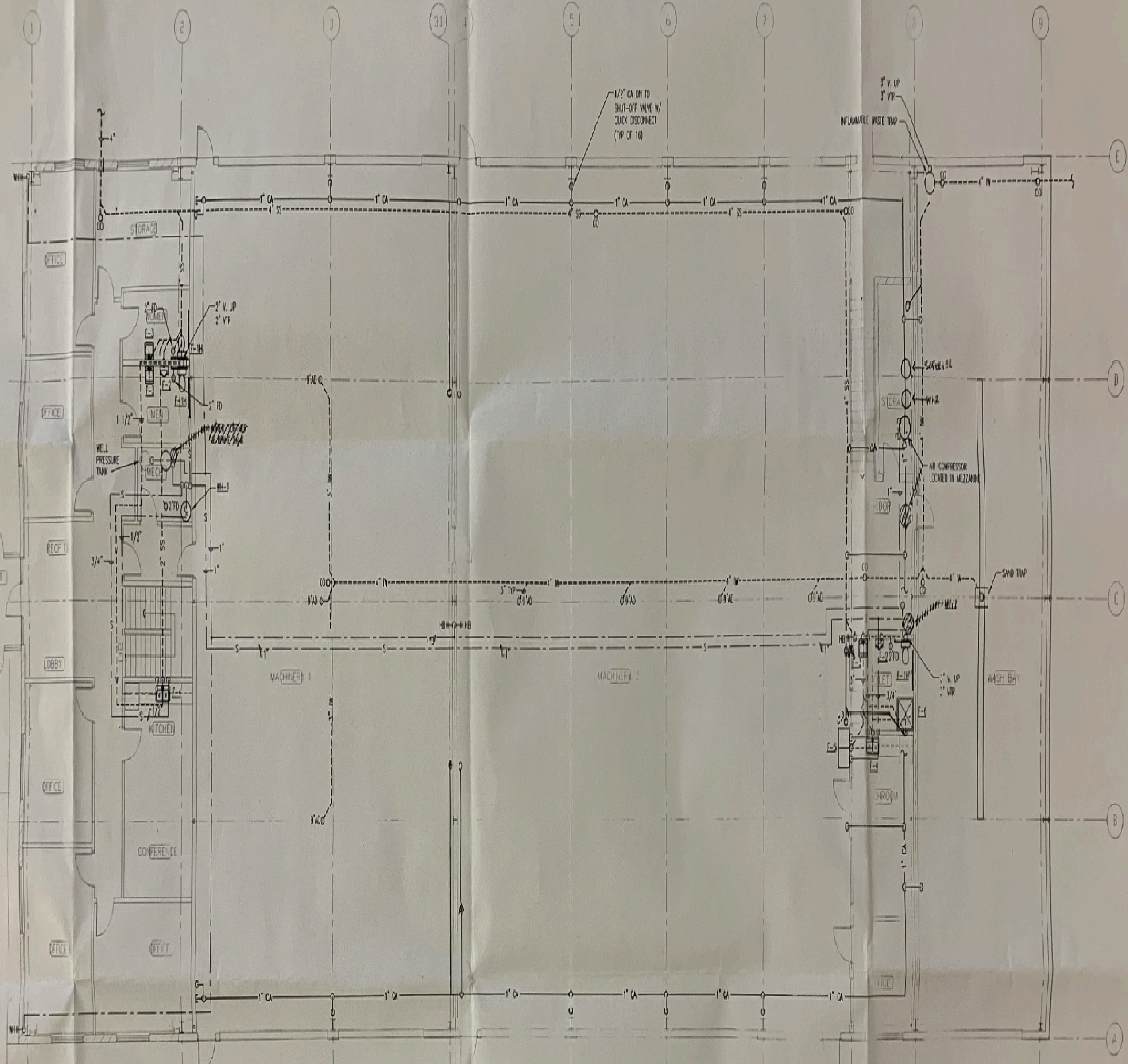
Greg A. Buchal, P.E.
Date: 04.30.18 Reg. No.: 23793

Rev.	Date	Description
5	12.07.18	City Resubmittal
6	03.19.19	Addendum #1
7	04.09.19	City Resubmittal
8	05.03.19	City Comments
9	08.02.19	Proposal Request #2
10	08.16.19	Proposal Request #3

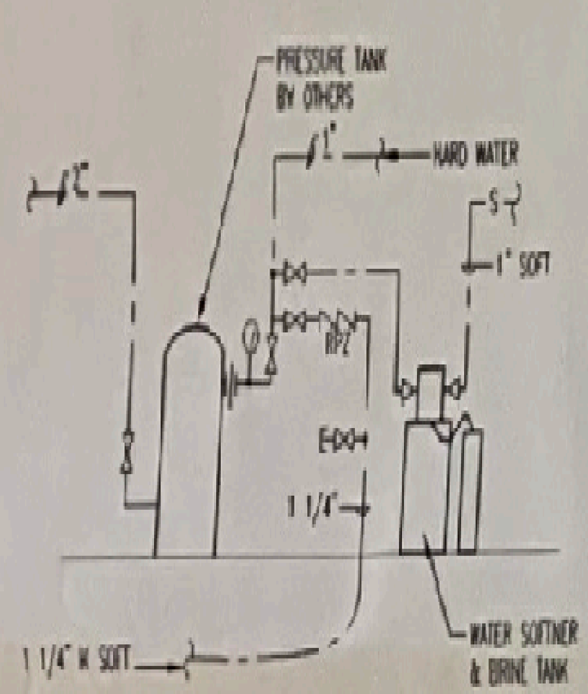
Project #: 12196005
Drawn By: KJA
Checked By: GAB
Issue Date: 04.30.18

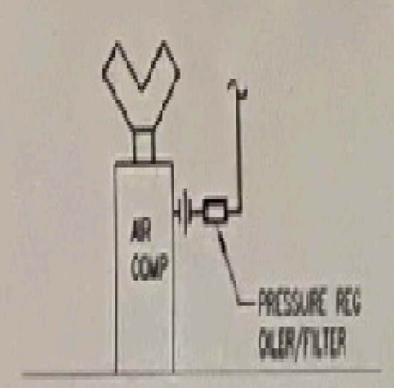
Sheet Title: UTILITY PLAN

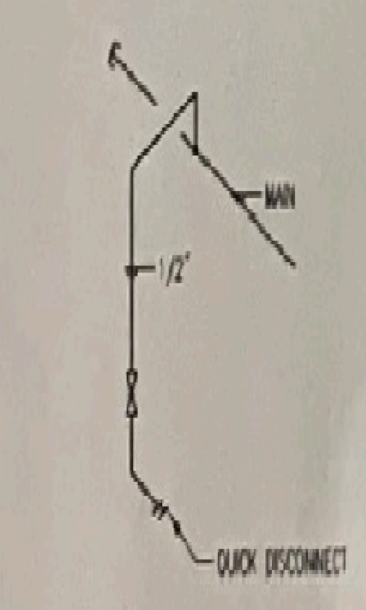
Sheet: C4



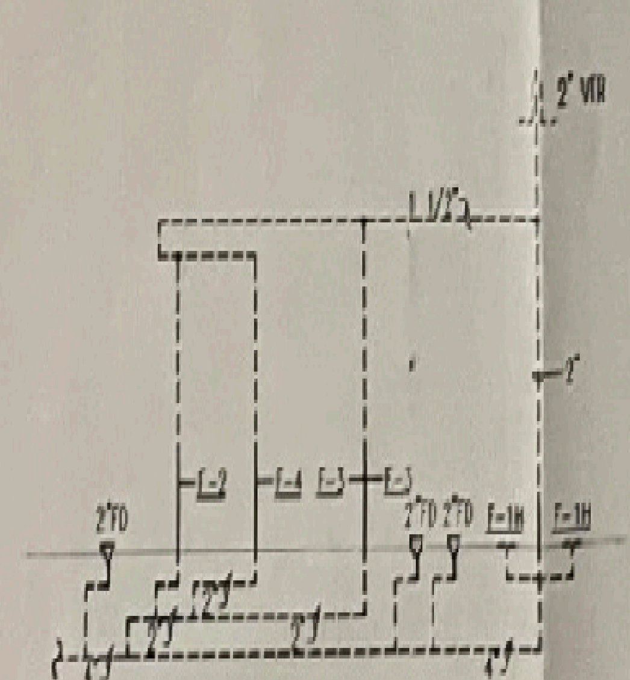
1 PLUMBING FLOOR PLAN
P1 SCALE: 1/8" = 1'-0"



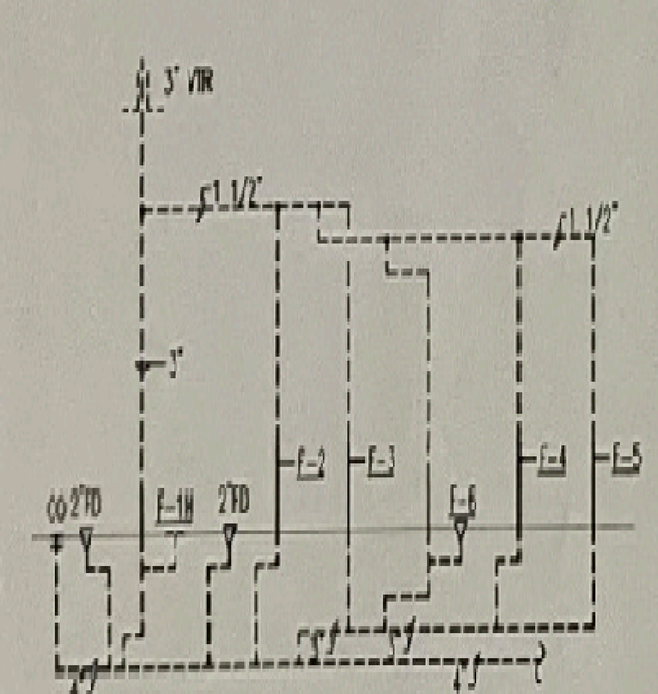




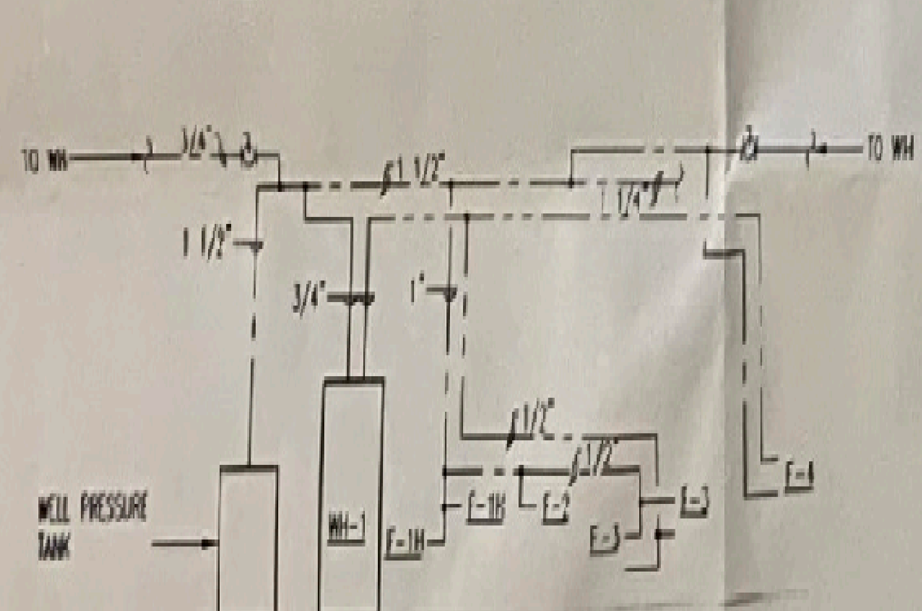
5 AIR DROP
P1 SCALE: NONE



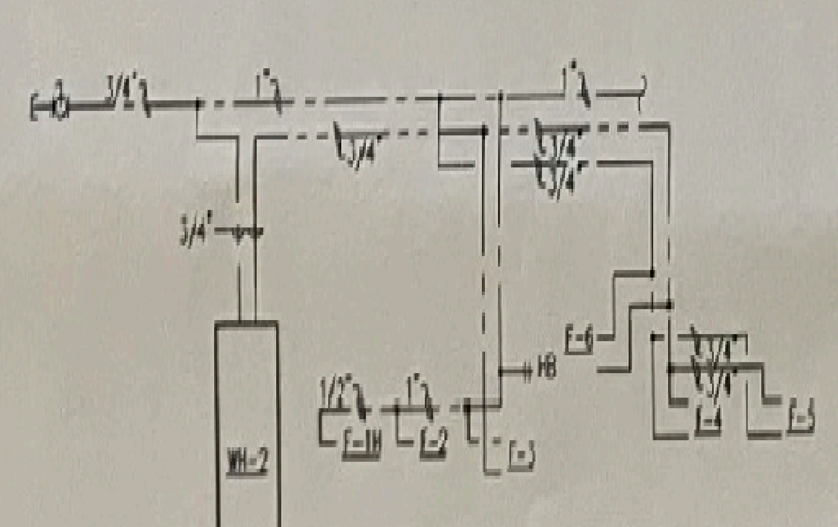
2 WASTE & VENT RISER DIAGRAM
P1 SCALE: NONE



4 WASTE & VENT RISER DIAGRAM
P1 SCALE: NONE



3 WATER RISER DIAGRAM
P1 SCALE: NONE



5 WATER RISER DIAGRAM
P1 SCALE: NONE

PLUMBING FIXTURE SCHEDULE

FIXTURE NO	NO. OF FIXTURES	TYPE	WASTE (IN)	VENT (IN)	HW (IN)	CW (IN)	TRIM	MANUFACTURER	MODEL NO.	REMARKS
F-1H	3	WATER CLOSET	3	2		1/2	EL-CADET PRESS ASSIST, 1.6 GPF	AMERICAN STANDARD	3042109/4086100	ADA HEIGHT 17" WHITE SPOT/LESS COVER
F-2	2	URINAL	2	1 1/2		3/4	WASHBROOK, 3/4" TS, 1 GPF WH.	AMERICAN STANDARD	6501010	REGAL FLUSH VALVE, ADA HEIGHT
F-3	3	LAV	1 1/2	1 1/2	1/2	1/2	LUCERNE WH. 20X18 WHITE	AMERICAN STANDARD	0355012	DELTA SINGLE LEVER FAUCET
F-4	2	DOUBLE COMPARTMENT SINK	1 1/2	1 1/2	1/2	1/2	SS 33x22 DOUBLE BOWL SINK	REPUBLIC	RE HT 33223	DELTA KITCHEN SINGLE LEVER FAUCET
F-5	1	SERVICE SINK 2 COMPARTMENT	2	1 1/2	3/4	3/4	MOP BASIN 24x24x10 W/H	MUSTEE	MU	CHICAGO 897 FAUCET
F-6	1	SHOWER	2	1 1/2	1/2	1/2	1 PC SHOWER WHITE 36x33 3/4x75 3/4	-	365	A/S COLONY/HAMPTON SHOWER VALVE

REMARKS:
A. OR EQUAL FOR ALL FICTURES LISTED, GERBER, KOHLER

WATER HEATER SCHEDULE

EQUIP NO	LOCATION	STORAGE CAPACITY	GPH RECOVERY	TEMP RISE	KW INPUT	NO OF ELEMENTS	VOLT/ PHASE	MANUFACTURER	MODEL NO.	REMARKS
WH-1	MECH	20	-	60	4.5	1	240/1	STATE	STP6 2010 MSE	ELECTRIC
WH-2	MECH	30	20	60	4.5	1	240/1	STATE	STCD 63020 RT	ELECTRIC

REMARKS:
A

SANITARY WASTE & VENT
SCH 40 PVC PIPE AND FITTING (ABOVE AND BELOW GRADE)
C.I. NO HUB PIPE AND FITTING (IN RETURN AIR PLENUM AND INFLAMMABLE WASTE VENT)

DOMESTIC HOT AND COLD WATER
TYPE L HARD COPPER PIPE AND COPPER FITTING (ABOVE GRADE)
TYPE K SOFT COPPER PIPE (BELOW GRADE)

COMPRESSED AIR
TYPE L HARD COPPER PIPE AND FITTINGS

AREA DRAINS
ZURN Z-508-9"⌀ (EXTRA HEAVY DUTY)

BATH ROOM FLOOR DRAINS
SCHER NICKEL/BRONZE TOP 2"

WALL HYDRANTS
WOODFORD 67C 3/4"

TRENCH DRAIN
ZURN ZN-886-RFS

MID-CITY MECHANICAL CORP.
9103 Davenport Street North East
Blaine, Minnesota 55449
Phone: 763-757-7100 Fax: 763-786-8640

