Wastewater Treatment Operation and Maintenance Manual

FOR

Frontier Trails
Baldwin Township

Prepared for: Baldwin Township

Date: Dec 1, 2017

Prepared by: Jon Bogart, PE 19900, ISTS # 2399

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Registered Engineer under the State of Minnesota Statues Sections 326.02 to 326.16

Jon Bogart, P.E.

Date: 7/1/2018 Reg. No. 19900

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Part 1 – General

A. Description of Site

This operation and maintenance manual is for the plat known as Frontier Trails, located in the Northwest Quarter of Section 7, Township 35, Range 26, Sherburne County, MN. See attached maps in Appendix A. Original construction occurred in 1998. The system was subsequently modified in 2007 and recently in 2016.

The water table is high throughout the site thus limiting the options for more traditional septic systems. The soil is comprised of fine sands with high permeability.

Forty one homes comprise the subdivision.

B. Groundwater Movement

Groundwater elevations have been measured over a period of time and the measurements sent to the MPCA. Results of the groundwater movement have been included in Appendix E.

C. Department of Health Permit

There is limited space for a soil-based dispersal system within the plat. There is a Department of Health requirement under Rule 4725 that a minimum distance of 300 feet be maintained from any soil dispersal unit and a water well for human use. After searching the site for an adequate area for soil dispersal it was determined that there was no area that met this requirement. Thus ultimate disposal of the effluent came to a choice of effluent surface disposal in a wetland area immediately next to human habitation, or asking the Department of Health for a variance to the Rule.

The Department of Health granted the variance with the movement of two water wells to locations as far from the soil disposal units as possible. See Appendix G.

D. Description of Wastewater Treatment System Over Time

The system consists of multiple parts due to the modifications over the years.

The initial design called for two separate systems. System #1 or the South system was originally designed to treat 21 homes System #2 or the North System was designed to treat 20 homes. Each of the two systems that were constructed were constructed in phases so as to more closely meet the wastewater demand over time.

Originally a number of recirculating sand filters at each of the two systems were proposed. Prior to the second phase of the development, Advantex developed their AX100 modular unit. These units replaced the original proposed sandfilters for cost and maintenance reasons.

For cost purposes the developer chose a system that had a decentralized tankage system. This provided two advantages for the developer. One was that the cost of the individual septic tanks could be deferred to the individual home owner as the individual lots were developed. The second allowed individual homeowners to pump their own tanks and control when and how often their tanks were pumped.

Both the North and the South Treatment systems had a drip irrigation field. These two fields had several issues. The first issue turned out to be the local wildlife in terms of the gopher population around the site. For whatever reason gophers are attracted to the irrigation pipe that was used at the time for distributing the effluent to the soil. Even after the effluent had saturated the soil there were still gopher issues. The second issue revolved around the interpretation of rules regarding the wastewater treatment. The rule in question regards the requirement that the limit of Total Nitrogen (TN) could be no more than 10 mg/l at the nearest property boundary. At the time of platting this rule was interpreted to mean no more then 10mg/l at the plat boundary. At some point in time the interpretation changed to no more than 10mg/l at the nearest property boundary with a well on the adjacent property. This new interpretation makes sense given that over time new residents moved into the subdivision with a well that was considerably closer than the minimum required distance in MN Rules 4725 regarding setbacks for drainfields and that the TN was considerably higher at the new wells than was originally intended.

There appear to have been three modifications to the septic design plans over the years. The original plan set was in 1999. Plan modifications occurred in 2005, 2006, and 2016. Not all of 2005 modifications appear to have been built. All four sets of plans have been included in Appendix B.

During construction of the latest update to the wastewater system the clarifier tank cracked during placement. The Contractor and Weiser Concrete Company repaired the tank with an epoxy coating as a alternative to replacing the tank. This is a standard repair technique and is allowed by the MPCA. The Contractor and Weiser Concrete came before the Board on Aug. 21st, 2017 to ask for the Boards acceptance of this fix as the alternative was replacement of the tank. The Board accepted the repair with an additional twenty year warranty on the tank. See appendix H.

E. Overview of the Onsite Wastewater Treatment System

This system has experienced a number of modifications over the years. The original system consists of a septic tank at each residence. Each tank is equipped with an Orenco pump vault. The individual tanks pump the effluent through a low-pressure treatment system to one of two secondary treatment systems. These two secondary systems, or north and south treatment systems, consist of a recirculation system tanks, a sand filter and an Advantex AX100 filter which removes BOD, TSS and nitrifies the effluent. After nitrification the flow from the two secondary systems are combined and are treated for denitrification. This denitrification system consists of an MBBR/aeration unit and a clarifier attached to the south system. This system has the ability to provide a carbon source and add alkalinity as needed for the denitrification process. Final treatment is accomplished by dispersing the effluent through one of four dispersal fields.

The north and south system was designed to treat sewage from 20 homes and 21 homes, respectively. Average design flows for the north and south systems are based on 450 gpd. Peak design flows for the north and south systems are 6525 gpd and 7,035 gpd, respectively. The design will use the existing recirculation floats for both the existing RSF and the AX100 pumps. The existing floats are setup to time dose the pretreatment units. Flow distribution calculations estimate that 44% of the flow will be distributed to the RSF and 56% to the AX100. The recirculation pumps are designed to dose for 1.57 min./dose.

Typical concentration of BOD_5, TSS, fecal coliforms, FOG, total nitrogen (TN), and phosphorus for residential sewage is typically for raw sewage 270-400 mg/l, 300-400 mg/l, $10^6 - 10^8$ MPN/100ml, 70-105 mg/L, 100-150 mg/l, and 10-40 mg/l respectively. Expected treatment from this system will consist of removing >90% BOD_5 and TSS, >98% FOG, >95% total nitrogen.

Part 2 - Treatment Process and System Description

A. **Primary Treatment** – Collection of sewage at each house in a septic tank provides primary treatment of the sewage effluent in that initial biological treatment and sludge separation occurs at each residence.

B. **Secondary Treatment** – The secondary treatment is split into two parts. The first part provides for secondary treatment and nitrification of the effluent. The second part provides for the denitrification process.

The first part of secondary treatment is accomplished in two separate areas. These two areas were part of the original system that was constructed. An Advantex AX100 Geotextile Filter is paired with a sand filter in a recirculating configuration: Each AX100 filter pod/ sand filter combination is designed to treat an average flow of about 6500 gallons of septic effluent per day.

For the second half of the secondary treatment the two flows are combined at the south system site and then are treated for denitrification in an MBBR/aeration/ clarifier train. A carbon source of Micro C and an alkalinity source are made available in this portion of the treatment to make sure that PH levels and that there is enough carbon for denitrification to occur.

C. **Tertiary Treatment** – This treatment consists of the final polishing of the effluent in one of four dispersal areas. This treatment consists of effluent dispersal of a large area providing for adequate capture and encapsulation of whatever viruses and bacteria are left over from the secondary treatment in the soil media.

D. **Detailed Description of the Treatment System**

1. Septic Tanks
   There is a septic tank at each house. The septic tank provides for the primary treatment of the effluent at each dwelling unit. It does this by the removal of sludges from the treatment stream. Further the sludge is then broken down further into a denser sludge and scum through the anaerobic process in the tank. Within the tank is a OSI Effluent pump P200511 or approved equal. It sits in an Orenco Biotube Pump Vault kit X4SI254 or approved equal which consists of a filter cartridge, float assemblies, and the pump vault itself. The discharge pipe from the pump is a 1.25" SDR11 HDPE. It leads to a check valve in the right-of-way preventing backflow from the 2" low head collection pipe. Each home has its own control panel mounted on a board near the septic tank. It controls the pump within the pump vault with floats for pump off, pump on, and high-water alarm.

2. Collection System
   The collection system consists of two separate lines. Each leading to either the north system or the south system. Each line is constructed of 2" SDR11 HDPE. Air release manholes, pigging ports to allow for the cleaning of the main lines and the appropriate valving is included within the collection system. New effluent meters are to be installed just upstream of the north system area and south system area

3. Recirculating Geotextile filter /sand filter combination

A 4,200-gallon concrete tank and an existing 7,500-gallon concrete tank will serve as the recirculating tanks for the recirculating Advantex AX100 geotextile filter coupled with a 864 sf sand filter. Dual alternating screened pumps will recirculate the effluent through the RSF and AX100 filters. The pumps are operating on a time-controlled basis by means of a control panel. Three mercury floats are wired to the control panel and will control redundant off/timer on, timer override, high level water alarm functions. The filtered effluent will gravity drain out of each filter pod to a 4" Schedule 40 PVC drain back pipe. The filtered effluent will return to the existing recirculating splitter valve placed in an access riser of the existing 4,200-gallon recirculation tank. The splitter valve allows the returning filtrate to recirculate through the filters and back to the recirculation tank during low flow periods. During high flow periods the splitter valve directs the filtrate to the second 4,200-gallon dosing tank for denitrification treatment before disposal to the drainfield. Effluent recirculation ratio can be controlled by adjusting the pump time or float settings. A 4:1 to 5:1 recirculation ratio is recommended. Details on the recirculating AX100 filter, float settings, tank placement and design calculations are shown in the septic plans and in Appendix B.

The process of recirculation through the sand filter and the AX100 media chamber allows for the further reduction of the effluent by aerobic processes. It also allows the effluent to be nitrified prior to the final step of denitrification in the MBBR unit.

The north system 7,500-gallon distribution tank disposes of the effluent in the tank to the south system 4,200 -gallon dosing tank. It does this through a 2" SDR11 HDPE forcemain. A air release assembly is housed in a manhole at the high point near the north system to allow trapped air to escape the forcemain. The pump system in the north system disposal tanks are Orenco X5D1290-3624 vaults with 2 OSI P500115 in duplex.

4. MBBR/Aeration Chamber and Clarifier

The MBBR unit is installed in the first half of a 3800/1800-gallon Weiser combination concrete tank. The aeration unit is installed is the second half of the tank. The clarifier is contained in a 2500-gallon single chamber tank.

The MBBR tank is fed by gravity from the second 4,200-gallon tank in the south system. The MBBR system consists of plastic media which allows attached bacterial growth within the tank. In the center of the MBBR tank there is a Sharpe slow speed mixer, The slow speed impellor keeps the effluent circulating within the tank allowing for a more even distribution of the effluent over the plastic media and bacteria. The effluent prior to entering the MBBR had oxygen levels of 6 to 8mg/l prior to the last modification. The introduction of a carbon food source upstream of the MBBR reduces BOD_5 to near zero before entering the MBBR. This is necessary to allow the anaerobic process for denitrification to work. This carbon source is supplied via a small pump in the control shed to the second 4,200-gallon tank in the south system.

The aerobic chamber in the second half of the MBBR tank allows the system to remove any BOD_5 that was left over from the introduction of the carbon source that might not have been used up by the MBBR. Because PH is important to the denitrification process an alkalinity source is also provided to the MBBR tank via a small pump in the control shed. The aerobic tank is gravity fed from the MBBR unit. The aeration unit consists of a blower kept in the control shed. which is heated, to allow warm air to circulate through the aeration tank. The warm air is distributed through the bottom of the aeration portion of the tank by 4mm perforations in 1.5" schedule 40 PVC. The aeration tank feeds the clarifier tank via gravity.

The clarifier tank uses an air lift in the center of the tank to transport the dead bacteria that collect in the center of the clarifier tank back to the 4,200-gallon recirculation tank in the south system. This then provides additional carbon to the system for the recirculation system to help minimize the denitrification requirements. The clarifier tank discharges by gravity to the 7,500-gallon final distribution tank.

5. Dispersal Field Distribution tank

   The 7,500-gallon dispersal tank in the south system area feeds the 4 dispersal fields immediately to the west. The dispersal fields are fed by two Gould 3885 WEOSH effluent pumps configured in duplex operation. Each pump serves a single 2" Sch 40 forcemain leading to the dispersal fields.