License #
James Fuson
Date 07/22/2001

PROJECT
E & H EARTH MOVERS
As-Built

LOCATION
LAKE ELMO
MINNESOTA

REVISIONS

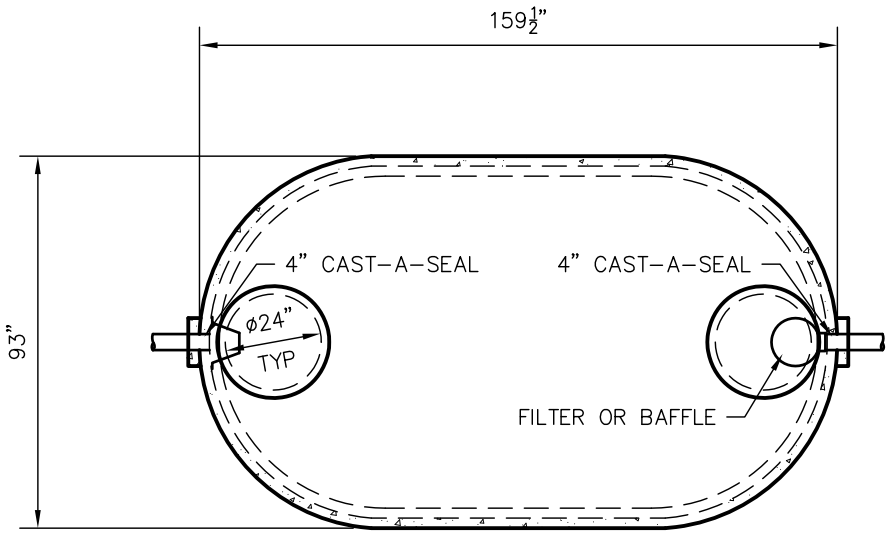
JOB NUMBER

ISSUE DATE
06/11/2001
PROJECT MANAGER
JP
DRAWN BY
MJV

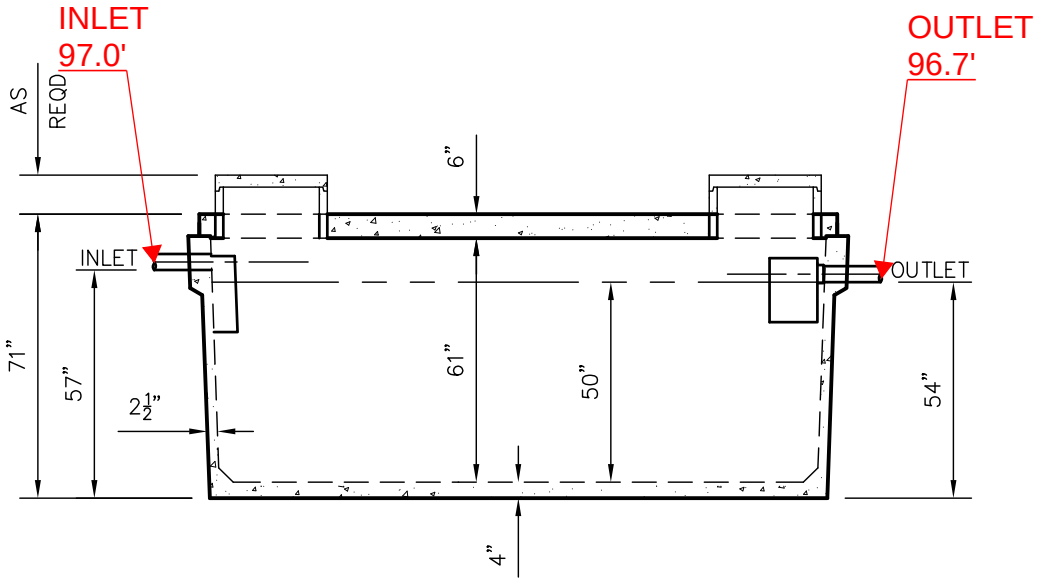
SHEET TITLE
PLUMBING FLOOR PLAN, SCHEDULES, & RISERS

SHEET NUMBER
P1

W2500–MR
TANK SPECIFICATIONS



TOP VIEW



SIDE VIEW

DIMENSIONS:
- WALL: 2 1/2"
- BOTTOM: SEPTIC 4"

- COVER: 6"
- MANHOLE: 24" I.D. PRECAST CONCRETE RISER
- HEIGHT: 71" O.D.
- LENGTH: 159 1/2" O.D.
- WIDTH: 93" O.D.
- BELOW INLET: 57" O.D.
- LIQUID LEVEL: 50"
- WEIGHT: 10,500 LBS.
  COVER 6,340 LBS.

INLET AND OUTLET:
- 4" CAST–A–SEAL BOOT OR EQUAL
- GASKET, CAST–A–SEAL BOOT OR EQUAL

LIQUID CAPACITY: 49.46 GAL/IN

LOADING DESIGN: 8' 0" UNSATURATED SOIL

COVER: MIX DESIGN #8 (NO FIBER)
TANK: MIX DESIGN #9 (SMALL FIBER)

TANKS ARE MANUFACTURED TO MEET OR EXCEED ASTM C–1227 REQUIREMENTS

DRAWINGS SUBMITTED FOR APPROVAL

APPROVED BY: _____

APPROVAL DATE: _____

PRODUCTS NEEDED BY: _____

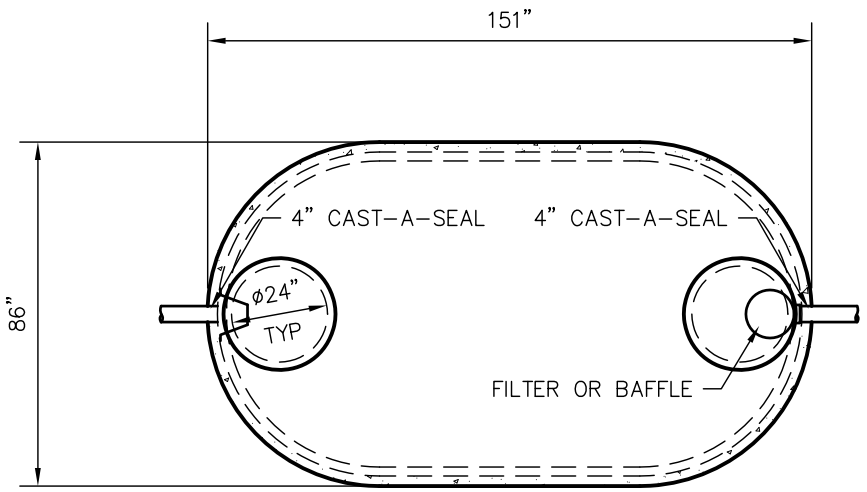
PRE–POUR: POST–POUR:
SCALE: 1/4"=1'–0" REV.
DRAWN BY: WCP DATE: 00/00/00
FILE: W2500–MR

WIESER CONCRETE
W3716 US HWY 10 MAIDEN ROCK, WI 54750
800–325–8456

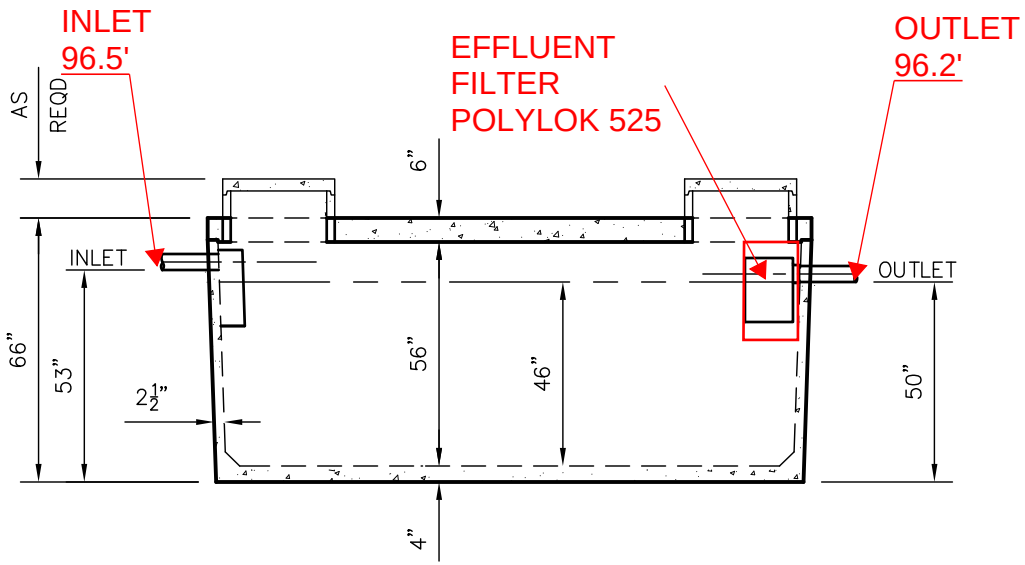
W2500–MR
SEPTIC MANUAL

SHEET NO. 1 OF 1

W2000–MR
TANK SPECIFICATIONS



TOP VIEW



SIDE VIEW

DIMENSIONS:
- WALL: 2 1/2"
- BOTTOM: SEPTIC 3"
  HEAVY DUTY 5" (ADD 2,050 LBS.)
- COVER: 6"
- MANHOLE: 24" I.D. PRECAST CONCRETE RISER
- HEIGHT: 66" O.D.
- LENGTH: 151" O.D.
- WIDTH: 86" O.D.
- BELOW INLET: 53" O.D.
- LIQUID LEVEL: 46"
- WEIGHT: 13,540 LBS. SEPTIC
  15,370 LBS. HOLDING

INLET AND OUTLET:
- 4" CAST–A–SEAL BOOT OR EQUAL
- GASKET, CAST–A–SEAL BOOT OR EQUAL

INLET AND OUTLET BAFFLE AND FILTER:
- WISCONSIN, SEE DETAIL #10
- (OTHER STATES SEE CHART)

LIQUID CAPACITY: 42.92 GAL/IN

LOADING DESIGN: 8' 0" UNSATURATED SOIL

HOLDING TANK:
- OUTLET HOLE PLUGGED
- ACTUAL CAPACITY: 2,146 GALLONS

TANK CAN BE USED AS:
SEPTIC/ HOLDING/ PUMP OR SIPHON

COVER: MIX DESIGN #8 (NO FIBER)
TANK: MIX DESIGN #10 (STRUCTURAL FIBER)

CUSTOMIZED TANKS:
FOR CUSTOM TANKS CONTACT WIESER CONCRETE

TANKS ARE MANUFACTURED TO MEET OR EXCEED ASTM C–1227 REQUIREMENTS

DRAWINGS SUBMITTED FOR APPROVAL

APPROVED BY: _____

APPROVAL DATE: _____

PRODUCTS NEEDED BY: _____

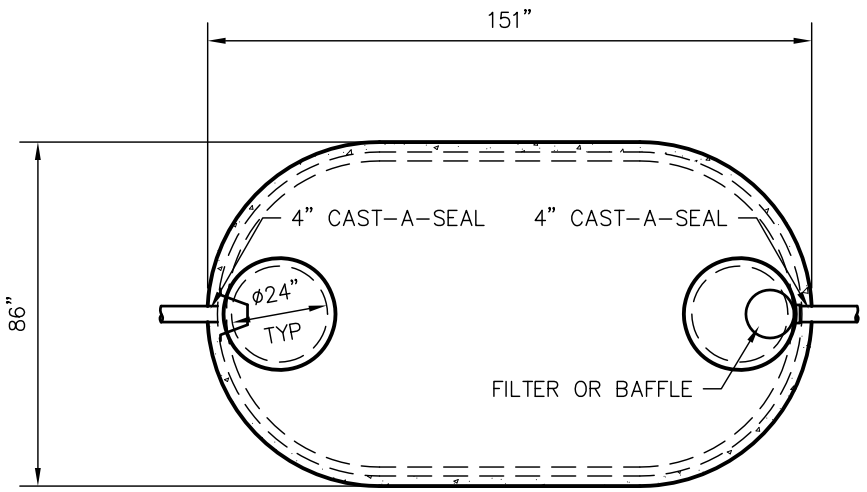
PRE–POUR:
POST–POUR:
SCALE: 1/4"=1'–0"
REV.
DATE:
DRAWN BY: WCP
DATE: 00/00/00
FILE: W2000–MR

WIESER CONCRETE
W3716 US HWY 10 MAIDEN ROCK, WI 54750
800–325–8456

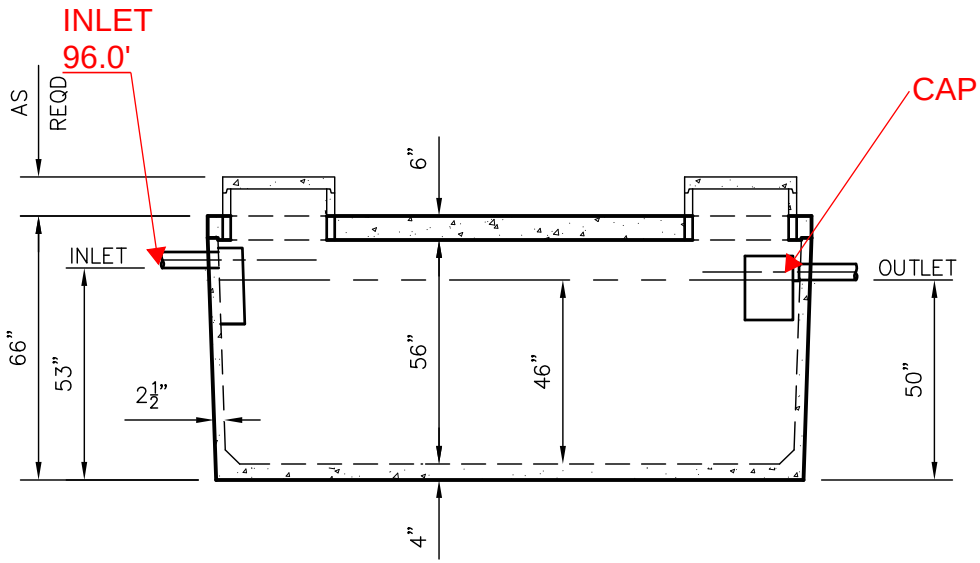
W2000–MR
SEPTIC MANUAL

SHEET NO. 1 OF 1

W2000–MR
TANK SPECIFICATIONS



TOP VIEW



SIDE VIEW

DIMENSIONS:
- WALL: 2 1/2"
- BOTTOM: SEPTIC 3"
  HEAVY DUTY 5" (ADD 2,050 LBS.)
- COVER: 6"
- MANHOLE: 24" I.D. PRECAST CONCRETE RISER
- HEIGHT: 66" O.D.
- LENGTH: 151" O.D.
- WIDTH: 86" O.D.
- BELOW INLET: 53" O.D.
- LIQUID LEVEL: 46"
- WEIGHT: 13,540 LBS. SEPTIC
  15,370 LBS. HOLDING

INLET AND OUTLET:
- 4" CAST–A–SEAL BOOT OR EQUAL
- GASKET, CAST–A–SEAL BOOT OR EQUAL

INLET AND OUTLET BAFFLE AND FILTER:
- WISCONSIN, SEE DETAIL #10
- (OTHER STATES SEE CHART)

LIQUID CAPACITY: 42.92 GAL/IN

LOADING DESIGN: 8' 0" UNSATURATED SOIL

HOLDING TANK:
- OUTLET HOLE PLUGGED
- ACTUAL CAPACITY: 2,146 GALLONS

TANK CAN BE USED AS:
SEPTIC/ HOLDING/ PUMP OR SIPHON

COVER: MIX DESIGN #8 (NO FIBER)
TANK: MIX DESIGN #10 (STRUCTURAL FIBER)

CUSTOMIZED TANKS:
FOR CUSTOM TANKS CONTACT WIESER CONCRETE

TANKS ARE MANUFACTURED TO MEET OR EXCEED ASTM C–1227 REQUIREMENTS

DRAWINGS SUBMITTED FOR APPROVAL

APPROVED BY: _____

APPROVAL DATE: _____

PRODUCTS NEEDED BY: _____

PRE–POUR:
POST–POUR:
SCALE: 1/4"=1'–0"
REV.
DATE:
DRAWN BY: WCP
DATE: 00/00/00
FILE: W2000–MR

WIESER CONCRETE
W3716 US HWY 10 MAIDEN ROCK, WI 54750
800–325–8456

W2000–MR
SEPTIC MANUAL

SHEET NO. 1 OF 1

MOUND DETAIL

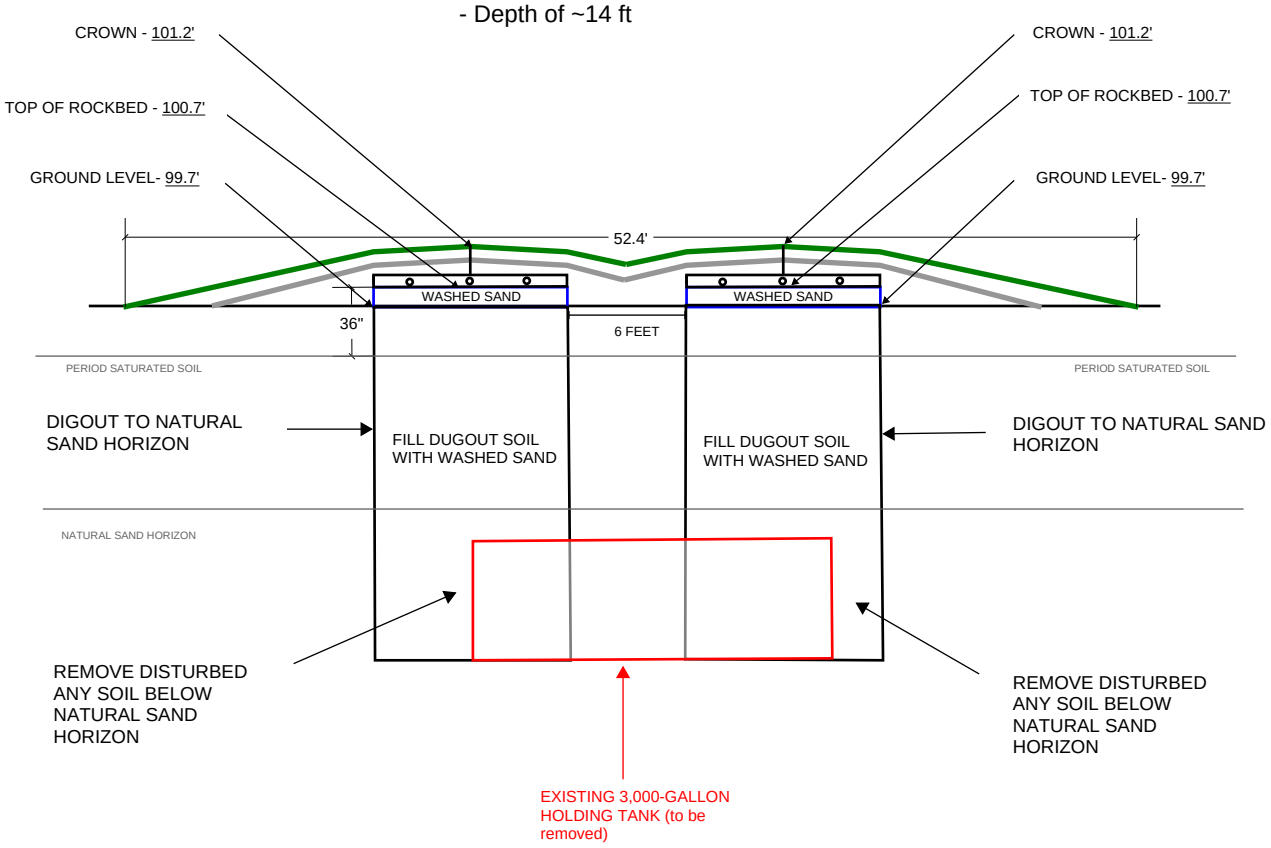
MOUND DIMENSIONS

Dimensions for each mound
- 10' X 60'
- 12" WASHED SAND
- 3 - LATERALS PER ZONE
- 58' LATERAL LENGTH

DIGOUT DIMENSIONS (estimated)

Under Parking in Absorption Area
- 10' wide x 60' long (x 2)
- Depth of ~ 7 ft

Above Holding Tank
- Depth of ~14 ft



KSD

Your water. Our neighbors.