6. Dispersal Fields

   Each dispersal field consist of two dispersal cells each. Each cell is 104 ft x 41 ft in area. Each cell works in conjunction with one of the two forcemains from the dispersal tank. There is a distributing valve that allows one set of laterals in each cell to be used at one time.

   Each dispersal field consists of three sets of three 1.5" SCH 40 PVC laterals perforated with 1/8" holes three feet apart. The design of the laterals is such that the pressure throughout the later does not deviate more than 10% from anywhere else in the lateral. Each field consists of 12" of topsoil covering 12" of ¾" to 2-1/2' clean sewer rock. The subgrade of the sewer rock is always a minimum of three feet above mottled soil.

7. Control Panels

   The north Area Control Panel is mounted on a board within the north treatment area. It is a EWS-1246 control panel produced by Anderson industries. The panel controls four recirculation pumps for the AX100 and the sand filter. Each of the pumps are in duplex configuration inside of Orenco X5D1290-3624 vaults with 2 OSI P500115 pumps. The panel also controls the pumps in the dosing tank leading to the south system are in duplex configuration inside of Orenco X5D1290-3624 vaults with 2 OSI P500115 pumps as well.

   The south area control panel and associated controls are mounted within the control shed. The control panel is a Anderson EWS-1247. The panel controls four

recirculation pumps for the AX100 and the sand filter. Each of the pumps are in duplex configuration inside of Orenco X5D1290-3624 vaults with 2 OSI P500115 pumps. The panel also controls the pumps in the dosing tank leading to the south system are in duplex configuration. These pumps are Gould 3885 WOSH effluent pumps. This panel also controls the blower for the aeration tank as well as the low speed impellor in the MBBR. Also included in this control panel are the breakers for the heating units for the control shed and the air lift pump in the clarifier.

Part 3 - Monitoring

A. General Monitoring

a. Monitoring of the system is to be in accordance with the State Disposal System (SDS) permit.

f. Semiannual monitoring of the treatment system is recommended. Schedule monitoring activities during both a summer month and a winter month.

g. Analytical testing of effluent in the dosing tank of the south area system before the should be performed in accordance with MPCA permit requirements. Reporting requirements include; Monthly precipitation totals, CBOD, Total Suspended Solids (TSS), pH, Ammonia Nitrogen, TKN, Nitrate and Nitrate, Total Nitrogen and Chloride. Current permit requirements require monitoring every month.

h. Adjust carbon source and alkalinity source as required to maintain TN at >10mg/l in the south system dosing tank.

i. Monitor the DMR reports for unexplained increases and decreases in flow. Rapid or large increases in flow could mean inflow or infiltration entering into the system from cracks or breaks in the infrastructure.

j. Check for unexplained odors in homeowners septic tanks. This could indicate an imbalance in the bacterial biology. Causes could be varied. Likely causes are household cleaning chemicals, or drugs meant for human consumption.

B. Septic tank

a. The depth of sludge in each tank should be checked at a minimum of once every two years.

b. The controls for the septic tank at each home should be inspected at the time of pumping and cleaning the septic tank, or at a minimum of once every three years. They should be inspected for corrosion and whether the controls and the floats are working properly.

c. The filter in the pump vault should be inspected semi-annually.

d. Each home has a alarm system near the septic tank monitoring the pump and effluent levels in the tank. If the alarm goes off, a qualified technician should inspect the system at the house and make the necessary repairs.

e. Check high and low level alarm operation yearly

C. Collection System

a. Every three years inspect all pigging ports and associated valves.

b. Every year inspect mag meters for correct operation and leakage.

c. Every three years inspect air release assemblies for operation and leakage.

d. Every three years check manhole covers for mag meters, pigging ports, and air release valves for leakage and structural integrity.

D. Recirculating Tanks, Sand Filter and Advantex AX100 Geotextile Filter

a. Inspect AX100 Filter semi-annually for evidence of ponding or slow drainback

b. Inspect AX100 Filter and Sand filter for freezing during winter months

c. Check all manhole covers for water-tightness and structural integrity yearly.

d. Screened pump vaults in all the recirculation and dosing tanks in the North and South system should be cleaned and inspected yearly.

e. Check recirculation valve for proper operation monthly.
f. Check outlet baffles for clogging and proper operation semi-annually.
g. Record AdvanTex filter pumps - elapsed time, event counters, high alarm events, and, low level events monthly.
h. Check all pump floats, level alarms for operation monthly
i. Calibrate pumps quarterly.
j. Measure sludge and scum depth of the tank yearly
k. Check for ponding in the Advantex AX100 filters, and on the surface of the sand filters monthly.
l. Check Advantex AX100, and sand filter temperatures monthly.
m. Check filter lateral orifices for plugging yearly.
n. Visually check clarifier tank for cracking repair. Check clarifier tank for watertightness whenever tank is pumped or every three years at a maximum.

E. MBBR/Aeration Chamber and Clarifier

a. Monitor MBBR plastic media for excess bacterial sluffing.
b. Check impellor speed every two years
c. Check inlets and outlets for obstructions every two years.
d. Check aeration pipe for proper operation semi-annually.
e. Check air lift pump for proper operation in clarifier tank semi-annually
f. Check outlet and outlet baffle to dosing tank for clogging semi-annually.

F. Dispersal Field Distribution Tank

a. Check pumps and controls yearly for operation.
b. Check tank for cracks and water-tightness
c. Check manhole covers and for water-tightness and structural integrity.

G. Dispersal Fields

a. Check for animal burrows semi-annually
b. Check pressure in sewage laterals semi-annually
c. Check distribution valves for proper operation.
d. Check distribution valve for leaking.
e. Check for ponding at the bottom of the rock layer in each dispersal field cell semi-annually.

H. Control Panels

a. Monitor the system for alarms every time the site is visited.
b. Monitor the temperature inside the control shed during cold weather.
c. Check electric baseboard heater prior to winter operation.
d. Check for corrosion in and around the control panel.
e. Check for proper operation of all recirculation and dosing pumps.
f. Check alkalinity and carbon source pumps for proper operation semi-annually.

I. Record Keeping

The contractor shall record all monitoring activities. Records shall include:

a. Location of monitoring activity
b. Date of monitoring
c. What monitoring was performed
d. Outcome of the monitoring
e. A monitoring and DMR report shall be made monthly to the Township

Part 4 – Maintenance

A. Septic tank

a. The septic tank at each home within the development is to be pumped and cleaned a minimum of once every three years. The depth of sludge in each tank should be checked at a minimum of once every two years. If the depth of sludge reaches 25% of the initial liquid capacity of the tank the tank should be pumped.

b. At the time of pumping and cleaning the individual septic tanks the filter in the pump vault should be cleaned or replaced depending upon the condition of the filter. The filter may simply be rinsed off if still in useable shape.

B. Collection System

Every five years as a minimum

a. Exercise all main line valves.

b. Exercise curb stops

C. Recirculating Tanks, Sand Filter and Advantex AX100 Geotextile Filter.

a. Clean top of filter if sludge accumulation occurs. The filter can be cleaned with a garden hose or other low head pressure spray from the dosing tank.

b. Temperature of the effluent is important to maintain above 45° F for the denitrification process. Place hay or straw over the sand filter to help insulation for the effluent during the winter months, or when the outside temperature drops below freezing, Remove straw in the spring.

c. The recirculating tanks in both the north and south pretreatment systems should be checked for sludge accumulation, The tanks should be checked every two years. If the sludge accumulation in the recirculation tanks exceed 4" in depth they should be pumped and cleaned.

d. In the North System there are a 4,200-gallon, and a 7,500-gallon dosing tank. These should be checked every two years for sludge accumulation. If the accumulated sludge in the tanks exceed more than 4" the tanks should be cleaned. The tanks should be pumped and cleaned no more than every four years.

e. After tanks are pumped and cleaned, inspect for cracks, water-tightness and structural integrity. Low water levels in individual tanks could indicate the loss of effluent or leaks in the walls of the tank.

f. Check for filamentures bloom in AdvanTex filter tank. This would be caused by too much oxygen in the tank. Reduce recirculation rate.

g. If the level of effluent in AdvanTex filter cell or the sand filter is rising. This could be caused by an underdrain plug.in the filter system. Clean underdrains.

h. There is a valve between the 4,200-gallon tank and the 7,500-gallon tank in the North and south systems. These valves are normally in the closed position. Exercise the valves yearly to insure proper operation.

D. MBBR/Aeration Chamber and Clarifier

a. Check slow speed mixer for adequate mixing semi-annually.

b. Check outlet and baffle for clogging semi-annually.

c. Remove and clean media sieves in aeration tank and MBBR tank semi-annually.

d. Clean effluent filter in clarifier semi-annually.

E. Dispersal Field Distribution tank

a. Exercise all valves in system semi-annually.

F. Dispersal Fields

a. Every ten years take one of the distribution fields offline for one month for system rejuvenation.

G. Control Panels

a. Periodic maintenance not required.

H. **Record Keeping**

The maintenance contractor shall record all maintenance activities. Records shall include:

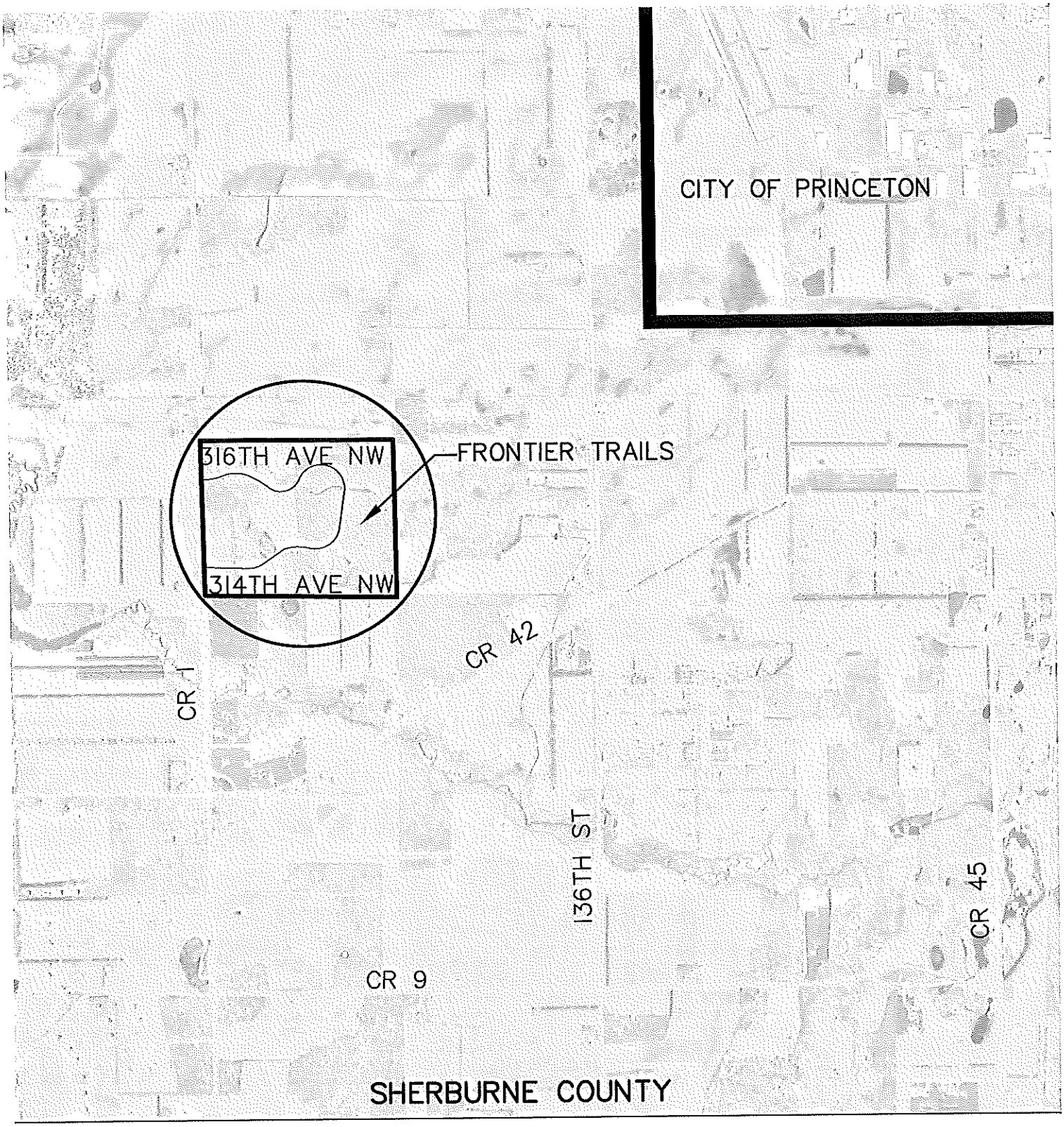
a. Address of residence or system where maintenance was performed.
b. Date of work performed
c. Whether the maintenance was performed as part of normal maintenance activities or was required do to a breakdown.
d. What maintenance was performed.
e. Replacement parts used.
f. Costs incurred for items not pre-negotiated with the Township
g. A maintenance report shall be sent to the Township on a monthly basis.

I. **Contract**

A maintenance contract with a licensed contractor or licensed firm must be in place at all times. The licensed Contractor must have a "C" Wastewater treatment operator's license. The contract will be between the contracting individual or company and Baldwin Township.

APPENDIX A

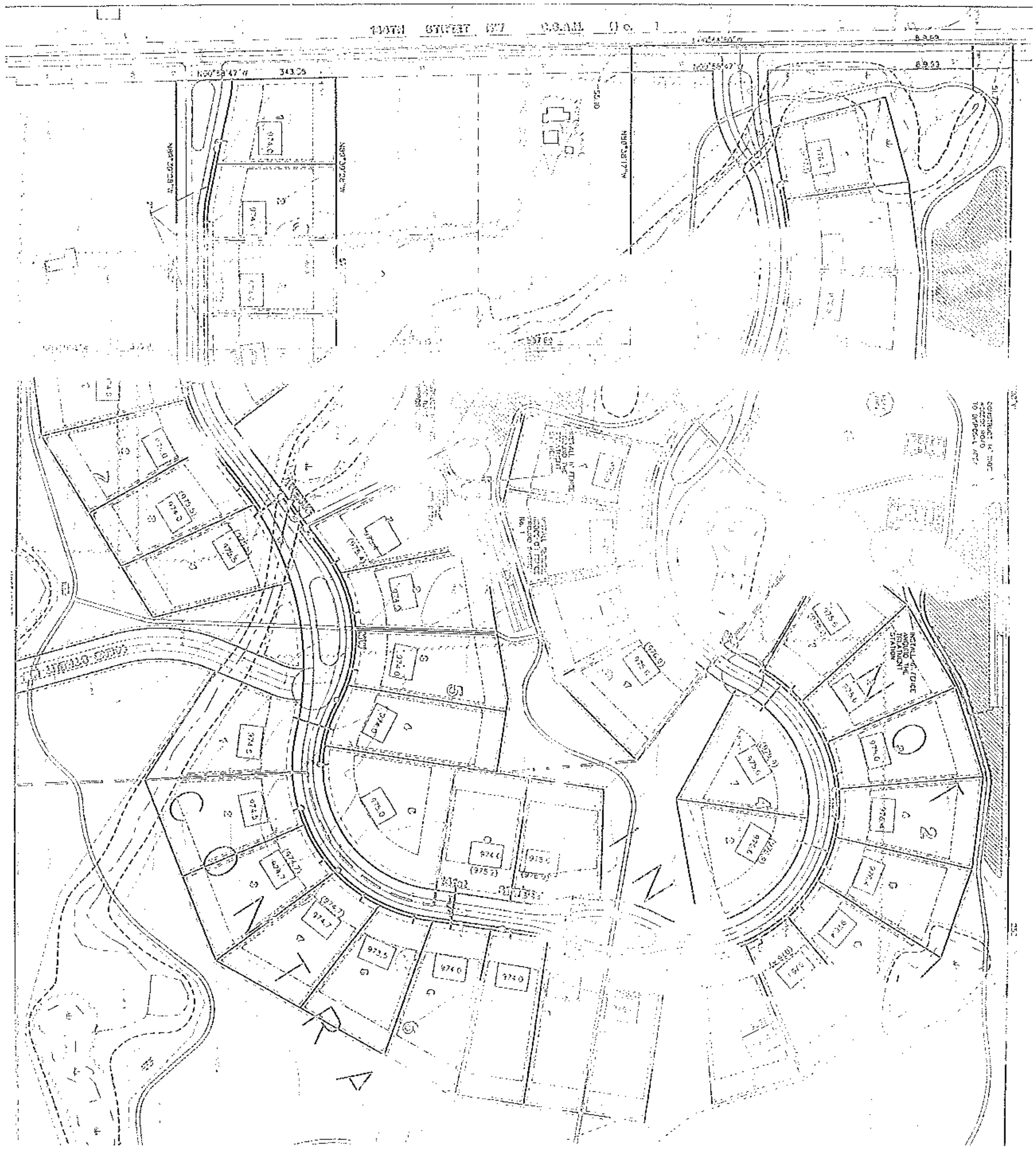
VICINITY MAP



Section 7, Township 35, Range 26

APPENDIX B

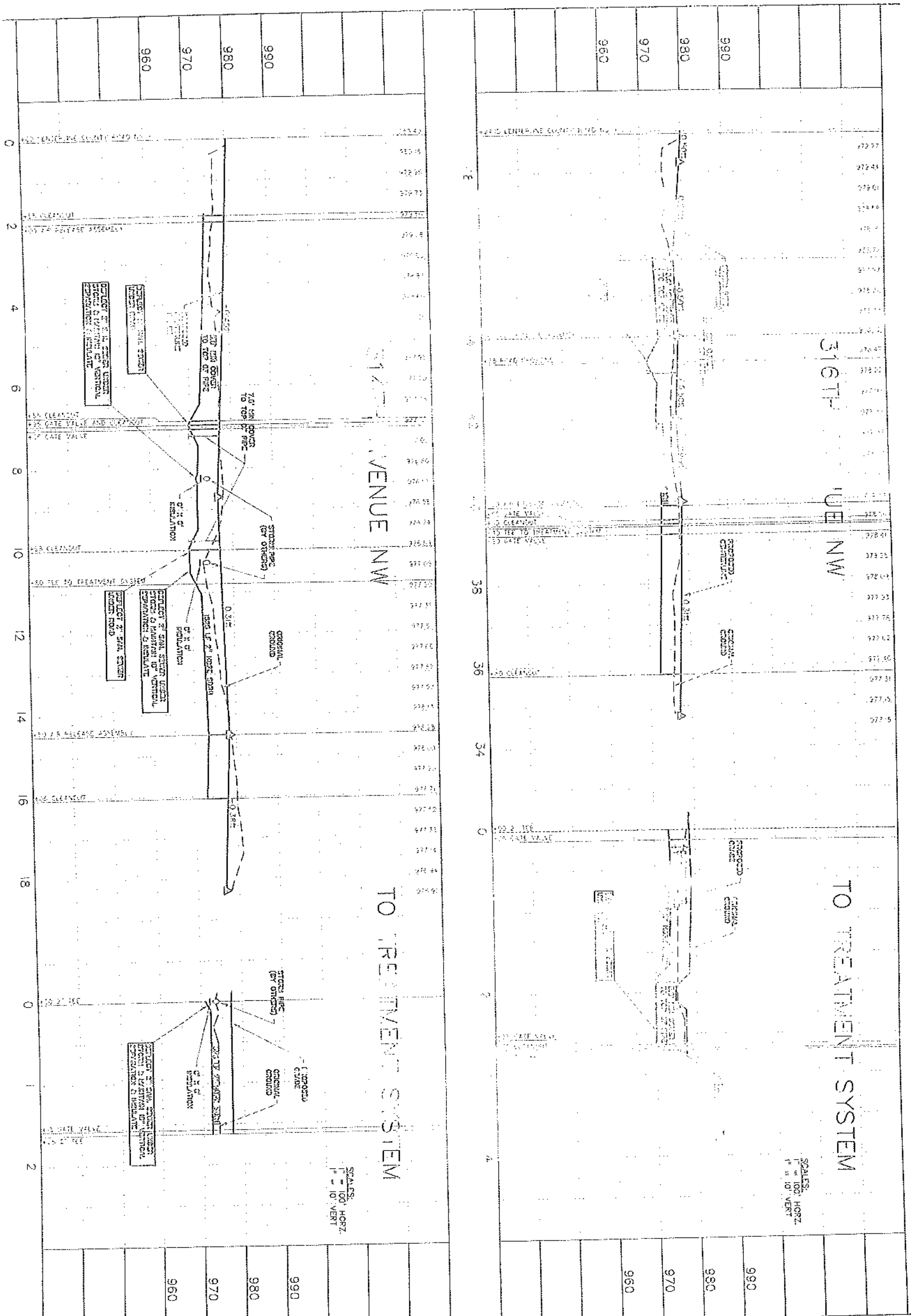
SYSTEM PLANS



FRONTIER TRAILS
BALDWIN TOWNSHIP
SHERBURNE COUNTY, MN
FOR
DYNAMICS DESIGN & LAND CO.

SEPTIC SEWER PLAN

John Oliver & Associates, Inc.



FRONTIER TRAILS
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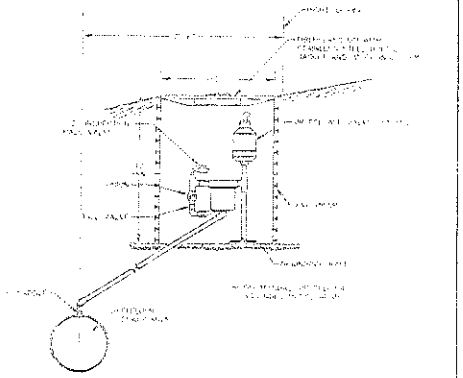
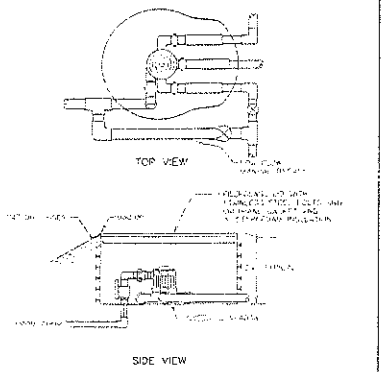
SHERBURNE COUNTY, MN
FOR
DYNAMICS DESIGN & LAND CO.
COLLECTION SEWER PROFILES

John Oliver & Associates, Inc.