University of Minnesota Onsite Sewage Treatment Program

Preliminary Evaluation Worksheet

Minnesota Pollution Control Agency

1. Contact Information

v 04.02.2019

Property Owner/Client:	ISD 834 - Stillwater Area Public Schools	Date Completed:	3/26/2020
Site Address:	11530 Hudson Blvd N, Lake Elmo, MN 55042	Project ID:	
Legal Description:	ONBlock 1 Lot 1 SubdivisionCd 3198 SubdivisionName FOUR CORNERS		

Parcel ID:	36.029.21.43.0004	TWP:	29	SEC:	36	RNG:	21

2. Flow and General System Information

A. Client-Provided Information

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

Project Use: ☐ Residential ☑ Other Establishment: Office

Residential use: # Bedrooms: | Dwelling Sq.ft.: | Unfinished Sq. Ft.:

Adults: | # Children: | # Teenagers:

In-home business (Y/N): | 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: No non-domestic waste will be discharged to system.

The above is complete & accurate: Anthony V. Willger (Apr 8, 2020) SIGN HERE

Client signature & date

B. Designer-determined flow Information

Attach additional information as necessary.

Design Flow: 1440 GPD Anticipated Waste Type: Other Est. - At-Risk

BOD: 400 mg/L TSS 100 mg/L Oil & Grease 20 mg/L

3. Well Information

#	Description	Mn. ID#	Well Depth (ft.)	Casing Depth (ft.)	Confining Layer	STA Setback	Source
1	11530 Hudson Blvd N	??	>50	>50		50	Owner
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 a 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?	No	Yes, name:	
Elevation of ordinary high water level:	ft	Source:	
Classification:	Tank Setback: ft.	STA Setbk: ft.	
C. Site located in a floodplain?	No	Yes, Type(s):	
Floodplain designation/elevation (10 Year):	ft	Source:	
Floodplain designation/elevation (100 Year):	ft	Source:	

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: 49—Antigo silt loam Slope Range: 0-2 %

List landforms: Flats, terraces

Landform position(s): Summit

Parent materials: Loess and/or silty glaciofluvial deposits over loamy glaciofluvial deposits over stratified sandy and gravelly outwash

Depth to Bedrock/Restrictive Feature: 80 in Depth to Watertable: 80 in

Map Unit Ratings

Septic Tank Absorption Field- At-grade:	Very Limited
Septic Tank Absorption Field- Mound:	Not Limited
Septic Tank Absorption Field- Trench:	Very Limited

5. Local Government Unit Information

Name of LGU:	Washington County - Public Health & Environment
LGU Contact:	Public Health & Environment - (651) 430-6655
LGU-specific setbacks:	
LGU-specific design requirements:	
LGU-specific installation requirements:	
Notes:	

Field Evaluation Worksheet

University of Minnesota Onsite Sewage Treatment Program

MINNESOTA POLLUTION CONTROL AGENCY

1. Project Information

v 04.02.2019

Property Owner/Client:	ISD 834 - Stillwater Area Public Schools	Project ID:	
Site Address:	11530 Hudson Blvd N, Lake Elmo, MN 55042	Date Completed:	3/26/2020

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):	Lawn	Landscape position:	Shoulder		
Percent slope:		%	Slope shape:	Linear, Linear	Slope direction:

Describe the flooding or run-on potential of site: Water will need to be diverted around mounds

Describe the need for Type III or Type IV system: There is no area of the site with undistrubed soil.

Note: The placement of the system was the original area for a future septic. A parking lot was installed.

Elevations and Benchmarks identified on map? (Y/N):	Yes	If yes, describe:	See Site Plan
Proposed soil treatment area protected? (Y/N):	Yes	If yes, describe:	Stakes

4. General Soils Information

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

If yes, describe: The soil under the parking lot and the area where the Holding Tank is located has been disturbed.

Soil observations were conducted in the proposed system location (Y/N):	Yes
A soil observation in the most limiting area of the proposed system (Y/N):	Yes
Number of soil observations: 6	Soil observation logs attached (Y/N): Yes
Percolation tests performed & attached (Y/N):	No

5. Phase I. Reporting Information

	Depth		Elevation				
Periodically saturated soil:	24	in	99.7	ft	Soil Texture:	Medium sand	
Standing water:		in		ft	Percolation Rate:		min/inch
Bedrock:		in		ft	Soil Hyd Loading Rate:	1.2	gpd/ft^2
Benchmark:			100	ft			

Benchmarck Location: SW corner of building (Slab at ground level)

Differences between soil survey and field evaluation:

Site evaluation issues / comments: A parking lot is located over STA

Anticipated construction issues: Removal of parking lot, holding tank and sewer manhole

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 04.02.2019

Client:	**ISD 834 - Stillwater Area Public Schools**	Location / Address:	11530 Hudson Blvd N, Lake Elmo, MN 55042

Soil parent material(s): (Check all that apply) ☐ Outwash ☐ Lacustrine ☑ Loess ☐ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter

Landscape Position: (check one) ☑ Summit ☐ Shoulder ☐ Back/Side Slope ☐ Foot Slope ☐ Toe Slope		Slope shape	Linear, Linear
Vegetation:	Lawn	Soil survey map units: 49	Slope %: 0
Elevation:	102.2		
Weather Conditions/Time of Day:	Overcast / 8:35 am	Date	03/26/20
Observation #/Location:	SP1 / See Map	Observation Type:	Soil Pit

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	I-------- Structure----------I		
							Shape	Grade	Consistence
0-24	Clay Loam	5%	7.5YR 3/2				Blocky	Moderate	Firm
24-42	Medium Sandy Loam	5%	7.5YR 4/4				Blocky	Moderate	Firm
42-54	Silt Loam	0%	10YR 3/2				Blocky	Moderate	Firm
54-66	Loamy Medium Sand	5%	10YR 4/4				Granular	Weak	Friable
66-72	Medium Sand	5%	7.5YR 5/3				Single grain	Structureless	Loose
72-96	Medium Sand	5%	10YR 5/3	2.5Y 7/8	Concentrations	S1	Single grain	Structureless	Loose
96-108	Medium Sand	5%	10YR 5/3	10YR 5/8	Concentrations	S1	Single grain	Structureless	Loose

Comments: Limiting Layer = 72" - 96.2' - Natural Soil starts at 42" (above is fill for hill) - Depth to LL from ground level is 30" of separation.

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

Jesse Kloeppner		**L4043**	**3/26/2020**
(Designer/Inspector)	(Signature)	(License #)	(Date)

Additional Soil Observation Logs

Project ID:

University of Minnesota Onsite Sewage Treatment Program

Client:	**ISD 834 - Stillwater Area Public Schools**			Location / Address:	11530 Hudson Blvd N, Lake Elmo, MN 55042		
Soil parent material(s): (Check all that apply)	☐ Outwash ☐ Lacustrine ☑ Loess ☐ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter						
Landscape Position: (check one)	☑ Summit ☐ Shoulder ☐ Back/Side Slope ☐ Foot Slope ☐ Toe Slope				Slope shape	Linear, Linear	
Vegetation:	Lawn	Soil survey map units:	49	Slope %:	0.0	Elevation:	101.7
Weather Conditions/Time of Day:	Overcast / 8:40 am				Date:	03/26/20	
Observation #/Location:	SP2 / Mound				Observation Type:	Soil Pit	

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	I-------- Structure----------I		
							Shape	Grade	Consistence
0-18	Silty Clay Loam	5%	7.5YR 3/2				Blocky	Moderate	Firm
18-36	Medium Sandy Loam	5%	7.5YR 4/4				Blocky	Moderate	Firm
36-48	Silt Loam	0%	10YR 3/2				Blocky	Moderate	Firm
48-60	Loamy Medium Sand	5%	10YR 4/4				Granular	Weak	Friable
60-66	Medium Sand	5%	7.5YR 5/3				Single grain	Structureless	Loose
66-90	Medium Sand	5%	10YR 5/3	2.5Y 7/8	Concentrations	S1	Single grain	Structureless	Loose
90-108	Medium Sand	5%	10YR 5/3	10YR 5/8	Concentrations	S1	Single grain	Structureless	Loose

Comments	Limiting Layer = 66" - 96.2' - Natural Soil starts at 36" (above is fill for hill) - Depth to LL from ground level is 24" of separation.

Textures:

c-clay
sic-silty clay
sc-sandy clay
cl-clay loam
sicl-silty clay loam
scl-sandy clay loam
si-silt
sil-silt loam
l-loam
sl-sandy loam*
ls-loamy sand*
s-sand*

Subsoil Indicator(s) of Saturation:

S1. Depleted matrix (value >/=4 and chroma </=2)
S2. Distinct gray or red redox features
S3. 5Y chroma </= 3
S4. 7.5 YR or redder faint redox concentrations or redox depletio

If yes to one of the above indicators then:

Topsoil Indicator(s) of Saturation:

T1. Wetland Vegetation
T2. Depressional Landscape
T3. Organic texture or organic modifiers
T4. N 2.5/ 0 color
T5. Redox features in topsoil
T6. Hydric Soil

***Sand Modifiers**

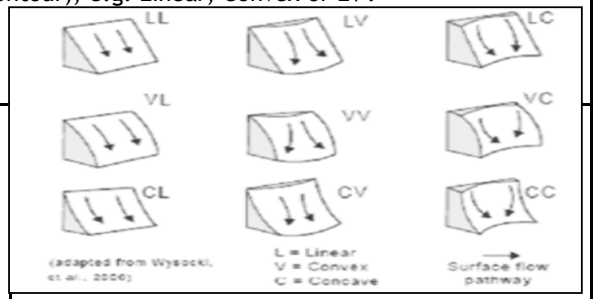
co-coarse
m-medium
f-fine
vf-very fine

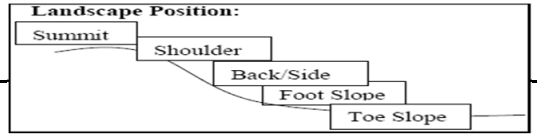
Consistence:

Loose-	Intact specimen not available
Friable-	Slight force between fingers
Firm-	Moderate force between fingers
Extremely firm-	Moderate force between hands or slight foot pressure
Rigid-	Foot pressure

Slope Shape:

Slope shape is described in two directions: up and down slope (perpendicular to the contour), and across slope (along the horizontal contour); e.g. Linear, Convex or LV'.





Soil Structure Grade:

Massive-	No observable aggregates, or no orderly arrangement of natural lines of weakness
Weak-	Poorly formed, indistinct peds, barely observable in place
Moderate-	Well formed, distinct peds, moderately durable and evident, but not distinct in undisturbed
Strong-	Durable peds that are quite evident in un-displaced soil, adhere weakly to one another, withstand displacement, and become separated when soil is disturbed
Loose-	No peds, sandy soil

Soil Structure Shape:

Granular-	The peds are approximately spherical or polyhedral and are commonly found in topsoil. These are the small, rounded peds that hang onto roots
Platy-	The peds are flat and plate like. They are oriented horizontally and are usually overlapping. Platy structure is commonly found in forested areas
Blocky-	The peds are block-like or polyhedral, and are bounded by flat or slightly rounded surface that are casting of the faces of surrounding peds.
Prismatic-	Flat or slightly rounded vertical faces bound the individual peds. Peds are distinctly longer vertically, and faces are typically cast or molds of
Single Grain-	The structure found in a sandy soil. The individual particles are not held together.

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 04.02.2019

Client:	ISD 834 - Stillwater Area Public Schools			Location / Address:	11530 Hudson Blvd N, Lake Elmo, MN 55042
Soil parent material(s): (Check all that apply)	☐ Outwash ☐ Lacustrine ☑ Loess ☐ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter				
Landscape Position: (check one)	☑ Summit ☐ Shoulder ☐ Back/Side Slope ☐ Foot Slope ☐ Toe Slope			Slope shape	Linear, Linear
Vegetation:	Lawn	Soil survey map units:	49	Slope %: 0.0	Elevation (ft): 103.5
Weather Conditions/Time of Day:	Overcast / 9:30 am			Date:	03/26/20
Observation #/Location:	SP3 / See Map			Observation Type:	Soil Pit

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	I-------- Structure----------I		
							Shape	Grade	Consistence
0-33	Medium Sandy Loam	15%	10YR 3/3		Disturbed		Blocky	Moderate	Firm
			10YR 5/3		Soil				
33-45	Medium Sandy Loam	25%	10YR 3/6		Disturbed		Blocky	Moderate	Firm
			7.5YR 4/4		Soil				
45-72	Medium Sandy Loam	20%	10YR 4/4		Disturbed		Blocky	Moderate	Firm
			7.5YR 4/4		Soil				
72-84	Loamy Medium Sand	15%	7.5YR 4/4		Disturbed		Blocky	Weak	Friable
			10YR 3/4		Soil				
84-108	Loamy Medium Sand	10%	10YR 3/3		Disturbed		Blocky	Weak	Friable
			10YR 4/4		Soil				
108-120	Silt Loam	10%	10YR 4/3				Blocky	Moderate	Firm
120-130	Medium Sand	5%	10YR 5/3				Single grain	Structureless	Loose

Comments No limiting layer observed. Most of the soil had been disturbed during construction of Holding Tank at 13 feet deep.

Additional Soil Observation Logs

Project ID:

University of Minnesota Onsite Sewage Treatment Program

Client:	**ISD 834 - Stillwater Area Public Schools**			Location / Address:	11530 Hudson Blvd N, Lake Elmo, MN 55042
Soil parent material(s): (Check all that apply)	☐ Outwash ☐ Lacustrine ☑ Loess ☐ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter				
Landscape Position: (check one)	☑ Summit ☐ Shoulder ☐ Back/Side Slope ☐ Foot Slope ☐ Toe Slope			Slope shape	Linear, Linear
Vegetation:	Lawn	Soil survey map units:	49	Slope %: 0.0	Elevation (ft): 102.5
Weather Conditions/Time of Day:	Overcast / 9:40 am			Date:	03/26/20
Observation #/Location:	SP4 / See Map			Observation Type:	Soil Pit

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	I-------- Structure----------I		
							Shape	Grade	Consistence
0-22	Medium Sandy Loam	15%	10YR 3/3		Disturbed		Blocky	Moderate	Firm
			10YR 5/3		Soil				
22-36	Medium Sandy Loam	25%	10YR 3/6		Disturbed		Blocky	Moderate	Firm
			7.5YR 4/4		Soil				
36-66	Medium Sandy Loam	20%	10YR 4/4		Disturbed		Blocky	Moderate	Firm
			7.5YR 4/4		Soil				
66-80	Loamy Medium Sand	15%	7.5YR 4/4		Disturbed		Blocky	Moderate	Firm
			10YR 3/4		Soil				
80-96	Loamy Medium Sand	10%	10YR 3/3		Disturbed		Blocky	Moderate	Firm
			10YR 4/4		Soil				
96-120	Silt Loam	10%	10YR 4/3				Blocky	Moderate	Firm
120-130	Medium Sand	5%	10YR 5/3				Single grain	Structureless	Loose

Comments No limiting layer observed. Most of the soil had been disturbed during construction of Holding Tank at 13 feet deep.