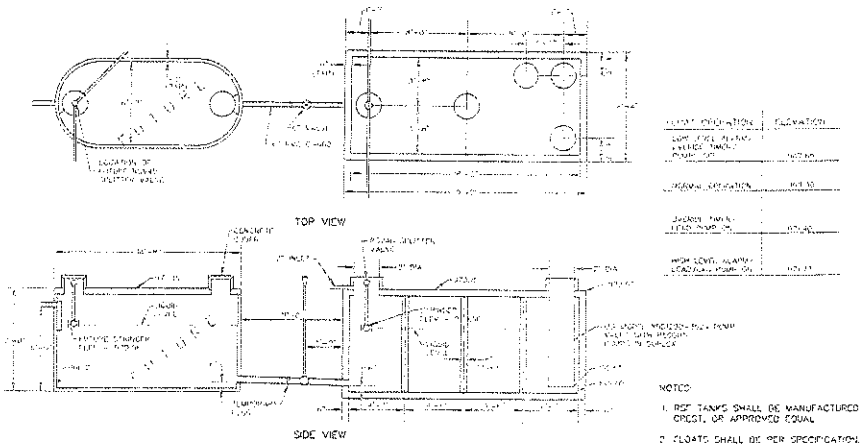
SHEET NO. 1A



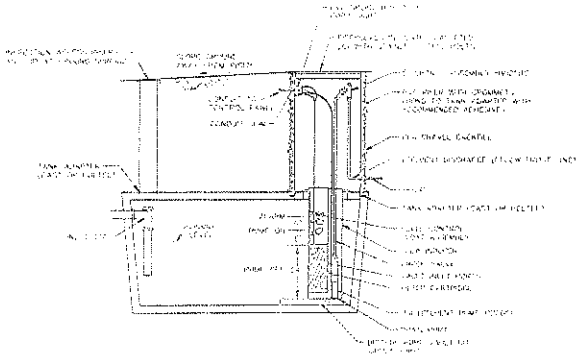
AIR RELIEF

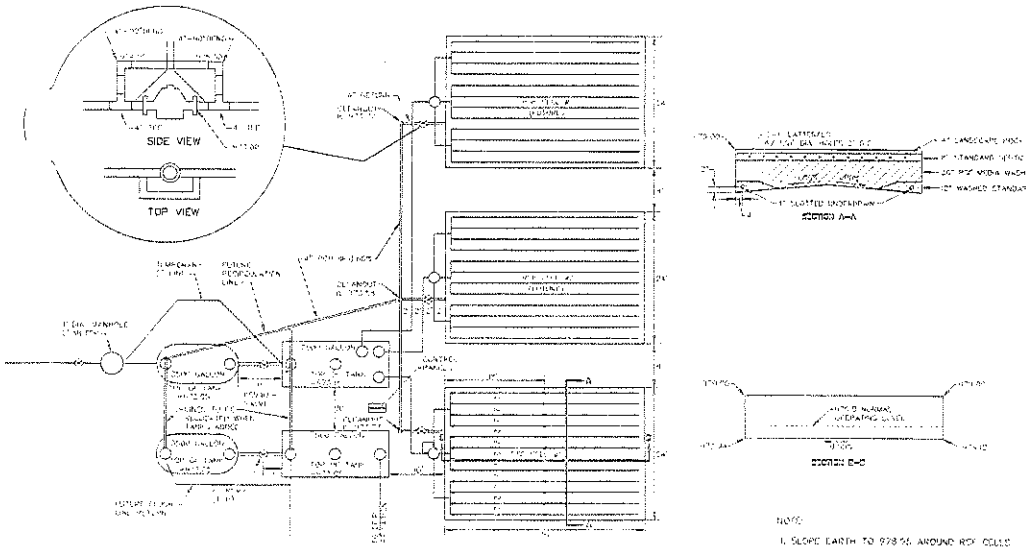


DISTRIBUTION VALVE



PSF DOSING TANKS





FRONTIER TRAILS
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SHEBOYGAN COUNTY, WI.
FOR
DYNAMICS DESIGN & LAND CO.
DETAIL SHEET

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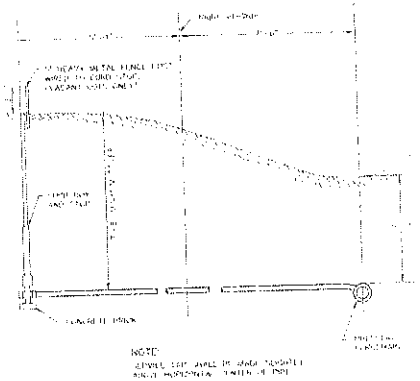
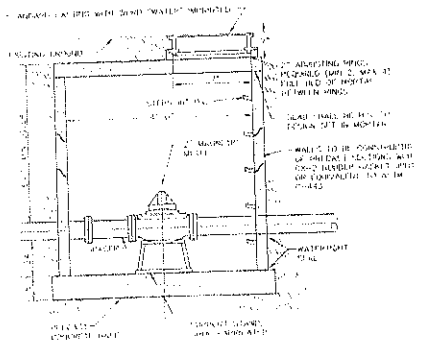
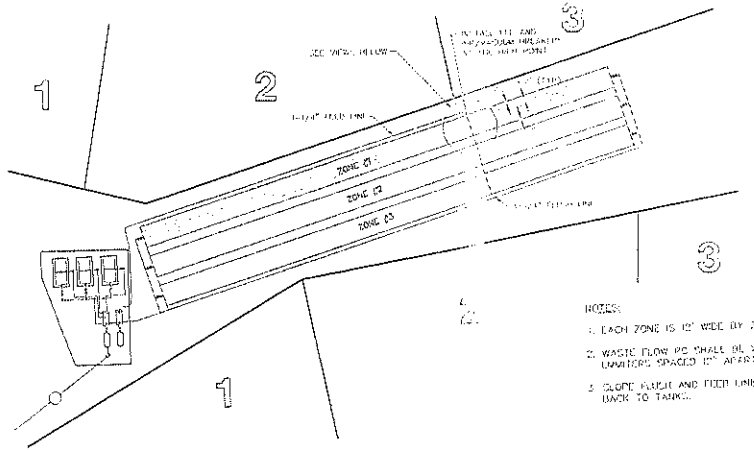
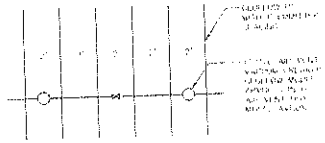


TYPICAL STEP SERVICE CONNECTION

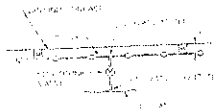


2" MAGNETIC METER/MANHOLE



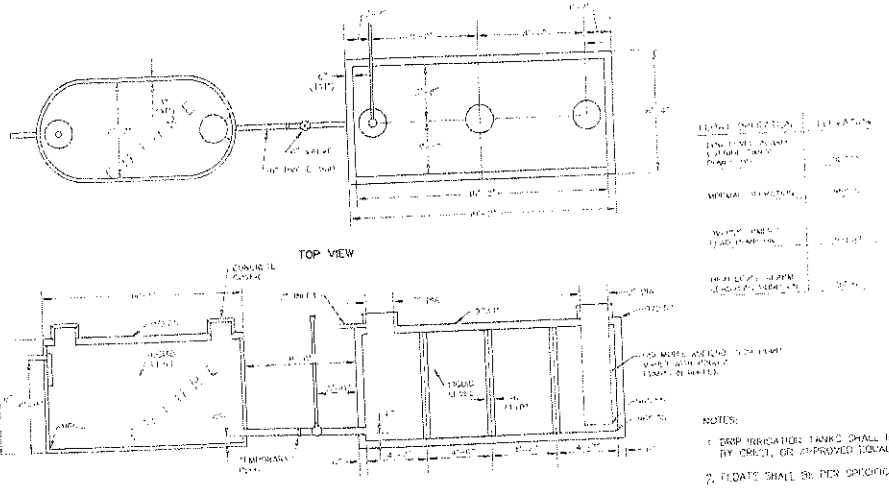


TOP VIEW



SIDE VIEW

DRIP IRRIGATION ZONES



TOP VIEW

SIDE VIEW

DRIP IRRIGATION TANKS

FRONTIER TRAILS
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SYBERURIE COUNTY, MN
FOR
YAMMOS DESIGN & LAND CO.

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FRONTIER TRAILS

BALDWIN TOWNSHIP, SHERBURNE COUNTY, MINNESOTA

DYNAMICS DESIGN & LAND CO.

WASTEWATER SYSTEM 1 & 2
RSF BASIN NO. 2

Civil Engineering
Land Surveying
Land Planning

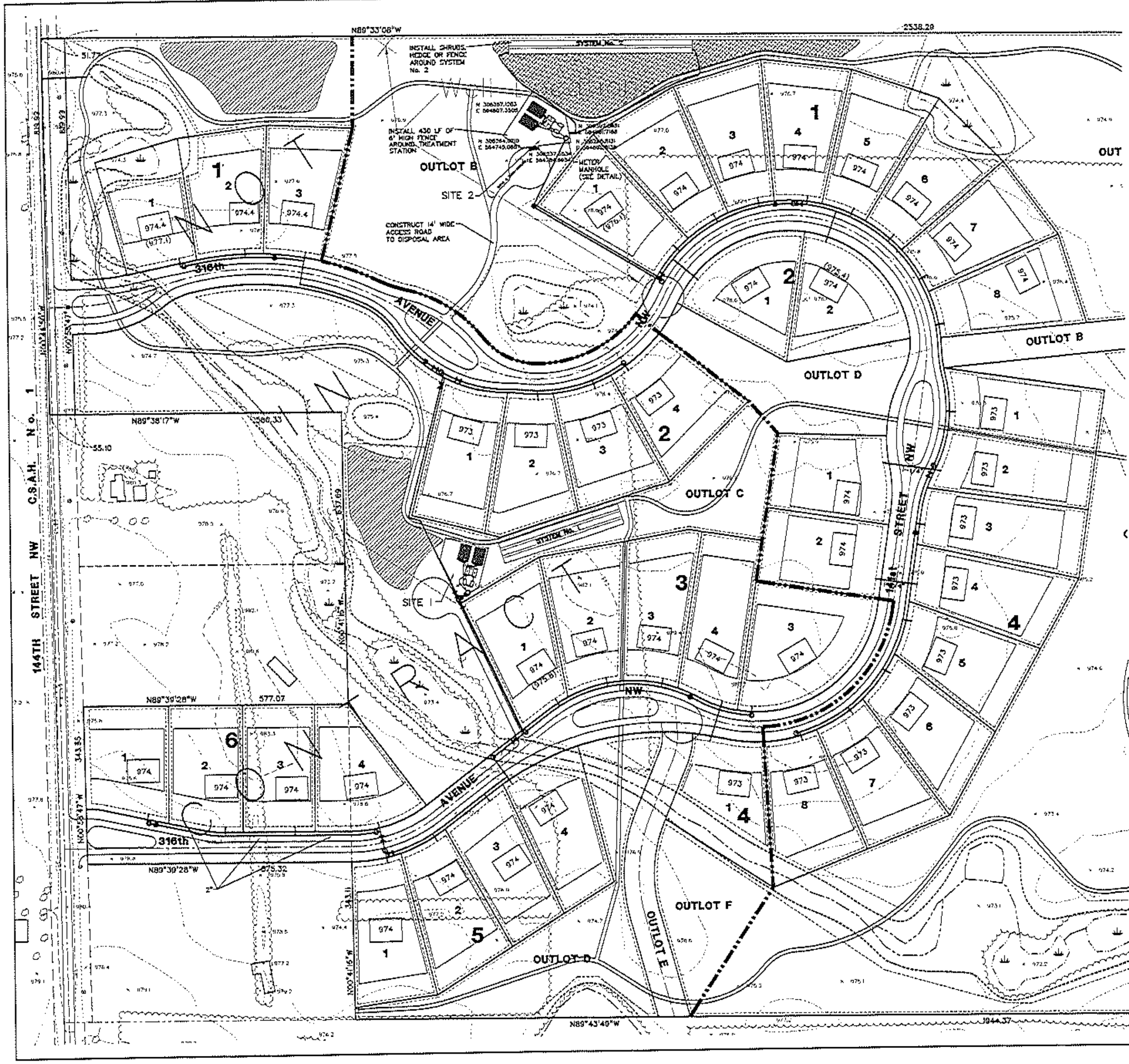
John Oliver & Associates, Inc.

580 Dodge Avenue, Elk River, Minnesota 55330 763-441-2072. Fax 763-441-5665
Offices in: Elk River, Burnsville and Brooklyn Center, Minnesota

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under State of Mn. Statutes Sections 326.02-326.15 Date 9/13/2005 Lic. No. 42661

Michael C. Brandt, PE

REV. NO.	DATE	REVISIONS	SHEETS REVISED



LEGEND

- Existing Contours
- Proposed Storm Sewer
- 995 — Possible House Pad Location With Lowest Floor Elevation
- (996) — Lowest Entry Elevation
- Buildable Area Boundary, Based on 3 ft. Above Mottled Soil As Per Soil Information Supplied
- Edge of Wetland as Delineated by Sherburne County SWCD
- Disposal Areas
- Cleanout/Pigging Port
- Valve
- Air Release Assembly
- Alternate Soil Disposal Areas —DO NOT DISTURB—

SOIL BORING SUMMARY

BORING No.	SURFACE ELEVATION	BORING DEPTH	MOTTLING AT	WATER AT
1	976.44	48"	974.44	972.44
2	974.75	49"	972.75	970.67
3	975.74	41"	974.66	972.32
4	976.86	62"	974.01	971.60
5	976.02	72"	NONE	NONE
6	976.01	62"	973.43	970.84
7	976.68	72"	NONE	NONE
8	974.26	80"	971.76	968.26
9	975.16	55"	972.91	970.58
10	976.27	41"	973.77	NONE
11	976.55	48"	973.22	NONE
12	977.36	53"	973.44	NONE
13	977.49	56"	973.32	NONE
14	975.31	32"	973.06	NONE

***CONTRACTORS SHOULD VARIFY ALL LOCATIONS • ELEVATIONS

REV NO.	DATE	DESCRIPTION

DATE: 03/13/05
DESIGN BY: JKJ MCB
DRAWN BY: MAJ, DJZ
CHECKED BY: JK, BH, MCB
DWG: 7671SHT-SEPTSEW.DWG
TEXT: NONE
FILE NO.: 7671.10-15

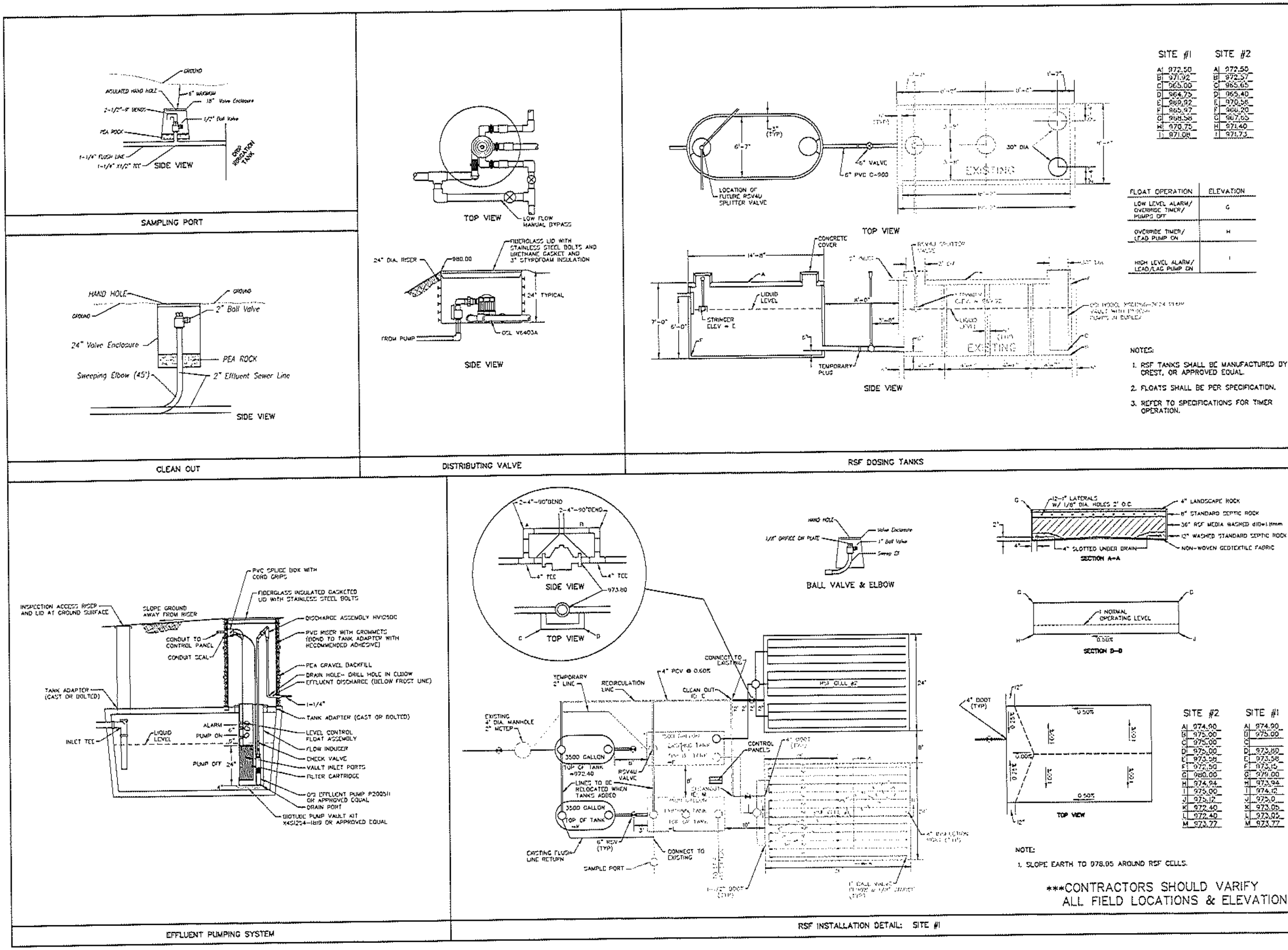
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under State of Minnesota Statutes Sections 326.02-326.16.

Signed: Michael C. Brandt, PE
Date: 03/13/2005 Lic. No. 42661

John Oliver & Associates, Inc.
Civil Engineering, Land Surveying, Land Planning
580 Dodge Avenue
Elk River, Minnesota 55330
(612)441-2072 (FAX)441-5565
201 W. Travelers Trail, Suite 200
Burnsville, Minnesota 55337
(612)894-3045 (FAX)894-5048

FRONTIER TRAILS
BALDWIN TOWNSHIP
SHERBURNE COUNTY, MN
FOR
DYNAMICS DESIGN & LAND CO.
SITE LAYOUT FOR
ADDITION RSF BASINS

SHEET NO. 2 OF 4



	SITE #1	SITE #2
A	972.50	972.50
B	971.92	972.57
C	965.00	965.65
D	964.75	965.40
E	969.92	970.56
F	965.97	966.20
G	968.58	967.65
H	970.75	971.40
I	971.08	971.73

FLOAT OPERATION	ELEVATION
LOW LEVEL ALARM/ OVERRIDE TIMER/ PUMPS OFF	G
OVERRIDE TIMER/ LEAD PUMP ON	H
HIGH LEVEL ALARM/ LEAD/LAG PUMP ON	I

NOTES:

1. RSF TANKS SHALL BE MANUFACTURED BY CREST, OR APPROVED EQUAL.
2. FLOATS SHALL BE PER SPECIFICATION.
3. REFER TO SPECIFICATIONS FOR TIMER OPERATION.

	SITE #2	SITE #1
A	974.90	974.90
B	975.00	975.00
C	975.00	
D	975.00	973.80
E	973.58	973.58
F	972.50	973.15
G	980.00	979.00
H	974.94	973.94
I	975.00	974.12
J	975.12	975.0
K	972.40	973.05
L	972.40	973.05
M	973.77	973.77

NOTE:

1. SLOPE EARTH TO 978.05 AROUND RSF CELLS.

***CONTRACTORS SHOULD VARIFY ALL FIELD LOCATIONS & ELEVATIONS

REV NO.	DATE	DESCRIPTION

DATE: 09/13/2005
DESIGN BY: JS/MCB
DRAWN BY: VU, DJZ
CHECKED BY: MU, VB, JH
DWG: 76715HT3-CET
TEXT: NONE
FILE NO: 7671.10-15

I hereby certify that this plan, specification, 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. Signature: Michael C. Brandt, PE. Date: 09/13/2005 Lic. No. 42651 Reg. No. 6155

John Oliver & Associates, Inc.
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Elk River, Minnesota 55330
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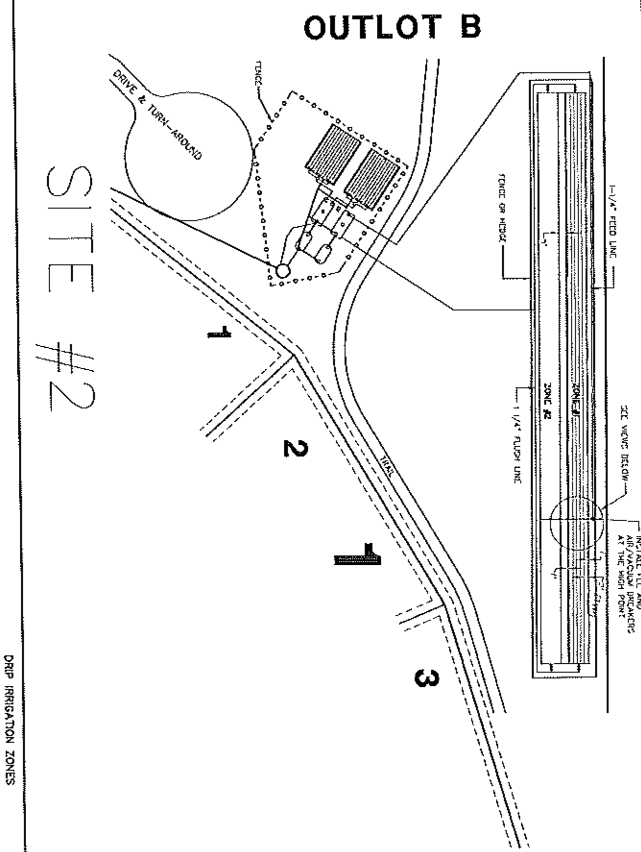
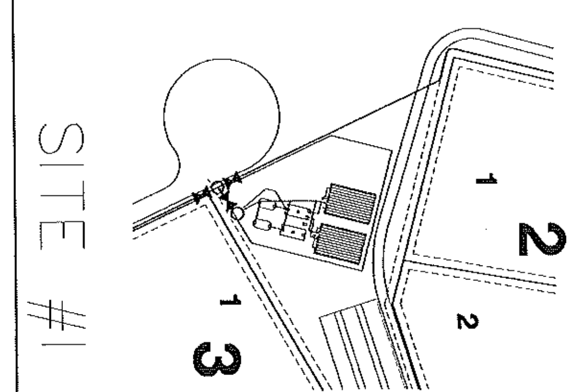
201 W. Travelers Trail, Suite 200
Burnsville, Minnesota 55337
(612)894-3045 (FAX)894-3049

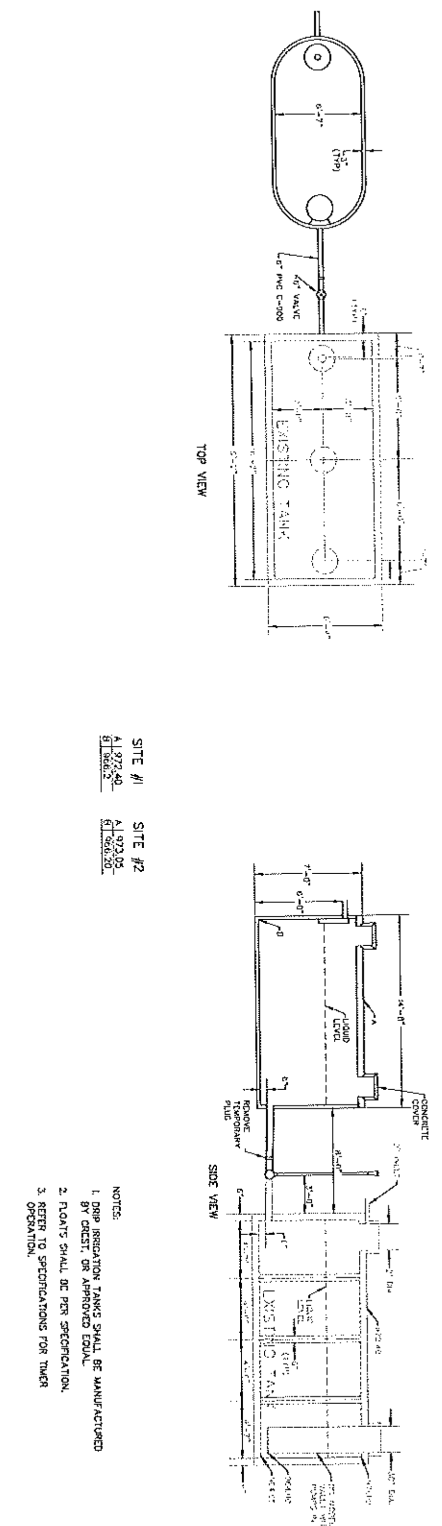
FRONTIER TRAILS
BALDWIN TOWNSHIP
SHERBURNE COUNTY, MN
FOR
DYNAMICS DESIGN & LAND CO.
SITE LAYOUT FOR
ADDITION RSF BASINS

SHEET NO. 3 OF 4





DRIP IRRIGATION ZONES



	SITE #1	SITE #2
A	972.40	973.05
B	966.2	966.20

NOTES:
1. DRIP IRRIGATION TANKS SHALL BE MANUFACTURED BY CREST, OR APPROVED EQUAL.
2. FLOATS SHALL BE PER SPECIFICATION.
3. REFER TO SPECIFICATIONS FOR TIMER OPERATION.