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 04.02.2019

Client:	**ISD 834 - Stillwater Area Public Schools**	Location / Address:	11530 Hudson Blvd N, Lake Elmo, MN 55042

Soil parent material(s): (Check all that apply) ☐ Outwash ☐ Lacustrine ☑ Loess ☐ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter

Landscape Position: (check one) ☑ Summit ☐ Shoulder ☐ Back/Side Slope ☐ Foot Slope ☐ Toe Slope		Slope shape	Linear, Linear
Vegetation:	Lawn	Soil survey map units: 49	Slope %: 0.0
Elevation (ft):	99.9		
Weather Conditions/Time of Day:	Overcast / 9:50 am	Date:	03/26/20
Observation #/Location:	SB2 - See Map	Observation Type:	Auger

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	I-------- Structure----------I		
							Shape	Grade	Consistence
0-5	Loam	0%	10YR 3/2				Blocky	Moderate	Firm
5-18	Silt Loam	0%	10YR 4/3				Blocky	Moderate	Firm
18-20	Medium Sandy Loam	5%	10YR 4/4				Granular	Weak	Friable
20-30	Medium Sand	5%	10YR 4/4				Single grain	Structureless	Loose
30-40	Medium Sand	5%	10YR 5/4	7.5YR 5/8	Concentrations	S1	Single grain	Structureless	Loose
				10YR 5/2	Depletions	S2			
40-60	Medium Sand	5%	10YR 5/3	10YR 5/2	Depletions	S2	Single grain	Structureless	Loose
				7.5YR 5/6	Concentrations	S1			

Comments Limiting Layer = 30" - 97.2' - Most natural soil for the area. Designing Absorption Area from this boring.

Additional Soil Observation Logs

Project ID:

University of Minnesota Onsite Sewage Treatment Program

Client:	ISD 834 - Stillwater Area Public Schools	Location / Address:	11530 Hudson Blvd N, Lake Elmo, MN 55042

Soil parent material(s): (Check all that apply) ☐ Outwash ☐ Lacustrine ☑ Loess ☐ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter

Landscape Position: (check one) ☑ Summit ☐ Shoulder ☐ Back/Side Slope ☐ Foot Slope ☐ Toe Slope — Slope shape: Linear, Linear

Vegetation:	Lawn	Soil survey map units:	49	Slope %: 0.0	Elevation (ft): 99.7
Weather Conditions/Time of Day:	Overcast / 10:00 am			Date:	03/26/20
Observation #/Location:	SB1 - See Map			Observation Type:	Auger

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure: Shape	Structure: Grade	Structure: Consistence
0-12	Silt Loam	15%	10YR 3/2		Disturbed		Blocky	Moderate	Firm
			7.5YR 4/3		Soil				
12-20	Sandy Clay Loam	20%	10YR 3/4		Disturbed		Blocky	Moderate	Firm
			10YR 4/3		Soil				
20-30	Medium Sandy Loam	10%	10YR 4/4		Disturbed		Blocky	Moderate	Firm
			7.5YR 4/4		Soil				
30-42	Loamy Medium Sand	15%	7.5YR 5/3		Disturbed		Granular	Weak	Friable
			10YR 3/3		Soil				
42-55	Medium Sand	5%	10YR 4/4	10YR 4/2	Depletions	S2	Single grain	Structureless	Loose
55-70	Medium Sand	10%	10YR 5/3	10YR 5/2	Depletions	S2	Single grain	Structureless	Loose
				10YR 5/6	Concentrations	S1			

Comments: Disturbed Soil until 42" - Found redox @ 42" (faint signs)

Design Summary Worksheet

1. PROJECT INFORMATION

v 04.02.2019

Property Owner/Client: ISD 834 - Stillwater Area Public Schools | Project ID:

Site Address: 11530 Hudson Blvd N, Lake Elmo, MN 55042 | Date: 04/06/20

2. DESIGN FLOW & WASTE STRENGTH

Attach data / estimate basis for Other Establishments

Design Flow: 1440 GPD | Anticipated Waste Type: Other Est. - At-Risk

BOD: 400 mg/L | TSS: 100 mg/L | Oil & Grease: 20 mg/L

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

3. HOLDING TANK SIZING

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

Code Minimum **Holding Tank** Capacity: Gallons in Tanks or Compartments

Recommended **Holding Tank** Capacity: Gallons in Tanks or Compartments

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

Comments:

4. SEPTIC TANK SIZING

A. Residential dwellings:

Number of Bedrooms (Residential):

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

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

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

B. Other Establishments:

Waste received by: Gravity | 1440 GPD x 3 Days Hyd. Retention Time

Code Minimum **Septic Tank** Capacity: 4320 Gallons In 2 Tanks or Compartments

Recommended **Septic Tank** Capacity: 4500 Gallons In 2 Tanks or Compartments

Effluent Screen & Alarm (Y/N): Yes | Model/Type: PolyLok 525 or equal

5. PUMP TANK SIZING

Pump Tank 1 Capacity (Minimum): 2000 Gal

Pump Tank 1 Capacity (Recommended): 2000 Gal

Pump 1 25.0 GPM Total Head 16.0 ft

Supply Pipe Dia. 2.00 in Dose Vol: 80.0 gal

Pump Tank 2 Capacity (Minimum): Gal

Pump Tank 2 Capacity (Recommended): Gal

Pump 2 GPM Total Head ft

Supply Pipe Dia. Dose Vol: Gal

Design Summary Worksheet

6. SYSTEM AND DISTRIBUTION TYPE

Project ID:

Soil Treatment Type:	Mound	Distribution Type:	Pressure Distribution-Level
Elevation Benchmark:	100 ft	Benchmark Location:	Slab at ground level of SW cor.
MPCA System Type:	Type III	Distribution Media:	Rock
Type III/IV Details:	Removal of Disturbed Soil & Reduced CLR		

7. SITE EVALUATION SUMMARY:

Describe Limiting Condition: Redoximorphic Features/Saturated Soils

Layers with >35% Rock Fragments? (yes/no) 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	
Limiting Condition:	24	inches	2.0	ft	99.7	ft
Minimum Req'd Separation:	36	inches	3.0	ft		
					Elevation	
Code Max System Depth:	Mound	inches	-1.0	ft	100.7	ft

Critical for system compliance

This is the maximimum depth to the bottom of the distribution media. Negative Depth (ft) means it must be a mound.

Soil Texture:	Medium Sand		
Soil Hyd. Loading Rate:	1.20 GPD/ft^2	Percolation Rate:	MPI
Contour Loading Rate:	12	Note:	
Measured Land Slope:	0.0 %	Note:	
Comments:			

8. SOIL TREATMENT AREA DESIGN SUMMARY

Trench:

Dispersal Area	ft^2	Sidewall Depth	in	Trench Width	ft
Total Lineal Feet	ft	No. of Trenches		Code Max. Trench Depth	in
Contour Loading Rate	ft	Min. Length	ft	Designed Trench Depth	in

Bed:

Dispersal Area	ft^2	Sidewall Depth	in	Maximum Bed Depth	in
Bed Width	ft	Bed Length	ft	Designed Bed Depth	in

Mound:

Dispersal Area	1200.0 ft^2	Bed Length	120.0 ft	Bed Width	10.0 ft
Absorption Width	10.0 ft	Clean Sand Lift	1.0 ft	Berm Width (0-1%)	13.2 ft
Upslope Berm Width	13.2 ft	Downslope Berm	13.2 ft	Endslope Berm Width	13.2 ft
Total System Length	146.4 ft	System Width	36.4 ft	Contour Loading Rate	12.0 gal/ft

Design Summary Worksheet

Project ID:

At-Grade:

Bed Width	ft	Bed Length	ft	Finished Height	ft
Contour Loading Rate	gal/ft	Upslope Berm	ft	Downslope Berm	ft
Endslope Berm	ft	System Length	ft	System Width	ft

Level & Equal Pressure Distribution

No. of Laterals	3	Perforation Spacing	3 ft	Perforation Diameter	3/16 in
Lateral Diameter	1.50 in	Min Dose Volume	0 gal	Max Dose Volume	360 gal

Non-Level and Unequal Pressure Distribution

	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

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

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

1008 gpd X 223 mg/L X 8.35 ÷ 1,000,000 = 1.88 lbs. BOD/day

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

1008 gpd X 223 mg/L X 8.35 ÷ 1,000,000 = 1.88 lbs. BOD/day

Lbs. BOD To Be Removed: 0.00

PreTreatment Technology: *Must Meet or Exceed Target

Disinfection Technology: *Required for Levels A & B

C. Organic Loading to Soil Treatment Area:

223 mg/L X 1008 gpd x 8.35 ÷ 1,000,000 ÷ 1200 ft^2 = 0.00156 lbs./day/ft^2

10. Comments/Special Design Considerations:

1. The estimated design flow is calculated for 12 full-time employess; 200 bus drivers and 5 visitors per day.
2. Soil Absorption Area (mound) will be divided into two zones of 10' x 60'.
3. Disturbed soil below the absorption area will be dugout and replaced with washed mound sand.
4. The existing Manhole & 3,000-gallon Septic Tank will be removed.
5. The flow to the mounds will be restricted to 70% of Design Flow. If flow exceeds 1,008 gallons in 24-hours, an Alarm will sound.
6. Dual Alternating Pumps will be used to Time-Dose the flow to the mounds.
7. Cap drain from Shop Floor to Manhole. Install new Holding Tank for flow.

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

Jesse Kloeppner		L4043	4/6/2020
(Designer)	(Signature)	(License #)	(Date)

University of Minnesota Onsite Sewage Treatment Program

Flow Estimation: Other Establishments

MINNESOTA POLLUTION CONTROL AGENCY

v 04.02.2019

Establishment	*7081* Specified Type of Establishment	Unit	# of Units	Design Flow per Unit (See Table I)	Total Avg Daily Flow
1	Office	employee	12	15.00	180
2	Office	visitor	5	4.00	20
3	Public lavatory	user	200	5.00	1000
4					
5					
				Total Flow 7081 Establishments (gpd)	1200

Establishment	*NON 7081* Specified Type of Establishment	Unit	# of Units	Design Flow per Unit	Total Avg Daily Flow
6					
7					
8					
9					
10					
				Total Flow Non-7081 Establishments (gpd)	
				Safety Factor (gpd)	240.00
				Total Flow 7081 and Non 7081 Establishments (gpd)	1440.00

Estimate of Waste Strengths from Other Establishments

Type of Facility	BOD_5 (mg/L)	BOD_5 (lbs/unit/day)
Airports		
Per passenger	400 - 500	0.02
Per employee	400 - 500	0.05
Apartment houses	240 - 400	0.175/multiple family
Assembly hall (no kitchen)	240 - 400	0.01/seat
Boarding school	240 - 400	0.208/student
Bowling alley (no kitchen)	240 - 400	0.15/lane
Camps		
Construction (Semi-permanent)	400 - 500	0.140
Country club (member)	400 - 500	0.052/member
Country club (resident)	240 - 400	0.208/resident
Day (no meals)	400 - 500	0.031
Luxury	400 - 500	0.208
Church (no kitchen)	240 - 400	0.02/seat
Country club	400 - 800	0.208/member
Personnel addition	240 - 400	0.04/employee
Day school	240 - 400	0.031/student
Add for showers	240 - 400	0.011/student
Add for cafeteria	500 - 700	0.031/meal
Factory		
No showers	240 - 400	0.073/employee
With showers	240 - 400	0.083/employee
Food service		
Ordinary restaurant	600 - 1500	0.35/seat
24-Hour restaurant	600 - 1500	0.50/seat
Freeway restaurant	600 - 1500	0.70/seat
Tavern (limited food)	400 - 800	0.10/seat
Carry-out (single service)	600 - 800	0.70/100 sqft
Carry-out	200 - 600	0.04/employee
Fast food chain	1000 - 2000	0.80/seat
Kitchen Waste	600 - 1500	0.015/meal
Toilet and Kitchen Waste	600 - 1500	0.021/customer
Additional for bars & cocktail lounges	600 - 1500	0.01/customer
Hospital (not including personnel)	400 - 600	0.518/bed
Laundromat	600 - 800	2.0/machine
Mobile home park	240 - 400	0.40/space
Mobile home park	240 - 400	0.140/person
Motel, Hotel	240 - 400	0.083/bed
Motel, Hotel	240 - 400	0.14/person
Nursing home (not including kitchen or laundry)	400 - 600	0.26/bed
Office building (per 8 hour shift)	240 - 400	0.05/employee
Park, toilets only	400 - 600	0.01/person
Park, bathhouse and flush toilets	240 - 400	0.021/person
Resort hotel, cottage	240 - 400	0.15/room
Add for self-service laundry	600 - 800	2.0/machine
Service station	240 - 400	0.50/toilet or urinal
Service station	240 - 400	0.021vehicle served
Shopping center (no food service or laundry)	400 - 600	0.30/1000 sqft
Shopping center (no food service or laundry)	400 - 600	0.050/employee
Sports Stadium	400 - 600	0.20/person
Swimming pool	300 - 500	0.021/person
Theaters		
Drive-in	400 - 500	0.010/car space
Indoor	240 - 400	0.010/seat
Travel trailer or RV park		
No water/sewer hook up	400 - 800	0.25/space
With water and sewer	400 - 800	0.35/space

Waste Strength Concentration into Soil Treatment Area for Other Establishments

1 DESIGN FLOW & WASTE STRENGTH *Attach data / estimate basis for Other Establishments*

Design Flow: 1440 GPD Anticipated Waste Type: Other Est. - At-Risk

BOD: 400 mg/L TSS: 100 mg/L

2 SEPTIC REMOVAL RATE THROUGH SEPTIC TANKS

A. Typical removal of BOD and TSS in primary sedimentation (septic) tanks is calculated as a function of the detention time and constituent concentration represented in the equalization below:

$$R = \frac{t}{a + bt}$$

R = expected removal efficiency, % **Max. 7 hours*

t = nominal detention time, h

a, b = empirical constants

Empirical constant at 20 C

Item	a, h	b
BOD	0.018	0.02
TSS	0.0075	0.014

Reference = pg. 303-304 "Small and Decentralized Wastewater Management Systems" - Crites & Tchobanoglous

B. Equation Removal Percentage Equation (BOD): 7 h ÷ (0.018 + (0.02 * 7 h) = 44 %

C. Equation Removal Percentage Equation (TSS): 7 h ÷ (0.0074 + (0.014 * 7 h) = 66 %

D. Expected BOD Concentration after min. of 3 days of retention time

Starting BOD Concentration = 400 mg/L Septic Tank Removal percentage: 44 %

Equation: 400 mg/L x 44 % = 177 mg/L

THEN 400 mg/L - 177 mg/L = 223 mg/L

Expected BOD Concentration from Septic Tank Effluent: 223 mg/L BOD

E. Expected TSS Concentration after min. of 3 days of retention time

Starting TSS Concentration = 100 mg/L Septic Tank Removal percentage: 66 %

Equation: 100 mg/L x 66 % = 66 mg/L

THEN 100 mg/L - 66 mg/L = 34 mg/L

Expected TSS Concentration from Septic Effluent: 34 mg/L TSS

Waste Strength Concentration into Soil Treatment Area for Other Establishments

3 MAXIMUM WASTE STRENGTH LOADING RATES - BOTTOM AREA ONLY

TABLE 5.1 Maximum Waste Strength Loading Rates—Bottom Area Only

Soil Loading Rate (gpd/ft2)	Pounds of BOD5/ft2/day	Pounds of TSS/ft2/day	Pounds of FOG/ft2/day
1.2	0.0017	0.0006	0.0003
0.78	0.0011	0.0004	0.0002
0.68	0.0009	0.0003	0.0001
0.6	0.0009	0.0003	0.0001
0.52	0.0008	0.0003	0.0001
0.5	0.0007	0.0003	0.0001
0.45	0.0006	0.0002	0.0001
0.42	0.0006	0.0002	0.0001

Based on organic loading to a Type I system with design flow and bottom area loading with concentrations of BOD5 of 170 mg/L, TSS of 60 mg/L. and FOG of 25 mg/L.

A. Maximum Waste Strength Loading Rate based on Soil Loading Rate

Soil Hydraulic Loading Rate (SHLR) : 1.2 gpd/sqft

BOD Constant per SLR: 0.0017 Pounds of BOD5/ft2/day:

TSS Constant per SLR: 0.0006 Pounds of TSS/ft2/day:

B. Timed-Dose Flow from "Pump Tank Design Worksheet (Time Dose)"

C. "Choosen Maximum Flow to STA": 1008 gallons

C. Size of Bottom Area of Absorption Area based on Soil Hydraulic Loading Rate - Level C effluent

Required Square Feet based on SHLR = Time-Dosed Flow X SHLR

1008 gpd ÷ 1.2 gpd/sqft 840 ft^2

D. Size of Bottom Area of Absorption Area based on BOD to Maximum Waste Strength Loading Rates

BOD Concentration = Time-Dosed Flow X Septic Tank Effluent BOD (mg/L) X 8.35 ÷ 1,000,000

1008 gpd X 223 mg/L X 8.35 ÷ 1,000,000 = 1.88 lbs. BOD/day

Required Square Feet for removal of lbs. BOD/day = lbs. BOD/day x Maximum Pounds of BOD5/ft2/day

1.88 lbs. BOD/day ÷ 0.0017 Max Pounds of BOD5/ft²/day = 1103 ft^2

E. Size of Bottom Area of Absorption Area based on TSS Maximum Waste Strength Loading Rates

TSS Concentration = Time-Dosed Flow X Septic Tank Effluent TSS (mg/L) X 8.35 ÷ 1,000,000

1008 gpd X 34 mg/L X 8.35 ÷ 1,000,000 = 0.28 lbs. TSS/day

Required Square Feet for removal of lbs. TSS/day = lbs. TSS/day x Maximum Pounds of TSS/ft2/day

0.28 lbs. TSS/day ÷ 0.0006 Max Pounds of TSS/ft2/day: = 472 ft^2

Waste Strength Concentration into Soil Treatment Area for Other Establishments

4 DESIGNED SOIL TREATMENT AREA

A. Summary of Minimum Size of Soil Treatment Area (STA) - Bottom Only

SHLR	840	
BOD	1103	ft^2
TSS	472	ft^2
Designer's Choice	1200	ft^2 *must be greater than largest Minimum STA

B. Safety Factor for Designer's Choice of Soil Treatment Area - lbs./BOD/day/ft2

Safety Factor for lbs./BOD/ft2: 109%

223 mg/L X 1008 gpd x 8.35 ÷ 1,000,000 ÷ 1200 ft^2 = 0.00156 lbs./day/ft^2

Max 0.0017 lbs./day/ft^2 / Actual 0.00156 lbs./day/ft^2 = 109% safety percentage

C. Safety Factor for Designer's Choice of Soil Treatment Area - lbs./TSS/day/ft2

Safety Factor for lbs./TSS/ft2: 254%

34 mg/L X 1008 gpd x 8.35 ÷ 1,000,000 ÷ 1200 ft^2 = 0.00024 lbs./day/ft^2

Max 0.0006 lbs./day/ft^2 / Actual 0.00024 lbs./day/ft^2 = 254% safety percentage

It may be advisable to oversize the absorption area by 50% and divide the system into 3 zones for dosing and resting cycles if secondary treatment is not employed (a must for MSTS - MN Rules Chapter 7081.0270, Subp. 5 B 3).