***CONTRACTORS SHOULD VARIFY ALL FIELD LOCATIONS & ELEVATIONS

DRIP IRRIGATION TANKS: SITE #1

SHEET NO. 4 OF 4

FRONTIER TRAILS
BALDWIN TOWNSHIP
SHERBURNE COUNTY, MN
FOR
DYNAMICS DESIGN & LAND CO.
SITE LAYOUT FOR
ADDITION RSF BASINS

John Oliver & Associates, Inc.
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Burnsville, Minnesota 55337
(612)894-3045 (FAX)894-3049

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Signature:
Michael C. Brandt, PE
Date: 09/13/2005 Lic. No. 42661

DATE:	09/13/2005
DESIGN BY:	JP/MCB
DRAWN BY:	MV, DJT
CHECKED BY:	MV, EW, TH
DWG:	7671SHT4.DWG
TEXT:	NONE
FILE NO.:	7671.10-15

REV NO.	DATE	DESCRIPTION

FRONTIER TRAILS

BALDWIN TOWNSHIP, SHERBURNE COUNTY, MN

DYNAMICS DESIGN & LAND COMPANY

DESIGN OF SECOND PRETREATMENT SYSTEM

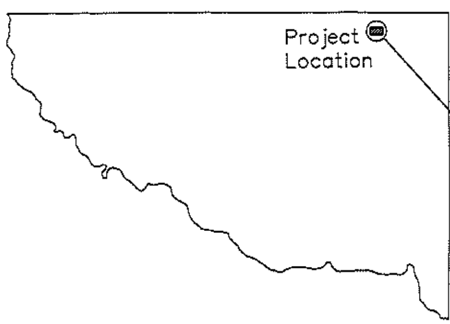
Second Pretreatment Design Information:

Once a facility is placed into operation, the flows and waste strengths to the facility should be monitored. If flow or any of the influent waste strengths exceed those listed in the design, measures should be taken to reduce these parameters to those listed on the plan set. Otherwise additional treatment capacity and plant expansion will be necessary.

Don't dispose of toxics or chemicals into system. Examples: restaurant degreasers and cleansers, wax stripper for linoleum, carpet shampoo, and waste products any other toxics.

In order to demonstrate watertightness, tanks shall be tested at the factory and again on-site prior to acceptance. Inlets to the septic tank will be watertight pipe seal Cast-A-Seal. (Manufactured by Press-Seal Gasket Corporation) or approved equal. Each tank shall be tested at the factory, prior to shipping, by filling with water to the soffit and letting stand. After 24 hours, the tank shall be refilled to the soffit and the exfiltration rate shall be determined by measuring the water loss during the next two (2) hours. Any leakage shall be cause for rejection. After installation is completed and before backfilling, each tank shall be filled with water to a point 2' above the top of the tank and the water loss measured after a twenty-four hour period. After it has been determined that there is no leakage, test the access riser seam. Backfill to a minimum depth of 2' above the riser seam to prevent damage from hydrostatic uplift. Fill the tank to a point 2' above the riser seam (the field test period may be reduced to not less than two (2) hours). No tank will be accepted if there is any leakage over the two (2) hour period.

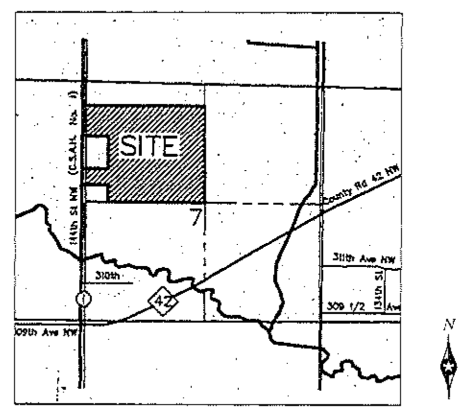
SHERBURNE COUNTY, MINNESOTA



I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Individual Sewage Treatment Designer under the laws of the State of Minnesota.

Signed:

Dated: Reg. No. 2309



NO SCALE

SHERBURNE COUNTY

Section 7, Township 35, Range 26

VICINITY MAP

Second Pretreatment Design Information:

"This plan set is based upon the expected flows and waste strengths dated for the purpose of serving Frontier Trails. Any changes in usage that would affect flows or waste strength requires a review by this designer."

Existing MPCA State Disposal System (SDS) Permit No. MN0064459

North Wastewater Treatment System:
20 Homes
Pretreatment Unit - Advantex AX100
- Qave, 4,000 gpd (200 gpd/home)
- Qpeak 6,700 gpd (335 gpd/home)

(20 homes * 200 gpd/home)/2500 gpd/2 (2 pretreat units) = 1 AX100 Pods

South Wastewater Treatment System:
21 Homes
Pretreatment Unit - Advantex AX100
- Qave, 4,200 gpd (200 gpd/home)
- Qpeak 7,035 gpd (335 gpd/home)

(21 homes * 200 gpd/home)/2500 gpd/2 (2 pretreat units) = 1 AX100 Pods

Recirculation and Dosing Tank Sized for a Minimum of One Times Average Pretreatment Flow

Typical Residential Influent Quality to septic tanks
EPA Onsite Wastewater Treatment System Manual, February 2002

Grease & Oil: 70-105 mg/L
BOD: 155-286 mg/L
TSS: 155-330 mg/L
TKN: 26-75 mg/L
FOG: 70-105mg/L

Typical Effluent Quality after treatment entering recirculation tank

Characteristic	Average	Weekly Peak	Rarely Exceeds
BOD	150	250	500
TSS	40	75	150
TKN	65	75	150
FOG	20	25	30

Typical Effluent Quality after treatment
BOD: < 20 mg/L
TSS: < 20 mg/L
TN: < 25 mg/L
FOG: 0 mg/L

REV NO.	DATE	DESCRIPTION
1	10/3/06	REVISIONS PER ORENCO COMMENTS

DATE: 7/6/06
DESIGN BY: GB
DRAWN BY: MG, GB
CHECKED BY: GB
DWG FILE: 1_COVER
FILE NO.: 06-0316.00

I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.

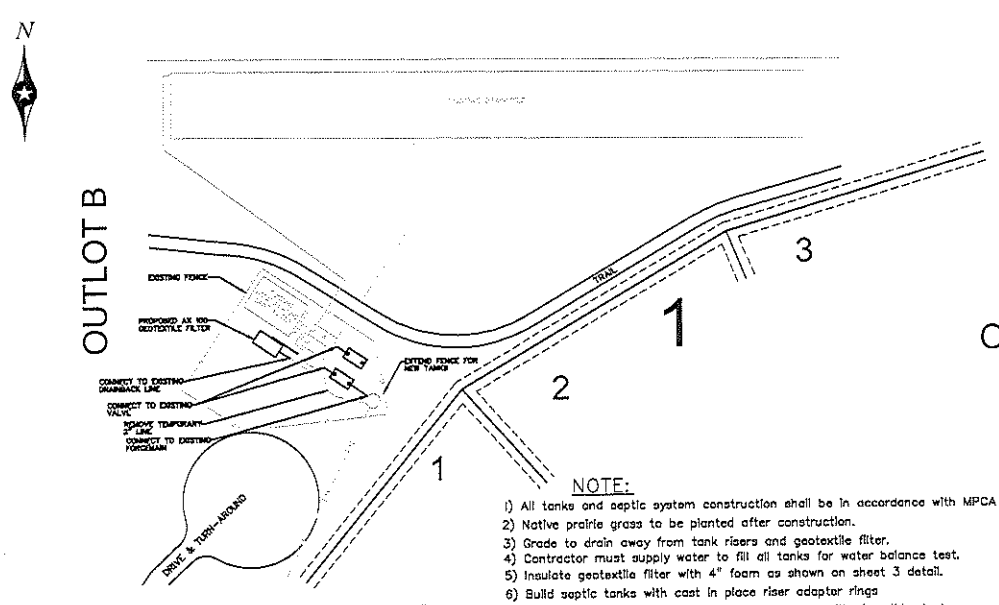
Signed:

Date: Reg. No. 41929

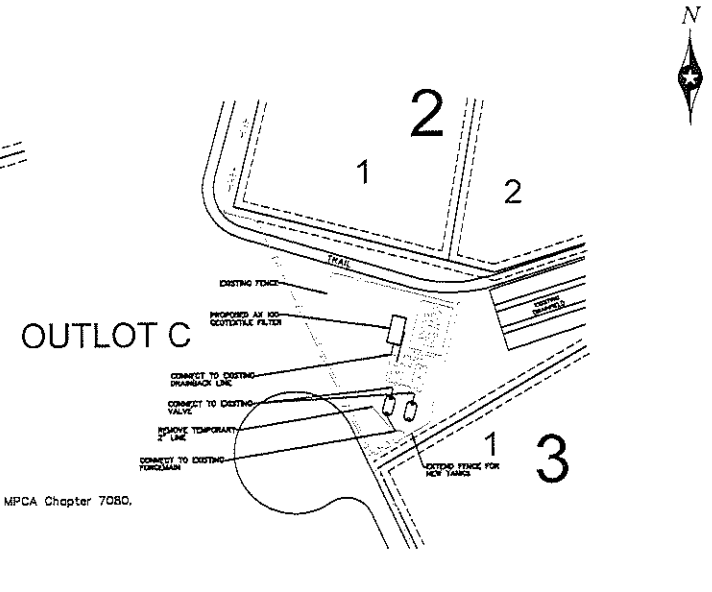
BOGART, PEDERSON & ASSOCIATES, INC.
LAND SURVEYING
CIVIL ENGINEERING
MAPPING

FRONTIER TRAILS
BALDWIN TOWNSHIP, MN
DYNAMICS DESIGN & LAND COMPANY
DESIGN OF SECOND ONSITE SEWAGE PRETREATMENT UNIT
TITLE SHEET & INDEX SHEET