D. Number of Zones for Soil Treatment Area

Designer Choice of Zones	2	zones
Absorption Area per Zone	600	ft^2

Waste Strength Concentration into Soil Treatment Area for Other Establishments

1 DESIGN FLOW & WASTE STRENGTH *Attach data / estimate basis for Other Establishments*

Design Flow: 1440 GPD Anticipated Waste Type: Other Est. - At-Risk

Maximum BOD: 850 mg/L Maximum TSS: 500 mg/L

2 SEPTIC REMOVAL RATE THROUGH SEPTIC TANKS

A. Typical removal of BOD and TSS in primary sedimentation (septic) tanks is calculated as a function of the detention time and constituent concentration represented in the equalization below:

$$R = \frac{t}{a + bt}$$

R = expected removal efficiency, % **Max. 7 hours*

t = nominal detention time, h

a, b = empirical constants

Empirical constant at 20 C

Item	a, h	b
BOD	0.018	0.02
TSS	0.0075	0.014

Reference = pg. 303-304 "Small and Decentralized Wastewater Management Systems" - Crites & Tchobanoglous

B. Equation Removal Percentage Equation (BOD): 7 h ÷ (0.018 + (0.02 * 7 h) = 44 %

C. Equation Removal Percentage Equation (TSS): 7 h ÷ (0.0074 + (0.014 * 7 h) = 66 %

D. Expected BOD Concentration after min. of 3 days of retention time

Starting BOD Concentration = 850 mg/L Septic Tank Removal percentage: 44 %

Equation: 850 mg/L x 44 % = 377 mg/L

THEN 850 mg/L - 377 mg/L = 473 mg/L

Expected BOD Concentration from Septic Tank Effluent: 473 mg/L BOD

E. Expected TSS Concentration after min. of 3 days of retention time

Starting TSS Concentration = 500 mg/L Septic Tank Removal percentage: 66 %

Equation: 500 mg/L x 66 % = 332 mg/L

THEN 500 mg/L - 332 mg/L = 168 mg/L

Expected TSS Concentration from Septic Effluent: 168 mg/L TSS

Waste Strength Concentration into Soil Treatment Area for Other Establishments

3 MAXIMUM WASTE STRENGTH LOADING RATES - BOTTOM AREA ONLY

TABLE 5.1 Maximum Waste Strength Loading Rates—Bottom Area Only

Soil Loading Rate (gpd/ft2)	Pounds of BOD5/ft2/day	Pounds of TSS/ft2/day	Pounds of FOG/ft2/day
1.2	0.0017	0.0006	0.0003
0.78	0.0011	0.0004	0.0002
0.68	0.0009	0.0003	0.0001
0.6	0.0009	0.0003	0.0001
0.52	0.0008	0.0003	0.0001
0.5	0.0007	0.0003	0.0001
0.45	0.0006	0.0002	0.0001
0.42	0.0006	0.0002	0.0001

Based on organic loading to a Type I system with design flow and bottom area loading with concentrations of BOD5 of 170 mg/L, TSS of 60 mg/L. and FOG of 25 mg/L.

A. Maximum Waste Strength Loading Rate based on Soil Loading Rate

Soil Hydraulic Loading Rate (SHLR) : 1.2 gpd/sqft

BOD Constant per SLR: 0.0017 Pounds of BOD5/ft2/day:

TSS Constant per SLR: 0.0006 Pounds of TSS/ft2/day:

B. Timed-Dose Flow from "Pump Tank Design Worksheet (Time Dose)"

C. "Choosen Maximum Flow to STA": 1008 gallons

C. Size of Bottom Area of Absorption Area based on Soil Hydraulic Loading Rate - Level C effluent

Required Square Feet based on SHLR = Time-Dosed Flow X SHLR

1008 gpd ÷ 1.2 gpd/sqft 840 ft^2

D. Size of Bottom Area of Absorption Area based on BOD to Maximum Waste Strength Loading Rates

BOD Concentration = Time-Dosed Flow X Septic Tank Effluent BOD (mg/L) X 8.35 ÷ 1,000,000

1008 gpd X 473 mg/L X 8.35 ÷ 1,000,000 = 3.98 lbs. BOD/day

Required Square Feet for removal of lbs. BOD/day = lbs. BOD/day x Maximum Pounds of BOD5/ft2/day

3.98 lbs. BOD/day ÷ 0.0017 Max Pounds of BOD5/ft²/day = 2344 ft^2

E. Size of Bottom Area of Absorption Area based on TSS Maximum Waste Strength Loading Rates

TSS Concentration = Time-Dosed Flow X Septic Tank Effluent TSS (mg/L) X 8.35 ÷ 1,000,000

1008 gpd X 168 mg/L X 8.35 ÷ 1,000,000 = 1.42 lbs. TSS/day

Required Square Feet for removal of lbs. TSS/day = lbs. TSS/day x Maximum Pounds of TSS/ft2/day

1.42 lbs. TSS/day ÷ 0.0006 Max Pounds of TSS/ft2/day: = 2360 ft^2

Waste Strength Concentration into Soil Treatment Area for Other Establishments

4 DESIGNED SOIL TREATMENT AREA

A. Summary of Minimum Size of Soil Treatment Area (STA) - Bottom Only

SHLR	840	
BOD	2344	ft^2
TSS	2360	ft^2
Designer's Choice	2400	ft^2 *must be greater than largest Minimum STA

B. Safety Factor for Designer's Choice of Soil Treatment Area - lbs./BOD/day/ft2

Safety Factor for lbs./BOD/ft2: 102%

473 mg/L X 1008 gpd x 8.35 ÷ 1,000,000 ÷ 2400 ft^2 = 0.00166 $lbs./day/ft^2$

Max 0.0017 $lbs./day/ft^2$ / Actual 0.00166 $lbs./day/ft^2$ = 102% safety percentage

C. Safety Factor for Designer's Choice of Soil Treatment Area - lbs./TSS/day/ft2

Safety Factor for lbs./TSS/ft2: 102%

168 mg/L X 1008 gpd x 8.35 ÷ 1,000,000 ÷ 2400 ft^2 = 0.00059 $lbs./day/ft^2$

Max 0.0006 $lbs./day/ft^2$ / Actual 0.00059 $lbs./day/ft^2$ = 102% safety percentage

It may be advisable to oversize the absorption area by 50% and divide the system into 3 zones for dosing and resting cycles if secondary treatment is not employed (a must for MSTS - MN Rules Chapter 7081.0270, Subp. 5 B 3).

D. Number of Zones for Soil Treatment Area

Designer Choice of Zones	2	zones
Absorption Area per Zone	1200	ft^2

University of Minnesota Onsite Sewage Treatment Program

Mound Design Worksheet
<1% Slope

MINNESOTA POLLUTION CONTROL AGENCY

1. SYSTEM SIZING: Project ID: v 04.02.2019

A. Design Flow : 1440 GPD

B. Soil Loading Rate: 1.20 GPD/ft^2

C. Depth to Limiting Condition: 2.0 ft

D. Percent Land Slope: 0.0 %

E. Design Media Loading Rate: 1.2 GPD/ft^2

F. Mound Absorption Ratio: 1.00

Table I
MOUND CONTOUR LOADING RATES:

Measured Perc Rate	← OR →	Texture - derived mound absorption ratio		Contour Loading Rate:
≤ 60mpi		1.0, 1.3, 2.0, 2.4, 2.6	→	≤12
61-120 mpi	← OR →	5.0	→	≤12
≥ 120 mpi*		>5.0*	→	≤6*

TABLE IXa
LOADING RATES FOR DETERMINING BOTTOM ABSORPTION AREA AND ABSORPTION RATIOS USING PERCOLATION TESTS

Percolation Rate (MPI)	Treatment Level C		Treatment Level A, A-2, B,	
	Absorption Area Loading Rate (gpd/ft^2)	Mound Absorption Ratio	Absorption Area Loading Rate (gpd/ft^2)	Mound Absorption Ratio
<0.1	-	1	-	1
0.1 to 5	1.2	1	1.6	1
0.1 to 5 (fine sand and loamy fine sand)	0.6	2	1	1.6
6 to 15	0.78	1.5	1	1.6
16 to 30	0.6	2	0.78	2
31 to 45	0.5	2.4	0.78	2
46 to 60	0.45	2.6	0.6	2.6
61 to 120	-	5	0.3	5.3
>120	-	-	-	-

*Systems with these values are not Type I systems. Contour Loading Rate (linear loading rate) is a recommended value.

2. DISPERSAL MEDIA SIZING

A. Calculate Dispersal Bed Area: Design Flow (1.A) ÷ Design Media Loading Rate (1.E) = ft^2

1440 GPD ÷ 1.2 GPD/ft^2 = 1200 ft^2

If a larger dispersal media area is desired, enter size: ft^2

B. Enter Dispersal Bed Width: 10 ft *Can not exceed 10 feet.*

C. Calculate Contour Loading Rate: Bed Width (2.B) X Design Media Loading Rate (1.E)

10 ft^2 X 1.2 GPD/ft^2 = 12.0 gal/ft *Can not exceed Table 1*

D. Calculate Minimum Dispersal Bed Length: Dispersal Bed Area (2.A) ÷ Bed Width (2.B) = Bed Length

1200 ft^2 ÷ 10 ft = 120.0 ft

3. ABSORPTION AREA SIZING

A. Calculate Absorption Width: Bed Width (2.B) X Mound Absorption Ratio (1.F) = Absorption Width

10.0 ft X 1.0 = 10.0 ft

B. For slopes from 0 to 1%, the Absorption Width is measured from the bed equally in both directions.

Absorption Width Beyond the Bed: Absorption Width (3.A) - Bed Width (2.B) ÷ 2 = Width beyond Bed

(10.0 ft - 10.0 ft) ÷ 2 = 0.0 ft

4. DISTRIBUTION MEDIA: ROCK Project ID:

A. Rock Depth Below Distribution Pipe

6 in 0.50 ft

5. DISTRIBUTION MEDIA: REGISTERED TREATMENT PRODUCTS: CHAMBERS AND EZFLOW

A. Enter Dispersal Media:

B. Enter the Component: Length: ft Width: ft Depth: ft

C. Number of Components per Row = Bed Length divided by Component Length (Round up)

ft ÷ ft = components/row

D. Actual Bed Length = Number of Components/row X Component Length:

components **X** ft =

Check registered product information for specific application and design

E. Number of Rows = Bed Width divided by Component Width

ft ÷ ft = rows *Adjust width so this is a whole number.*

F. Total Number of Components = Number of Components per Row X Number of Rows

X = components

6. MOUND SIZING

A. Calculate Clean Sand Lift: 3 feet minus Depth to Limiting Condition = Clean Sand Lift (1 ft minimum)

3.0 ft - 2.0 ft = 1.0 ft Design Sand Lift (optional): ft

B. Upslope Mound Height = Clean Sand Lift + Depth of Media + Depth of Cover (1 ft)

1.0 ft + 0.80 ft + 1.50 ft = 3.3 ft

C. Berm Width = Upslope Mound Height (4.B) X 4 (4 is recommended, but could be 3-12)

3.3 ft X 4.0 ft = 13.2 ft

D. Total Landscape Width = Berm Width + Dispersal Bed Width + Berm Width

13.2 ft + 10.0 ft + 13.2 ft = 36.4 ft

E. Additional Berm Width necessary for absorption - Absorption Width - Total Landscape Width

10.0 ft - 36.4 ft = 0 ft if number is negative (<0), value is **ZERO**

F. Final Berm Width = Additional Berm Width + Berm Width

0 ft + 13.2 ft = 13.2 ft

G. Total Mound Width = Final Berm Width + Dispersal Bed Width + Final Berm Width

13.2 ft + 10.0 ft + 13.2 ft = 36.4 ft

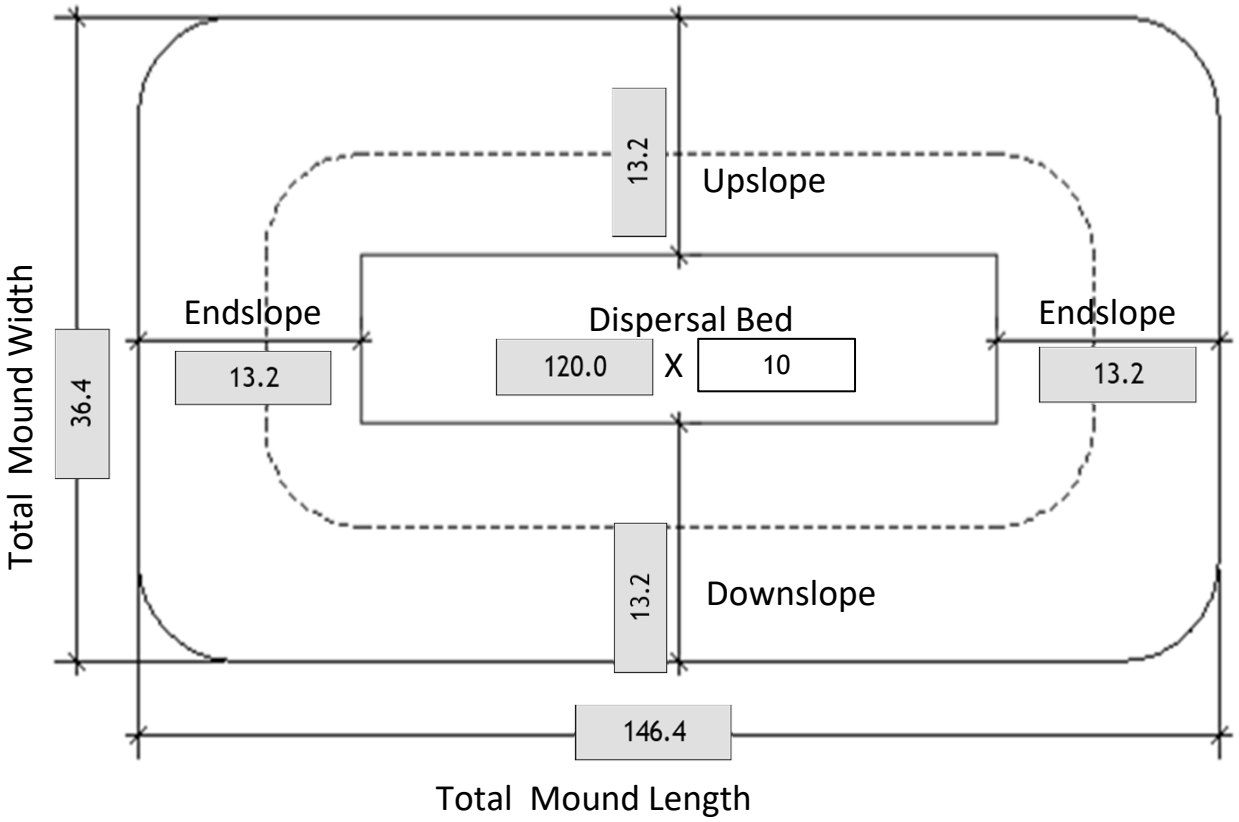
H. Total Mound Length = Final Berm Width + Dispersal Bed Length + Final Berm Width

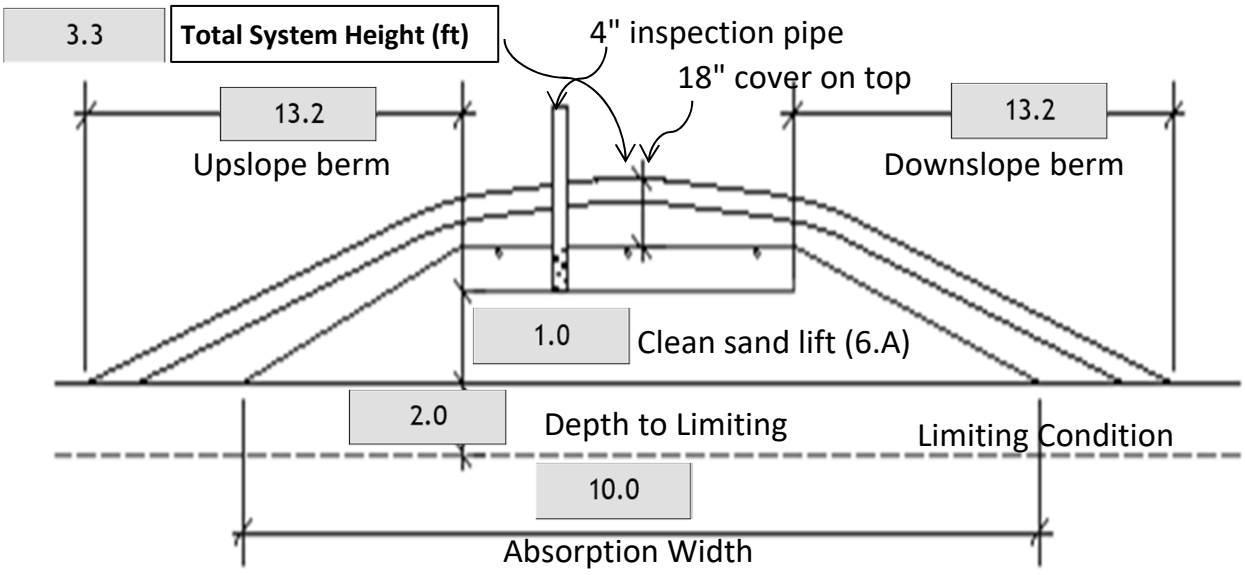
13.2 ft + 120.0 ft + 13.2 ft = 146.4 ft

I. Setbacks from the Bed: Absorption Width - Dispersal Bed Width divided by 2

(10.0 ft - 10.0) / 2 = ft

7. MOUND DIMENSIONS Project ID:





Comments:

Absorption Area will be divided into two zones of 10' x 60'. Mound slope ratio: 4:1.
Disturbed soil below the mound will be dugout and replaced with washed mound sand.

University of Minnesota Onsite Sewage Treatment Program

Mound Materials Worksheet

Minnesota Pollution Control Agency

Project ID:

v 04.02.2019

A. Rock *Volume* : (Rock Below Pipe + Rock to cover pipe (*pipe outside dia + ~2 inch)*) X *Bed Length* X *Bed Width* = *Volume*

(6 in + 3.5 in) ÷ 12 120.0 ft X 10.0 ft = 950.0 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 950.0 ft^3 ÷ 27 = 35.2 yd^3

Add 30% for constructability: 35.2 yd^3 X 1.3 = 45.7 yd^3

B. Calculate *Clean Sand Volume:*

Volume Under Rock bed : *Average Sand Depth* x *Media Width* x *Media Length* = cubic feet

1.0 ft X 10.0 ft X 120.0 ft = 1200.0 ft^3

For a Mound on a slope from 0-1%

Volume from Length = ((Upslope Mound Height - 1) X Absorption Width Beyond Bed X Media Bed Length)

3.30 ft - 1) X X 120 ft = 6.00

Volume from Width = ((Upslope Mound Height - 1) X Absorption Width Beyond Bed X Media Bed Width)

3.30 ft - 1) X X 10 ft = 6.00

Total Clean Sand Volume : *Volume from Length + Volume from Width + Volume Under Media*

6.0 ft^3 + 6.0 ft^3 + 1200 ft^3 = 1212.0 ft^3

For a Mound on a slope greater than 1%

Upslope Volume : ((*Upslope Mound Height - 1*) x 3 x *Bed Length*) ÷ 2 = cubic feet

((ft - 1) X 3.0 ft X) ÷ 2 = ft^3

Downslope Volume : ((*Downslope Height - 1)* x Downslope Absorption Width x *Media Length*) ÷ 2 = cubic feet

((ft - 1) X ft X) ÷ 2 = ft^3

Endslope Volume : (*Downslope Mound Height - 1)* x 3 x *Media Width* = cubic feet

(ft - 1) X 3.0 ft X ft = ft^3

Total Clean Sand Volume : *Upslope Volume + Downslope Volume + Endslope Volume + Volume Under Media*

ft^3 + ft^3 + ft^3 + ft^3 = ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 1212.0 ft^3 ÷ 27 = 44.9 yd^3

Add 30% for constructability: 44.9 yd^3 X 1.3 = 58.4 yd^3

C. Calculate *Sandy Berm Volume:*

Total Berm Volume (approx) : ((Avg. Mound Height - 0.5 ft topsoil) x Mound Width x Mound Length) ÷ 2

(3.3 - 0.5)ft X 36.4 ft X 146.4) ÷ 2 = 7460.5 ft^3

Total Mound Volume - Clean Sand volume -Rock Volume = cubic feet

7460.5 ft^3 - 1212.0 ft^3 - 950.0 ft^3 = 5298.5 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 5298.5 ft^3 ÷ 27 = 196.2 yd^3

Add 30% for constructability: 196.2 yd^3 x 1.2 = 255.1 yd^3

D. Calculate *Topsoil Material Volume: Total Mound Width X Total Mound Length X .5 ft*

36.4 ft X 146.4 ft X 0.5 ft = 2664.5 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 2664.5 ft^3 ÷ 27 = 98.7 yd^3

Add 30% for constructability: 98.7 yd^3 x 1.3 = 75.9 yd^3

University of Minnesota Onsite Sewage Treatment Program

Pressure Distribution Design Worksheet

Minnesota Pollution Control Agency

Project ID: v 04.02.2019

1. Media Bed Width: 10 ft

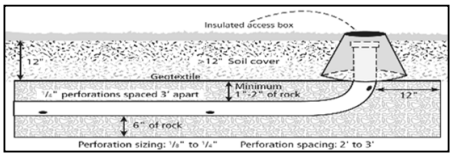
2. Minimum Number of Laterals in system/zone = Rounded up number of [(Media Bed Width - 4) ÷ 3] + 1.

   [(10 - 4) ÷ 3] + 1 = 3 laterals *Does not apply to at-grades*

3. Designer Selected *Number of Laterals*: 3 laterals
   Cannot be less than line 2 (Except in at-grades)

4. Select *Perforation Spacing*: 3.00 ft

5. Select *Perforation Diameter Size:* 3/16 in



6. *Length of Laterals* = Media Bed Length - 2 Feet.

   60.0 - 2ft = 58.0 ft *Perforation can not be closer then 1 foot from edge.*

7. Determine the *Number of Perforation Spaces*. Divide the *Length of Laterals* by the *Perforation Spacing* and round down to the nearest whole number.

   Number of Perforation Spaces = 58.0 ft ÷ 3.0 ft = 19 Spaces

8. *Number of Perforations per Lateral* is equal to 1.0 plus the *Number of Perforation Spaces*. Check table below to verify the number of perforations per lateral guarantees less than a 10% discharge variation. The value is double with a center manifold.

   Perforations Per Lateral = 19 Spaces + 1 = 20 Perfs. Per Lateral

Maximum Number of Perforations Per Lateral to Guarantee <10% Discharge Variation

¼ Inch Perforations						7/32 Inch Perforations					
Perforation Spacing (Feet)	Pipe Diameter (Inches)					Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1¼	1½	2	3		1	1¼	1½	2	3
2	10	13	18	30	60	2	11	16	21	34	68
2½	8	12	16	28	54	2½	10	14	20	32	64
3	8	12	16	25	52	3	9	14	19	30	60
3/16 Inch Perforations						1/8 Inch Perforations					
Perforation Spacing (Feet)	Pipe Diameter (Inches)					Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1¼	1½	2	3		1	1¼	1½	2	3
2	12	18	26	46	87	2	21	33	44	74	149
2½	12	17	24	40	80	2½	20	30	41	69	135
3	12	16	22	37	75	3	20	29	38	64	128

9. *Total Number of Perforations* equals the *Number of Perforations per Lateral* multiplied by the *Number of Perforated Laterals*.

   20 Perf. Per Lat. X 3 Number of Perf. Lat. = 60 Total Number of Perf.

10. Spacing of laterals; Must be greater than 1 foot and no more than 3 feet: 3.0 ft

10. Select *Type of Manifold Connection* (End or Center): End

11. *Select Lateral Diameter (See Table)*: 1.50 in

University of Minnesota Onsite Sewage Treatment Program

Pressure Distribution Design Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

12. Calculate the *Square Feet per Perforation. Recommended value is 4-11 ft² per perforation.*
Does not apply to At-Grades

a. *Bed Area* = Bed Width (ft) X Bed Length (ft)

10	ft	X	60	ft	=	600 ft²

b. *Square Foot per Perforation* = *Bed Area* divided by the *Total Number of Perforations*.

600	ft²	÷	60	perforations	=	10.0 ft²/perforations

13. Select *Minimum Average Head*: 1.0 ft

14. Select *Perforation Discharge* (GPM) based on Table: 0.41 GPM per Perforation

15. Determine required *Flow Rate* by multiplying the *Total Number of Perfs.* by the *Perforation Discharge*.

60	Perfs	X	0.41	GPM per Perforation =		25 GPM

16. *Volume of Liquid Per Foot of Distribution Piping (Table II)*: 0.110 Gallons/ft

17. *Volume of Distribution Piping* =

= [*Number of Perforated Laterals* X *Length of Laterals* X (Volume of Liquid Per Foot of Distribution Piping]

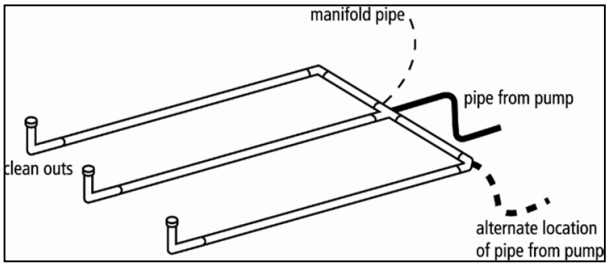
3	X	58	ft	X	0.110	gal/ft	=	19.1 Gallons

18. Minimum Delivered Volume = Volume of Distribution Piping X 4

19.1	gals	X	4	= 76.6 Gallons

Table II
Volume of Liquid in Pipe

Pipe Diameter (inches)	Liquid Per Foot (Gallons)
1	0.045
1.25	0.078
1.5	0.110
2	0.170
3	0.380
4	0.661



Comments/Special Design Considerations:

Distribution Network for each Mound

Basic Pump Selection Design Worksheet

University of Minnesota Onsite Sewage Treatment Program

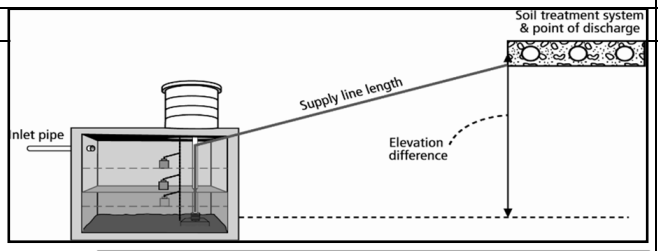
Minnesota Pollution Control Agency

1. PUMP CAPACITY Project ID: v 04.02.2019

Pumping to Gravity or Pressure Distribution: Pressure

1. If pumping to gravity enter the gallon per minute of the pump: _____ GPM *(10 - 45 gpm)*
2. If pumping to a pressurized distribution system: 25.0 GPM
3. Enter pump description: Equalization/Time Dosing

2. HEAD REQUIREMENTS



A. Elevation Difference between pump and point of discharge: 9 ft

B. Distribution Head Loss: 6 ft

C. Additional Head Loss: _____ ft (due to special equipment, etc.)

Distribution Head Loss	
Gravity Distribution = 0ft	
Pressure Distribution based on Minimum Average Head Value on Pressure Distribution Worksheet:	
Minimum Average Head	**Distribution Head Loss**
1ft	5ft
2ft	6ft
5ft	10ft

Table I. Friction Loss in Plastic Pipe per 100ft

Flow Rate (GPM)	Pipe Diameter (inches)			
	1	1.25	1.5	2
10	9.1	3.1	1.3	0.3
12	12.8	4.3	1.8	0.4
14	17.0	5.7	2.4	0.6
16	21.8	7.3	3.0	0.7
18		9.1	3.8	0.9
20		11.1	4.6	1.1
25		16.8	6.9	1.7
30		23.5	9.7	2.4
35			12.9	3.2
40			16.5	4.1
45			20.5	5.0
50				6.1
55				7.3
60				8.6
65				10.0
70				11.4
75				13.0
85				16.4
95				20.1

D. 1. Supply Pipe Diameter: 2.0 in

2. Supply Pipe Length: 45 ft

E. **Friction Loss in Plastic Pipe per 100ft** from Table I:

Friction Loss = 1.69 ft per 100ft of pipe

F. Determine *Equivalent Pipe Length* from pump discharge to soil dispersal area discharge point. Estimate by adding 25% to supply pipe length for fitting loss. *Supply Pipe Length (D.2)* X 1.25 = *Equivalent Pipe Length*

45 ft X 1.25 = 56.3 ft

G. Calculate *Supply Friction Loss* by multiplying *Friction Loss Per 100ft* (Line E) by the *Equivalent Pipe Length* (Line F) and divide by 100.

Supply Friction Loss =

1.69 ft per 100ft X 56.3 ft ÷ 100 = 1.0 ft

H. *Total Head* requirement is the sum of the *Elevation Difference* (Line A), the Distribution Head Loss (Line B), Additional Head Loss (Line C), and the Supply Friction Loss (Line G)

9.0 ft + 5.0 ft + _____ ft + 1.0 ft = 15.0 ft

3. PUMP SELECTION

A pump must be selected to deliver at least **25.0** GPM (Line 1 or Line 2) with at least **16.0** feet of total head.

Comments:

Pump calculations for each mound and supply line. Dual Alternating Pumps required.

University of Minnesota Onsite Sewage Treatment Program

Pump Tank Design Worksheet (Time Dose)

MINNESOTA POLLUTION CONTROL AGENCY

DETERMINE TANK CAPACITY AND DIMENSIONS Project ID: v 04.02.2019

1. A. *Design Flow (Design Sum.1A)* : 1440 GPD B. Tank Use: **Dosing**
   C. 70% of Design Flow 1008 Gal
   D. Min. required pump tank capacity: 2000 Gal E. Recommended capacity: 2000 Gal

2. A. Tank Manufacturer: Wieser Precast B. Tank Model: W2000-MR
   C. Capacity from manufacturer: 2146 Gallons
   D. Gallons per inch: 42.9 Gallons per inch
   E. Liquid depth of tank from manufacturer: 53.0 inches

Note: Design calculations are based on this specific tank. Substituting a different tank model will change the pump float or timer settings. Contact designer if changes are necessary.

DETERMINE DOSING VOLUME

3 Calculate *Volume to Cover Pump* (The inlet of pump should be 4 in from the bottom of the tank & 2 inches of water covering the pump is recommended)

(Pump and block height + 2 inches) X *Gallons Per Inch* (2D)

(10 in + 2 inches) X 42.9 Gallons Per Inch = 515 Gallons

4 *Minimum Delivered Volume* = 4 X Volume of Distribution Piping:

-Item 18 of the Pressure Distribution or Item 11 of Non-level 77 Gallons (minimum dose) 1.8 inches/dose

5 Calculate *Maximum Pumpout Volume* (25% of Design Flow)

Design Flow: 1440 GPD X 0.25 = 360 Gallons (maximum dose) 8.4 inches/dose

6 *Select a pumpout volume that meets both Minimum and Maximum:* 80 Gallons

7 Calculate *Doses Per Day* = Design Flow X 70% ÷ *Delivered Volume*

1008 gpd ÷ 80 gal = 8.8 *Doses*

8 Calculate Drainback:

A. *Diameter of Supply Pipe* = 2 inches

B. Length of Supply Pipe = 45 feet

C. *Volume of Liquid Per Lineal Foot of Pipe* = 0.170 Gallons/ft

D. *Drainback = Length of Supply Pipe* X *Volume of Liquid Per Lineal Foot of Pipe*

45 ft X 0.170 gal/ft = 7.7 Gallons

9. *Total Dosing Volume = Delivered Volume* plus *Drainback*

80 gal + 7.7 gal = 88 Gallons

10. Minimum Alarm Volume = Depth of alarm (2 or 3 inches) X gallons per inch of tank

3 in X 42.9 gal/in = 128.8 Gallons

Volume of Liquid in Pipe

Pipe Diameter (inches)	Liquid Per Foot (Gallons)
1	0.045
1.25	0.078
1.5	0.110
2	0.170
3	0.380
4	0.661

TIMER FLOAT SETTINGS*

11. Required *Flow Rate* :

A. From Pump Curve - Must be Validated after Installation: 40 GPM

B. Calculated GPM = Change in Depth (in) x Gallons Per Inch / Time Interval in Minutes

in X 42.9 gal/in ÷ min = GPM

**Note: This value must be adjusted after installation based on pump calibration.*

12. Select Flow Rate from Line 11.A or 11.B above: 40.0 GPM*

13. Calculate **TIMER ON** setting:

Total Dosing Volume x GPM

88 gal x 40.0 gpm = 2.2 Minutes ON*

Dual Alternating Pumps

14. Calculate **TIMER OFF** setting:

Minutes Per Day (1440)/*Doses Per Day* - Minutes On

1440 min ÷ 9 doses/day - 2.2 min = 161.1 Minutes OFF*

15. Pump Off Float - Measuring from bottom of tank:

Distance to set Pump Off Float=Gallons to Cover Pump / Gallons Per Inch:

515 gal ÷ 42.9 gal/in = 12.0 Inches

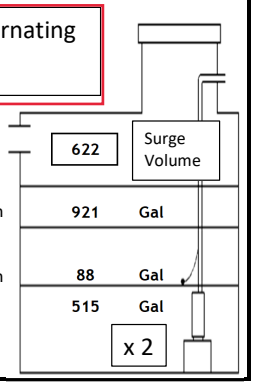
Alarm Depth 35.5 in

16. Alarm Float - Measuring from bottom of tank (90% recommended):

Distance to set Alarm Float = Tank Depth X % of Tank Depth (0.9 recommended)

53.0 in X 0.67 = 35.5 in 1009.05 **gallons from Off to HLA**

Timer On / Off 12.0 in



Include Dual Alternating Pumps

UNIVERSITY OF MINNESOTA

Septic System Management Plan for Below Grade 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 septic system is designed to kill harmful organisms and remove pollutants before the water is recycled back into our lakes, streams and groundwater.