SHEET NO. 1 / 3



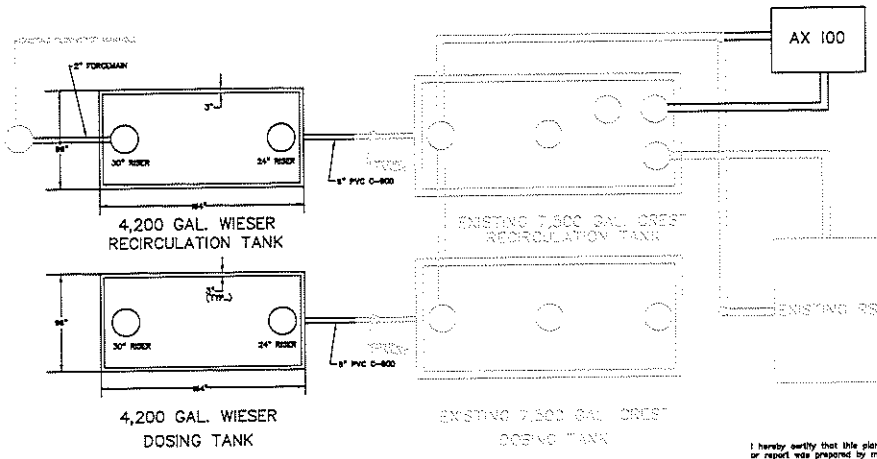
NORTH SITE



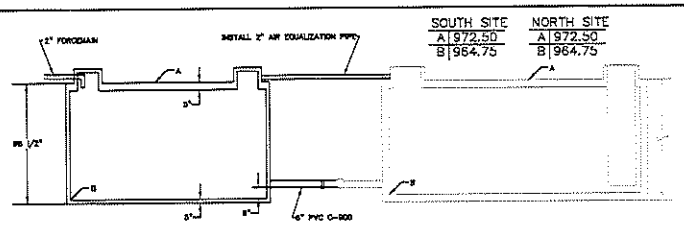
SOUTH SITE

NOTE:

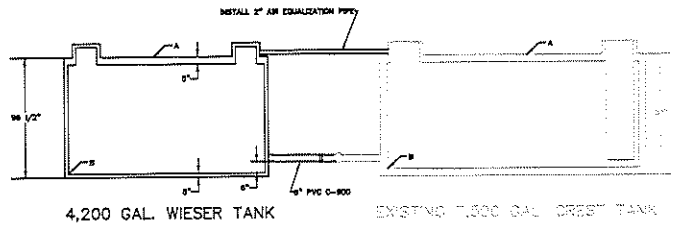
1) All tanks and septic system construction shall be in accordance with MPCA Chapter 7080.
2) Native prairie grass to be planted after construction.
3) Grade to drain away from tank risers and geotextile filter.
4) Contractor must supply water to fill all tanks for water balance test.
5) Insulate geotextile filter with 4" foam as shown on sheet 3 detail.
6) Build septic tanks with cast in place riser adaptor rings
7) All risers shall include insulated bolt on covers with riser lid adapters.
8) Contractor shall field verify all locations and elevations of existing system.



TOP VIEW OF RECIRCULATION & DOSING TANK



SIDE VIEW OF RECIRCULATION



SIDE VIEW OF DOSING TANK

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Individual Sewage Treatment Designer under the laws of the State of Minnesota.

Signed:_____

Dated:_____ Reg. No. 2399

REV NO.	DATE	DESCRIPTION
1	10/3/06	REVISIONS PER OSDIDG COMMENTS

DATE: 7/6/06
DESIGN BY: GB
DRAWN BY: MS, GB
CHECKED BY: GB
DWG FILE:
FILE NO.: 09-0318.00

I hereby certify that this plan was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.

Signed:_____ Reg. No. 41929

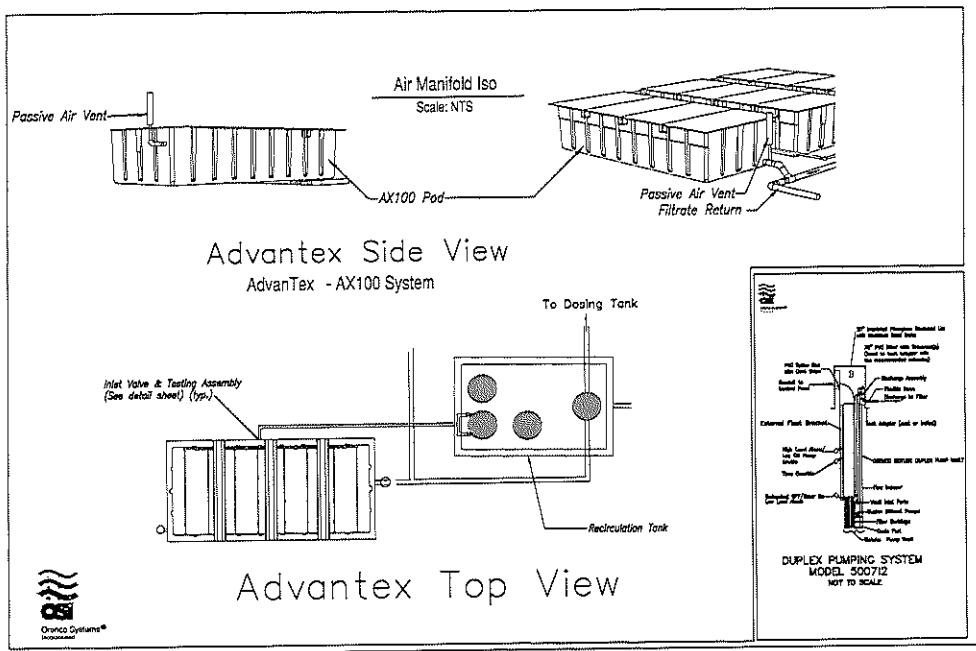
Date:_____

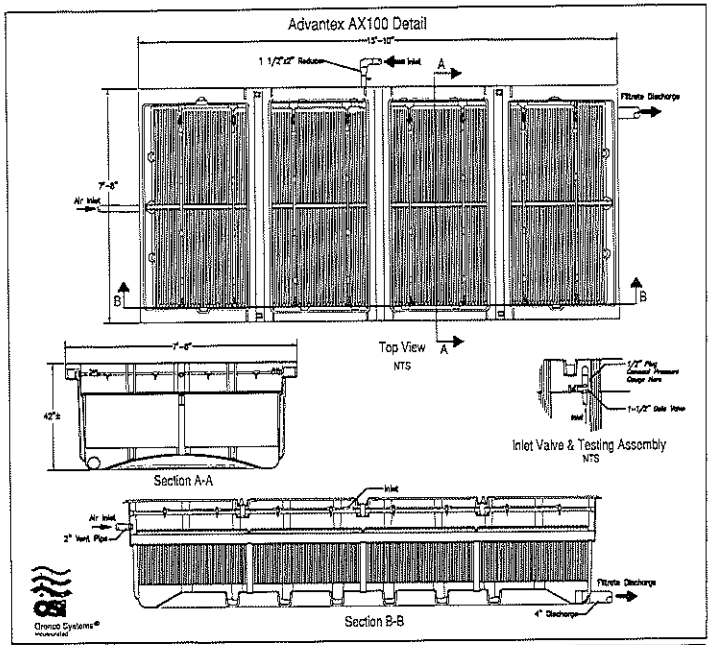
BOGART, PEDERSON & ASSOCIATES, INC.
LAND SURVEYING
ENGINEERING
PLANNING
2638 SHADOW LANE SUITE 200 CHASKA, MN 55318-1172
PH: 952-448-8838 FAX: 952-448-8844

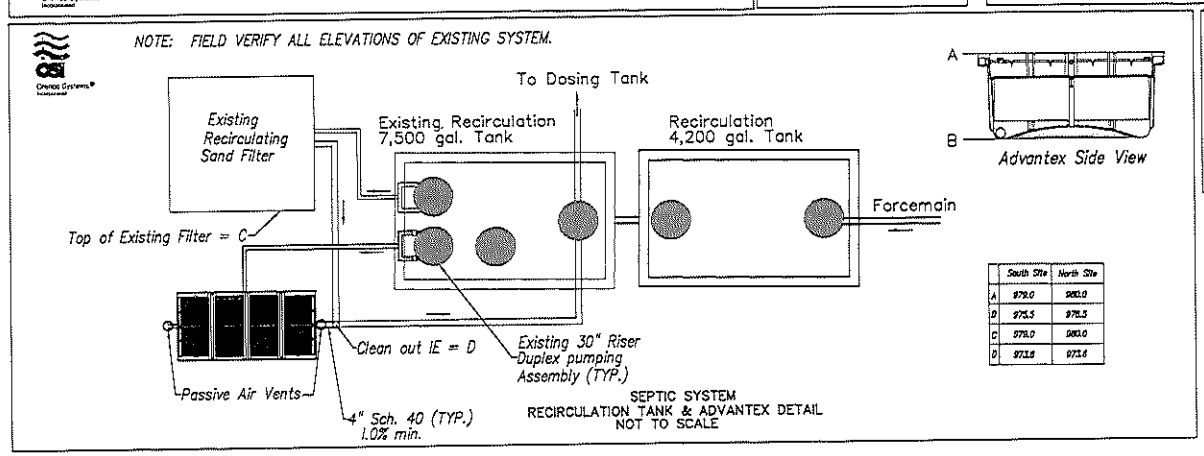
FRONTIER TRAILS
BALDWIN TOWNSHIP, MN
DYNAMICS DESIGN & LAND COMPANY
DESIGN OF SECOND ONSITE SEWAGE PRETREATMENT UNIT
SITE LAYOUT & TANK DETAILS

SHEET NO. 2 / 3

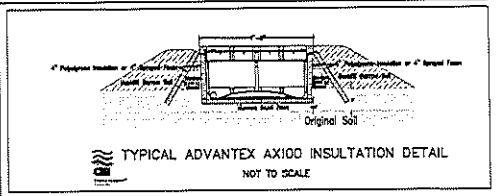
ADVANTEX DETAIL & RECIRCULATION TANKS

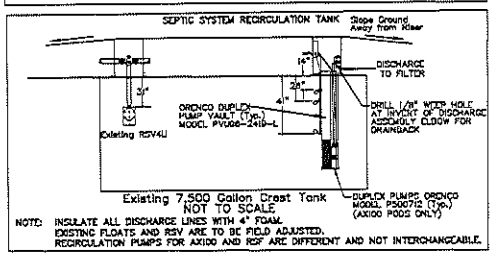






	South Site	North Site
A	979.0	980.0
B	975.5	976.5
C	978.0	980.0
D	973.5	973.5





I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Individual Sewage Treatment Designer under the laws of the State of Minnesota.

Signed: _____
Dated: _____ Reg. No. 2399

REV NO.	DATE	DESCRIPTION
1	10/3/06	REVISIONS PER ORENCO COMMENTS

DATE: 7/6/06
DESIGN BY: GB
DRAWN BY: MG, GB
CHECKED BY: GB
DWG FILE:
FILE NO.: 05-0316.00

I hereby certify that this plan 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.