This **management plan** will identify the operation and maintenance activities necessary to ensure long-term performance of your septic system. Some of these activities must be performed by you, the owner. Other tasks must be performed by a licensed septic maintainer or service provider. 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	Stillwater Area Public Schools - ISD 834	Email	willgert@stillwaterschools.org
Property Address	11530 Hudson Blvd N, Lake Elmo, MN 55042	Property ID	36.029.21.43.0004
System Designer	Kloeppner Services & Designs, LLC	Contact Info	763-843-4114
System Installer		Contact Info	
Service Provider/Maintainer		Contact Info	
Permitting Authority	Washington County - Public Health & Environment	Contact Info	651-430-6655
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-built 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*, visit www.bookstores.umn.edu and search for the word "septic" or call 800-322-8642.

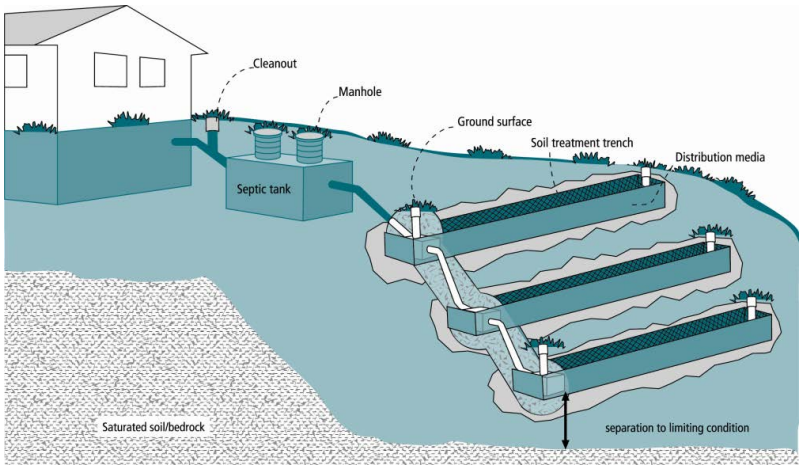
For more information see http://septic.umn.edu

Version: August 2015

UNIVERSITY OF MINNESOTA

Septic System Management Plan for Below Grade Systems

Your Septic System



Septic System Specifics

System Type: ◯ I ◯ II ◉ III ◯ IV* ◯ V*

(*Based on MN Rules Chapter 7080.2200 – 2400)*

**Additional Management Plan required*

☑ System is subject to operating permit*

☐ System uses UV disinfection unit*

Type of advanced treatment unit _____

Dwelling Type

Bus Facility & Offices

System capacity/ design flow (gpd): 1,440

Anticipated average daily flow (gpd): 1,008

Comments_____

Business? : ◉ Y ◯ N What type? School Bus Garage

Well Construction

Well depth (ft): > 50

- ❑ Cased well Casing depth: > 50
- ❑ Other (specify): _____

Distance from septic (ft): > 50'

Is the well on the design drawing? ◯ Y ◉ N

Septic Tank

- ❑ First Tank *volume:* 2,500 *gallons*
  Number of Compartments: 1
- ❑ Second *Tank volume:* 2,000 *gallons*
  Number of Compartments: 1
- ❑ Tank is constructed of Concrete
- ❑ Effluent screen: ◉ Y ◯ N Alarm ◉ Y ◯ N

- ❑ Pump Tank 2,000 *gallons*
- ❑ Effluent Pump *make/model:* Installer Choice
  Pump capacity 25 GPM
  TDH 16 Feet of head
- ❑ Alarm location TBD

Soil Treatment Area (STA)

Total Soil Treatment Absorption Area: 1,200 sqft

Number of Zones: 2

Mound (width x length) ea.: 10 ft x 60 ft

Location of additional STA:_____

Type of distribution media: Rock

☐ Gravity distribution ☑ Pressure distribution

☑ Inspection ports ☐ Cleanouts

☑ Additional STA not available

☑ Surface water diversions

Owner Management Tasks

These op*eration and maintenance ac*tivities are your responsibility. *Chart on page 6 can help track your activities.*

Your toilet is not a garbage can. Do not flush anything besides human waste and toilet paper. No wet wipes, cigarette butts, disposal diapers, used medicine, feminine products or other trash!

The system and septic tanks needs to be checked every __12__ months

Your service provider or pumper/maintainer should evaluate if your tank needs to be pumped more or less often.

Seasonally or several times per year

- *Leaks.* Check (listen, look) for leaks in toilets and dripping faucets. Repair leaks promptly.
- *Soil treatment area.* Regularly check for wet or spongy soil around your soil treatment area. If surfaced sewage or strong odors are not corrected by pumping the tank or fixing broken caps and leaks, call your service professional. *Untreated sewage may make humans and animals sick.* Keep bikes, snowmobiles and other traffic off and control borrowing animals.
- *Alarms.* Alarms signal when there is a problem; contact your service professional any time the alarm signals.
- *Lint filter.* If you have a lint filter, check for lint buildup and clean when necessary. If you do not have one, consider adding one after washing machine.
- *Effluent screen.* If you do not have one, consider having one installed the next time the tank is cleaned along with an alarm.

Annually

- *Water usage rate.* A water meter or another device can be used to monitor your average daily water use. Compare your water usage rate to the design flow of your system (listed on the next page). Contact your septic professional if your average daily flow over the course of a month exceeds 70% of the design flow for your system.
- *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, program the recharge frequency based on *water demand (gallons)* rather than *time (days)*. Recharging too frequently may negatively impact your septic system. Consider updating to demand operation if your system currently uses time,
- *Review your water usage rate.* Review the Water Use Appliance chart on Page 5. Discuss any major changes with your service provider or pumper/maintainer.

During each visit by a service provider or pumper/maintainer

- Make sure that your service professional services the tank through the manhole. (NOT though a 4" or 6" diameter inspection port.)
- Ask how full your tank was with sludge and scum to determine if your service interval is appropriate.
- 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. At each visit a written report/record must be provided to owner.

Plumbing/Source of Wastewater

- Review the Water Use Appliance Chart on Page 5 with owner.
  Discuss any changes in water use and the impact those changes may have on the septic system.
- Review water usage rates (if available) with owner.

Septic Tank/Pump Tanks

- *Manhole 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. The liquid level should be level with the bottom of the outlet pipe. (If the water level is below the bottom of the outlet pipe, the tank may not be watertight. If the water level is higher than the bottom of the outlet pipe of the tank, the effluent screen may need cleaning, or there may be ponding in the soil treatment area.)
- *Inspection pipes*. Replace damaged or missing pipes and caps.
- *Baffles*. Check to make sure they are in place and attached, and that inlet/outlet baffles are clear of buildup or obstructions.
- *Effluent screen*. Check to make sure it is in place; clean per manufacturer recommendation. Recommend retrofitted installation if one is not present.
- *Alarm*. Verify that the alarm works.
- *Scum and sludge*. Measure scum and sludge in each compartment of each septic and pump tank, pump if needed.

Pump

- *Pump and controls*. Check to make sure the pump and controls are operating correctly.
- *Pump vault*. Check to make sure it is in place; clean per manufacturer recommendations.
- *Alarm*. Verify that the alarm works.
- *Drainback*. Check to make sure it is draining properly.
- *Event counter or elapsed time meter*. Check to see if there is an event counter or elapsed time meter for the pump. If there is one or both, calculate the water usage rate and compare to the anticipated use listed on Design and Page 2. Dose Volume: __80__ gallons: Pump run time: _3.25_ Minutes

Soil Treatment Area

- *Inspection pipes*. Check to make sure they are properly capped. Replace caps and pipes that are damaged.
- *Surfacing of effluent*. Check for surfacing effluent or other signs of problems.
- *Lateral flushing*. Check lateral distribution; if cleanouts exist, flush and clean at recommended frequency.
- *Vegetation* - Check to see that a good growth of vegetation is covering the system.

All other components – evaluate as listed here:

Water-Use Appliances and Equipment in the Building

Appliance	Impacts on System	Management Tips
Garbage disposal	• Uses additional water. • Adds solids to the tank. • Finely-ground solids may not settle. Unsettled solids can exit the tank and enter the soil treatment area.	• Use of a garbage disposal is not recommended. • Minimize garbage disposal use. Compost instead. • To prevent solids from exiting the tank, have your tank pumped more frequently. • Add an effluent screen to your tank.
Washing machine	• Washing several loads on one day uses a lot of water and may overload your system. • Overloading your system may prevent solids from settling out in the tank. Unsettled solids can exit the tank and enter the soil treatment area.	• Choose a front-loader or water-saving top-loader, these units use less water than older models. • Limit the addition of extra solids to your tank by using liquid or easily biodegradable detergents. Limit use of bleach-based detergents and fabric softeners. • Install a lint filter after the washer and an effluent screen to your tank • Wash only full loads and think even – spread your laundry loads throughout the week.
Dishwasher	• Powdered and/or high-phosphorus detergents can negatively impact the performance of your tank and soil treatment area. • New models promote “no scraping”. They have a garbage disposal inside.	• Use gel detergents. Powdered detergents may add solids to the tank. • Use detergents that are low or no-phosphorus. • Wash only full loads. • Scrape your dishes anyways to keep undigested solids out of your septic system.
Grinder pump (in building)	• Finely-ground solids may not settle. Unsettled solids can exit the tank and enter the soil treatment area.	• Expand septic tank capacity by a factor of 1.5. • Include pump monitoring in your maintenance schedule to ensure that it is working properly. • Add an effluent screen.
~~Large bathtub (whirlpool)~~	• ~~Large volume of water may overload your system.~~ • ~~Heavy use of bath oils and soaps can impact biological activity in your tank and soil treatment area.~~	• ~~Avoid using other water-use appliances at the same time. For example, don’t wash clothes and take a bath at the same time.~~ • ~~Use oils, soaps, and cleaners in the bath or shower sparingly.~~
Clean Water Uses	**Impacts on System**	**Management Tips**
High-efficiency furnace	• Drip may result in frozen pipes during cold weather.	• Re-route water directly out of the house. Do not route furnace discharge to your septic system.
Water softener Iron filter Reverse osmosis	• Salt in recharge water may affect system performance. • Recharge water may hydraulically overload the system.	• These sources produce water that is not sewage and should not go into your septic system. • Reroute water from these sources to another outlet, such as a dry well, draintile 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	• Water from these sources will overload the system and is prohibited from entering septic system.	

Owner Maintenance Log

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

Activity	Date accomplished									
Check frequently:										
Leaks: check for plumbing leaks*										
Soil treatment area check for surfacing**										
Lint filter: check, clean if needed*										
Effluent screen (if owner-maintained)***										
Alarm**										
Check annually:										
Water usage rate (maximum gpd _____)										
Caps: inspect, replace if needed										
Water use appliances – review use										
Other:										

*Monthly

**Quarterly

***Bi-Annually

Notes: Additional frequency of service and reporting may be included in Operating Permit from Washington County

"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. If I have a new system, I agree to adequately protect the reserve area for future use as a soil treatment system."

Property Owner Signature: Anthony V. Willger Anthony V. Willger (Apr 8, 2020) Date Apr 8, 2020 SIGN HERE

Management Plan Prepared By: Jesse Kloeppner Certification # C8188

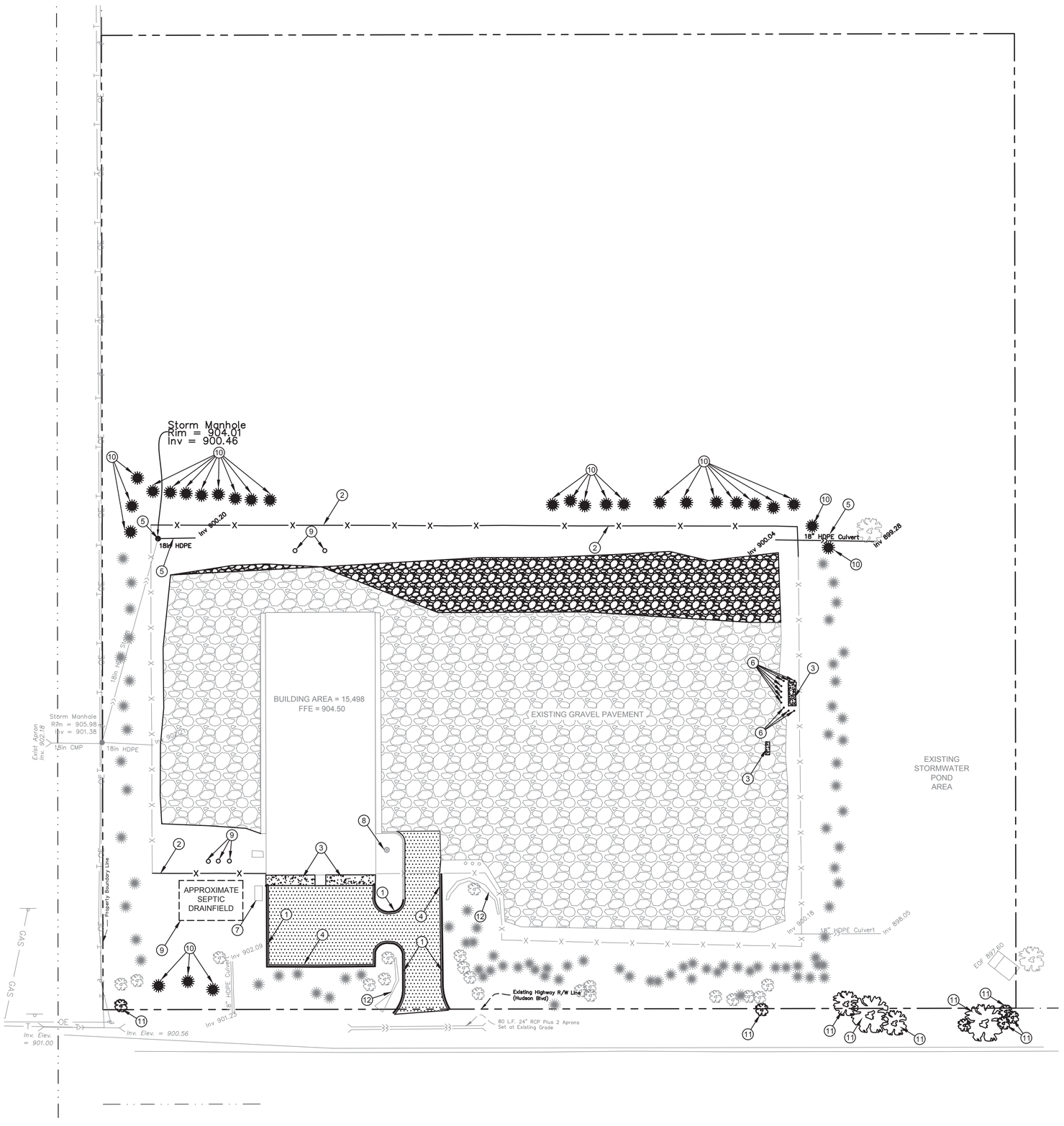
Permitting Authority: Washington County - Public Health & Environment

APPENDIX

11530 Hudson Blvd N, Lake Elmo

Acres	11	State	MN
Square Footage	479332	Plat Name	FOUR CORNERS
Parcel ID	3602921430004	Block	1
Owner Name	ISD 834 STILLWATER	Lot	1
Owner More	NULL	Multi Uses	N
Owner Address	1875 GREELEY ST S	Homestead	N
PO Box		Dwell Type	
City, State, Zip	STILLWATER MN 55082	Home Style	
Estimated Land Value	$958,400	Finished SqFt	
Estimated Building Value	$739,000	Garage	
Estimated Total Value	$1,697,400	Garage SqFt	
Sale Date	10/23/2018	Basement	
Sale Value	$5,000,000	Heating	
School District	ISD834	Cooling	
Watershed District	WS VALLEY BRANCH	Year Built	
Class Code 1	901 Schools-Public	Number of Units	0
Class Code 2		Green Acre	N
Class Code 3		Open Space	N
Class Code 4		Ag Preserve	N
City	CITY OF LAKE ELMO	TAXPIN	36.029.21.43.0004
City USPS	LAKE ELMO	SITUS_ADDRESS	11530 HUDSON BLVD N, CITY OF LAKE ELMO
ZIP	55042	TAXDESCRIPTION	Block 1 Lot 1 SubdivisionCd 3198 SubdivisionName FOUR CORNERS
ZIP4	NULL		

Map Scale
1 inch = 167 feet
10/21/2019



P:\Projects\Projects - 2017\12176010 - Stillwater Bus Facility Evals\C. Design\Drawing Files\12176010 - C1.dwg

SYMBOL LEGEND

REMOVE AND DISPOSE OF EXISTING BITUMINOUS PAVEMENT SECTION

REMOVE AND DISPOSE OF EXISTING CONCRETE PAVEMENT SECTION

REMOVE AND SALVAGE EXISTING GRAVEL SECTION FOR REUSE. DISPOSE OF ALL EXCESS MATERIALS.

KEY NOTES

1. REMOVE AND DISPOSE OF EXISTING CONCRETE CURB AND GUTTER.
2. REMOVE AND DISPOSE OF EXISTING CHAIN LINK FENCE FABRIC, POSTS, AND FOOTINGS.
3. REMOVE AND DISPOSE OF EXISTING CONCRETE PAVEMENT SECTION.
4. SAWCUT, REMOVE, AND DISPOSE OF EXISTING BITUMINOUS PAVEMENT SECTION.
5. REMOVE AND DISPOSE OF EXISTING STORM SEWER.
6. REMOVE AND DISPOSE EXISTING CONCRETE BOLLARDS.
7. PROTECT EXISTING ELECTRICAL TRANSFORMER DURING CONSTRUCTION.
8. PROTECT WELL DURING CONSTRUCTION UNTIL NEW WATER SERVICE CONNECTION IS INSTALLED AND OPERATIONAL. WELL TO BE ABANDONED AFTER WATER SERVICE INSTALLATION.
9. PROTECT EXISTING SEPTIC SYSTEM TANKS AND DRAINFIELD DURING CONSTRUCTION. ABANDON AND DISPOSE OF ALL COMPONENTS AND ASSOCIATED SOILS PER WASHINGTON COUNTY REQUIREMENTS, AFTER SANITARY SERVICE CONNECTION IS OPERATIONAL.
10. REMOVE AND DISPOSE EXISTING TREES, STUMPS AND ROOTS.
11. TREES TO BE REMOVED BY CONTRACTOR FOR FOUR CORNERS STREET & UTILITIES IMPROVEMENTS.
12. PROTECT EXISTING BOULDER RETAINING WALL DURING CONSTRUCTION.

DEMOLITION NOTES

1. Verify all existing utility locations.
2. It is the responsibility of the Contractor to perform or coordinate all necessary utility demolitions and relocations from existing utility locations to all onsite amenities and buildings. These connections include, but are not limited to, water, sanitary sewer, cable tv, telephone, gas, electric, site lighting, etc.
3. Prior to beginning work, contact Gopher State Onecall (651-454-0002) to locate utilities throughout the area under construction. The Contractor shall retain the services of a private utility locator to locate the private utilities.
4. Sawcut along edges of pavements, sidewalks, and curbs to remain.
5. All construction shall be performed in accordance with state and local standard specifications for construction.
6. Coordinate with Four Corners Plans for any work outside of the property within the road Right-Of-Way.
7. Protect all trees that are to remain during all construction.

LOT SIZE

Total Lot Size: 478,997 s.f. = 11.00 Acres

Breakdown:
Existing Building: 15,498 s.f. = 3.23%
Existing Gravel Surfaced Pavement Areas: 91,861 s.f. = 19.18%
Existing Concrete and Bituminous Pavement: 9,022 s.f. = 1.88%
Existing Open Space: 362,616 s.f. = 75.71%

NORTH

0 20 40 80

Larson Engineering, Inc.
3524 Labore Road
White Bear Lake, MN 55110
651.481.9120 (f) 651.481.9201
www.larsonengr.com

Client:
STILLWATER AREA PUBLIC SCHOOLS
1875 SOUTH GREELEY STREET
STILLWATER, MINNESOTA 55082

Project Title:
2019 STILLWATER BUS FACILITY IMPROVEMENTS
STILLWATER AREA PUBLIC SCHOOLS
STILLWATER, MN 55082

I hereby certify that this plan, specifications or report was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the state of Minnesota.

Greg A. Buchal, P.E.

Date: 04.30.18 Reg. No.: 23793

Rev.	Date	Description
1	06.06.18	Watershed Comments
2	09.14.18	City Resubmittal
3	10.12.18	City Resubmittal
4	11.06.18	City Resubmittal
5	12.07.18	City Resubmittal

Project #: 12196005
Drawn By: KJA
Checked By: GAB
Issue Date: 04.30.18

Sheet Title:
DEMOLITION PLAN

Sheet:
C1

United States Department of Agriculture

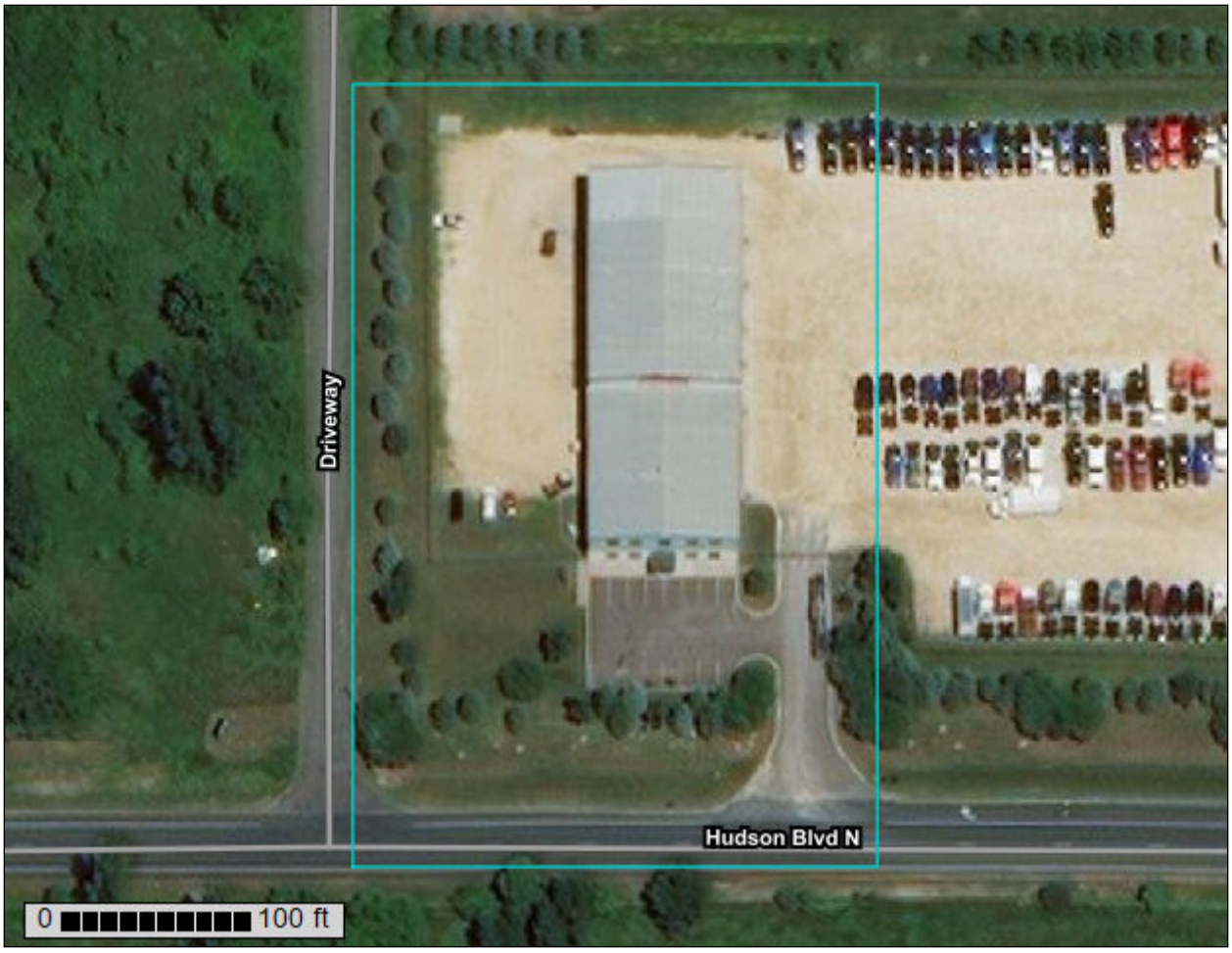
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Washington County, Minnesota

11530 Hudson Blvd N, Lake Elmo



March 25, 2020

92° 52' 22" W
92° 52' 17" W
44° 57' 1" N
44° 56' 56" N

Map Scale: 1:733 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 10 20 40 60

Feet
0 35 70 140 210

Map projection: Web Mercator Corner coordinates: WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Washington County, Minnesota
Survey Area Data: Version 15, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 1, 2013—Sep 13, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
49	Antigo silt loam, 0 to 2 percent slopes	2.0	78.4%
367B	Crystal Lake silt loam, 1 to 6 percent slopes	0.6	21.6%
Totals for Area of Interest		**2.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

Washington County, Minnesota

49—Antigo silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tnz7
Elevation: 690 to 1,900 feet
Mean annual precipitation: 27 to 36 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 80 to 150 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Antigo and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Antigo

Setting

Landform: Flats, terraces
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Loess and/or silty glaciofluvial deposits over loamy glaciofluvial deposits over stratified sandy and gravelly outwash

Typical profile

Ap - 0 to 9 inches: silt loam
E - 9 to 12 inches: silt loam
B/E - 12 to 19 inches: silt loam
Bt1 - 19 to 28 inches: silt loam
2Bt2 - 28 to 31 inches: loam
2Bt3 - 31 to 33 inches: very gravelly sandy loam
3C - 33 to 79 inches: stratified sand to very gravelly coarse sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B
Forage suitability group: Mod AWC, adequately drained (G090BY005WI)

Other vegetative classification: Acer saccharum/Hydrophyllum (AH), Acer saccharum/Viola-Osmorhiza (AViO)
Hydric soil rating: No

Minor Components

Billyboy
Percent of map unit: 8 percent
Landform: Terraces, flats
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Acer saccharum/Hydrophyllum (AH), Acer saccharum/Viola-Osmorhiza (AViO), Acer saccharum-Tsuga/Maianthemum (ATM), Acer saccharum/Caulophyllum-Circaea (ACaCi)
Hydric soil rating: No

Sconsin
Percent of map unit: 5 percent
Landform: Flats, terraces
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Acer saccharum/Hydrophyllum (AH), Acer saccharum/Viola-Osmorhiza (AViO), Acer saccharum-Tsuga/Maianthemum (ATM), Acer saccharum/Caulophyllum-Circaea (ACaCi)
Hydric soil rating: No

Rosholt
Percent of map unit: 3 percent
Landform: Flats, terraces
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Other vegetative classification: Acer saccharum/Athyrium (AAt), Acer saccharum/Caulophyllum-Circaea (ACaCi), Acer saccharum/Vaccinium-Desmodium (AVDe), Acer saccharum-Quercus/Viburnum=(Vaccinium) (AQVb-V)
Hydric soil rating: No

Brill
Percent of map unit: 2 percent
Landform: Terraces, flats
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Acer saccharum/Athyrium (AAt), Acer saccharum/Caulophyllum-Circaea (ACaCi)
Hydric soil rating: No

Ossmer
Percent of map unit: 2 percent
Landform: Flats, terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear, concave
Across-slope shape: Linear

Septic Tank Absorption Fields (MN)–Washington County, Minnesota							
Map symbol and soil name	Pct. of map unit	Septic Tank Absorption Fields - At-Grade		Septic Tank Absorption Fields - Mound		Septic Tank Absorption Fields - Trench	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
49—Antigo silt loam, 0 to 2 percent slopes							
Antigo	80	Very limited		Not limited		Very limited	
		>= 35% Rock Frags	0.90			>= 35% Rock Frags	0.90
						Excessive percolation	0.11
367B—Crystal Lake silt loam, 1 to 6 percent slopes							
Crystal lake	85	Very limited		Slightly limited		Extremely limited	
		Soil saturation	0.82	Slope	0.15	Soil saturation	1.00
						Restricted percolation	0.23

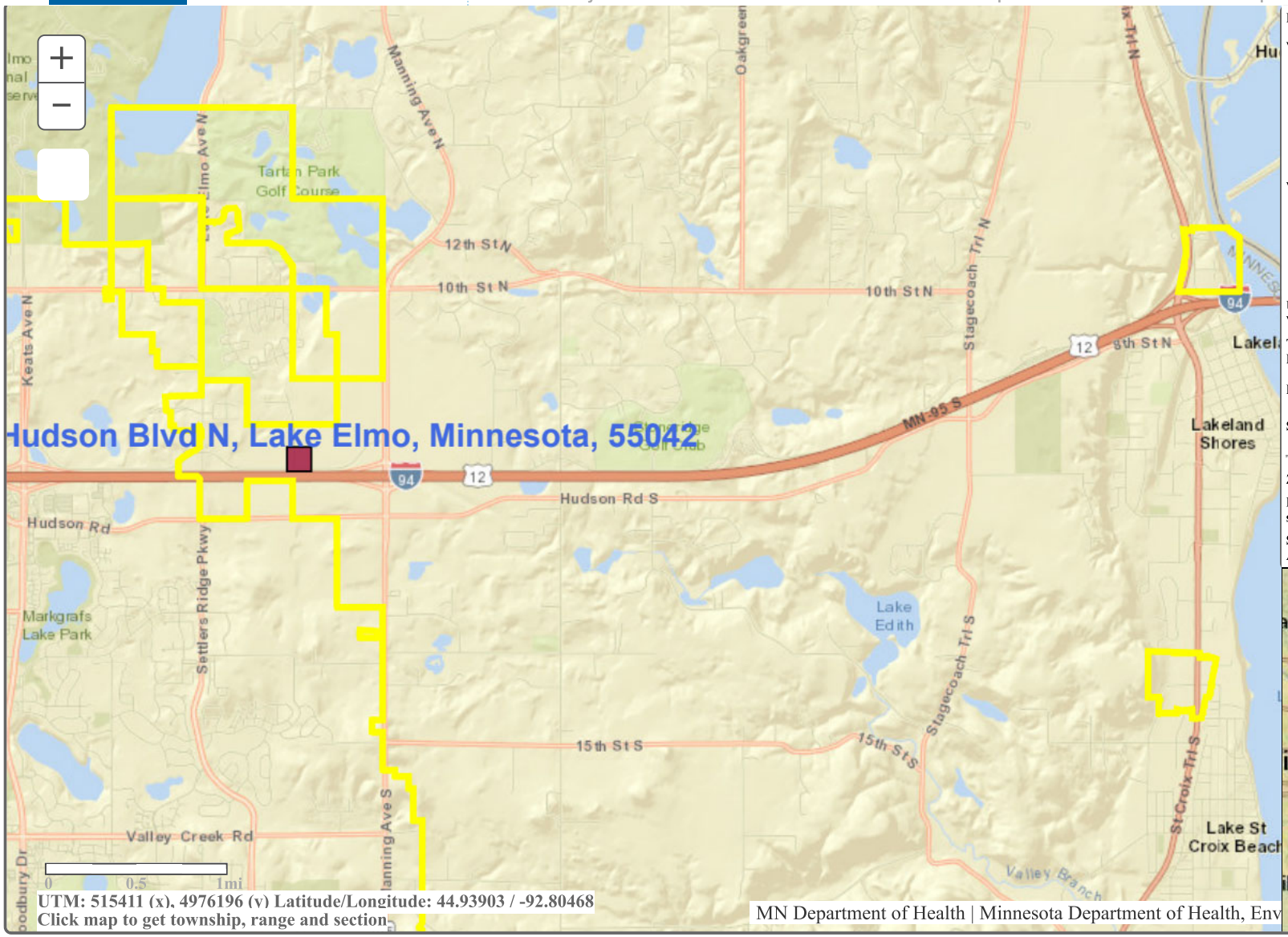
Minnesota Department of Health

Minnesota Well Index

Version 2.0.62, 07/15/19 1:39PM

11530 Hudson Blvd N, Lake Elmo, MN, 55042

Search by | Zoom to | Tools | Base Maps | Other Links | Help



Layer Name	Layer	Label	Legend
Wells	☐	☐	
Selected Wells			●
Public Wells			◆
Domestic Wells			●
Irrigation Wells			■
Monitor Wells			▲
Other Wells			★
Sealed Wells			⊙
Unverified Wells	☐	☐	●
Township Range Section	☐	☐	▭
DWSMA	☑	☑	▭
SWBCA	☐	☐	▭

Zoom to see wells, TRS, DWSMA and SWBCA

DWSMA: The area managed by a public water supplier to protect their source water

SWBCA: Special Well and Boring Construction Area layer

MDH Minnesota Department of Health

Minnesota Well Index

Version 2.0.62, 07/15/19 1:39PM

11530 Hudson Blvd N, Lake Elmo, MN, 5504

Search by | Zoom to | Tools | Base Maps | Other Links | Help

UTM: 510129 (x), 4977547 (y) Latitude/Longitude: 44.95128 / -92.87159
Click map to get township, range and section

MN Department of Health | Minnesota Geological Survey, Unive

Layer Name	Layer	Label	Legend
Wells	✓	✓	
Selected Wells			
Public Wells			
Domestic Wells			
Irrigation Wells			
Monitor Wells			
Other Wells			
Sealed Wells			
Unverified Wells	✓	✓	
Township Range Section			
DWSMA			
SWBCA			

Zoom to see wells, TRS, DWSMA and SWBCA

DWSMA: The area managed by a public water supplier to protect their source water

SWBCA: Special Well and Boring Construction Area layer