Signed: _____
Date: _____ Reg. No. 41929

BOGART, PEDERSON & ASSOCIATES, INC.
LAND SURVEYING
PLANNING
ENGINEERING

FRONTIER TRAILS
BALDWIN TOWNSHIP, MN
DYNAMICS DESIGN & LAND COMPANY
DESIGN OF SECOND ONSITE SEWAGE PRETREATMENT UNIT
ADVANTEX FILTER DETAILS

SHEET NO. 3 of 3

CONSTRUCTION PLANS

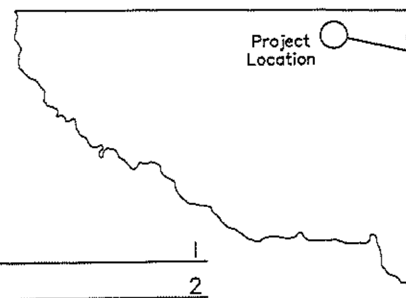
FOR

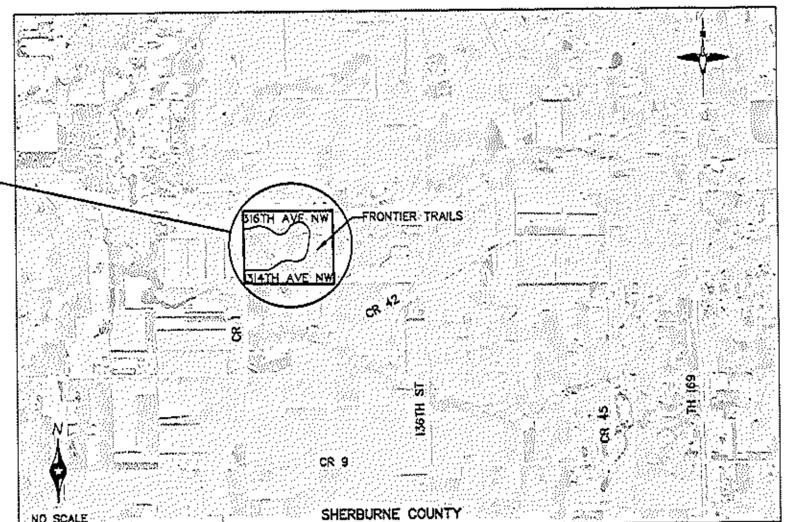
ONSITE SEPTIC SYSTEM MODIFICATIONS

FRONTIER TRAILS

BALDWIN TOWNSHIP

SHERBURNE COUNTY, MINNESOTA





Section 7, Township 35, Range 26

VICINITY MAP

BENCHMARKS:

TOP OF CIM W¼ COR SEC 7-34-26 FLUSH IN BITUMINOUS ROADWAY CR 1 LG FEET EAST OF WEST EDGE OF EXISTING BITUMINOUS EDGE OF ROAD

SITE BENCHMARK:

TOP OF 18"X26" OVAL CAP NORTH SIDE 318TH AVE, LOT 1, BLK 1 FRONTIER TRAILS

CALL 48 HOURS BEFORE DIGGING:
GOPHER STATE ONE CALL
TWIN CITY AREA 651-454-0002
MINNESOTA TOLL FREE 1-800-252-1166

REV NO.	DATE	DESCRIPTION

DATE: 00/00/00
DESIGN BY: JKB
DRAWN BY:
CHECKED BY:
DWG FILE:
FILE NO.: 14-0104.00
1PP Cover

I hereby certify that this plan, specification, 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.

Signed: Jon Bogort
Date: Reg. No. 19900

BOGART, PEDERSON & ASSOCIATES, INC.
LAND SURVEYING
CIVIL ENGINEERING
MAPPING

FRONTIER TRAILS
BALDWIN TOWNSHIP
SEPTIC SYSTEM MOD
TITLE SHEET & INDEX

SHEET NO. 1 / 15

GENERAL INFORMATION

Onsite Septic System Modifications for Frontier Trails consists of grading, aggregate surfacing, culvert replacement, and turf establishment on 420 LF (total net length) of 137th St endind at the southwest edge of pavement of TH10. Receiving waters for this project include local ditches none of which are classified as special waters.

This Stormwater Pollution Prevention Plan is prepared in accordance to the National Pollutant Discharge Elimination System Permit No. MN R100001 for stormwater discharges associated with construction activity.

Project Name:	Onsite Septic System Modifications for Frontier Trails
Location:	East of CR1, North of CR 42 Sherburne County, MN
Township:	Baldwin Township, Sherburne County
Lat/Long:	45° 32' 26" / 93° 37' 53"
Project Description:	Modification of the onsite septic treatment system.
Project Duration:	Anticipated 20 Days
Potential Discharges:	Sediment resulting from construction operations,
Area to be Disturbed:	xxx Acres
Pre-Construction Impervious Area:	0 Acres
Post Construction Impervious Area:	0 Acres
New Impervious Area:	0 Acres

PROJECT CONTACTS

Baldwin Township and the Contractor are responsible for implementation of the SWPPP and the installation, inspection, and maintenance of the erosion prevention and sediment control BMP's before and during construction.

PROJECT CONTACTS: Jon Bogart
Township Consulting Engineer
Bogart, Pederson & Associates
13378 FIRST STREET
BECKER, MN 55308
(763) 2820-8822

RECEIVING WATERS

Receiving Waters Within One Mile: Unnamed wetland complex/Battle Brook
Impact: 0.00 Ac
Acres wetlands lost: 0 Ac
Mitigation Efforts: 0 Ac

PLANS AND SPECIFICATIONS

The plan and profile sheets of this plan set indicate the following items: The project location and construction limits.
- Existing and final grades, including dividing lines and direction of flow for all pre
- and post-construction stormwater runoff drainage areas located within the project limits.

Soil types at the site.
- Locations of impervious surfaces.
- Locations of areas not to be disturbed (e.g., buffer zones, wetlands, etc.).
- Steep slope locations.
- Locations of all temporary and permanent erosion and sediment control Best
- Management Practices, (BMPs). The detail sheets indicate erosion and sediment control BMPs to be installed on the project. Estimated quantities for erosion and sediment control features for this project are indicated in the plans and in the bid proposal form of the Project Manual.

TIMING OF BMP INSTALLATION

The erosion prevention and sediment control BMP's shall be installed as necessary to minimize erosion from disturbed surfaces and capture sediment on site, and shall meet the NPDES permit part IV construction activity requirements.

TEMPORARY EROSION PREVENTION PRACTICES

Erosion control practices for this project include Mn/Dot Category 3 Erosion Control blanket along all slopes over thetop of the constructed drainfields. Areas of exposed soils draining toward the wetlands area are to be stabilized within 24 hours. Topsoil placement along the embankment slopes is to be spread by a low impact crawler tractor operating up and down the slopes so as to provide track prints parallel with the contours. All completed ditch slopes and bottoms are to be stabilized within 14 days. Temporary stabilization will be required in areas where grading operations are suspended or ceased for a period of 14 days or greater.

TEMPORARY SEDIMENT CONTROL PRACTICES

Down gradient silt fence and sediment log installations are to be inplace prior to the commencement of any earthwork operations.
Topsoil is to be windrowed along the construction limits and placed as slope dressing immediately following completion of the grading operations, as the grading operations proceed.
All temporary soils stockpiles will require an effective means of sediment control such as an erosion control blanket covering or silt fence installation along the toe of slope.
The cost for temporary stockpile sediment control is considered incidental to the project.
A rock construction entrance for sediment control is to be provided at the existing gravel road leading to the construction sites.
Street sweeping operations are considered incidental to the project.

TIMING OF EROSION CONTROL

Silt fence will be installed prior to construction.

Riprap and filter blanket will be placed at the outlets within 24 hours of the outlet placement.

The contractor must stabilize the all exposed soil areas immediately following construction wherever construction will not occur for a period greater than or equal to 14 days.

Stabilization work must be complete within 14 calendar days after the construction work in that area has temporarily or permanently ceased.

Areas that are within 200 ft of a Public Water must be stabilized within 24 hours of completing construction during periods of "Work in water restrictions" for time periods declared by the DNR.

The Contractor is responsible to maintain the disturbed area until vegetation is established.

Once vegetation is established and construction is complete, the silt fence and any other temporary erosion control that is not biodegradable shall be removed.

Street sweeping will be provided on 313th Ave NW and 125th St NW as directed by the engineer.

Applying mulch, hydromulch, tackifier, polyacrylamide or similar erosion prevention practice is not acceptable stabilization in any part of a temporary or permanent drainage ditch or swale.

EROSION CONTROL PRACTICES

A list of best management procedures (BMP's) has been developed and the locations of these BMP's are shown in the project plans, labeled Erosion Control/Final Restoration.

A number of the BMP's included in the erosion control plan sheets have been developed to serve as post-construction storm water controls.

-BMP's to be placed during construction are shown on the plan and profile sheets.
-Fertilizers will be applied only in the minimum amounts recommended by the manufacturer and will be worked into the soil to limit exposure to storm water.
-All vehicles on site will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage.
-Any asphalt substances used onsite will be applied according the manufacture's recommendation.
-Sanitary waste will be collected from portable units a minimum of biweekly to avoid overfilling.
-All hazardous material spills will be cleaned up immediately upon discovery. Spills will be reported to the appropriate state and local government agency, regardless of the size of the spill.
-Concrete trucks will not be allowed to wash out or discharge surplus concrete or drum wash water on the site, except in designated areas as directed by the Project Engineer.
-Top soil stock piles will be stabilized with temporary seed and mulch no later than fourteen days from the last construction activities in that area.
-All trash and construction debris from the site will be deposited in a dumpster. No construction materials will be buried on-site.
All personnel will be instructed regarding the correct procedure for waste disposal. Good housekeeping and spill control practices will be followed during construction to minimize storm water contamination from petroleum products, fertilizers, paints, and concrete.

INSPECTION AND MAINTENANCE ACTIVITIES

The Contractor is to provide a trained individual responsible for the implementation, inspection and maintenance of the erosion and sediment control BMPs on the project. That individual is to be identified at the pre-construction conference and listed in the minutes thereof. The appointed individual is to perform a routine inspection of the entire site at least once every seven days during construction operations and within 24 hours after a rainfall event greater than 0.5 inches in 24 hours.

A recommended inspection form will be provided to the Contractor at the pre-construction conference. Any deficiencies in the erosion and sediment control BMPs are to be noted on the inspection form and corrected by the end of the next business day. Perimeter control devices are to be repaired or replaced when they are no longer effective or when the sediment reaches one-half the height of the device.

The inspectors log and maintenance needed will be completed according to the NPDES ii rules. The Contractor is responsible for maintaining the inspection log and the long term maintenance within the county right of way. Visual inspections of all cleared and graded areas of the construction site will be performed every week and within 24 hours of the end of a storm with rainfall amounts greater than 0.5 inch. The inspection will be conducted by the SWPPP coordinator or a designated storm water team member. The inspection will verify that the structural BMP's are in good condition and are minimizing erosion. The inspection will also verify that the procedures used to prevent storm water contamination from construction materials and petroleum products are effective. The following inspection and maintenance practices will be used to maintain erosion and sediment controls:

-Built up sediment will be removed from silt fence, bale barriers, and super duty silt fence when it has reached one-third of the height.
-Silt fences will be inspected for depth of sediment, for tears and to see that the fence posts are firmly in the ground.
-Sediment traps will be inspected for depth of sediment and built up sediment will be removed when it reaches one foot in depth from bottom of basin.
-Temporary and permanent seeding will be inspected for bare spots, washouts, and healthy growth.
-The maintenance inspection report will be filled out after each inspection, and will be maintained on-site during the entire construction project.

The completed forms shall be provided to the Township Engineer. If construction activities or design modifications are made to the site plan which could impact storm water, this SWPPP will be amended appropriately.

POLLUTION PREVENTION

Fertilizers are to be applied only in the amounts as specified and worked into the soil to minimize exposure to stormwater runoff.

Onsite refueling operations are to be conducted with care.

Any inadvertent spillage of fuel or chemicals is to be immediately cleaned up, removed from the site and disposed of in accordance to State and Local Regulations. Major spills are to be reported to the MPCA 24 Hour Notification network at 800 422 0798.

All vehicles onsite are to be monitored for leaks and subject to routine preventive maintenance efforts to reduce the likelihood of leakage and or spills.

Portable sanitary waste facilities are to be provided onsite and emptied on a bi-weekly basis.

Concrete batch trucks will not be allowed to discharge drum and chute washout directly on the ground. A portable washout receptacle is to be provided by the Contractor at the location shown on the plans.

FINAL STABILIZATION

Final stabilization occurs when 70 percent of the pervious area is covered with uniform, permanent vegetation. All temporary erosion and sediment control features are to be removed and the NPDES Notice of Termination is to be prepared and submitted to the MPCA.

LOCATION OF SWPPP REQUIREMENTS IN PROJECT PLAN

DESCRIPTION	TITLE	LOCATION
Erosion Control Details	Erosion Control Details	Sheets xxx
Erosion Control Locations	Plan and Profiles	Sheets xxx
Permanent Turf	Plan and Profiles	Sheets xxx

24 HOUR MPCA EMERGENCY NOTIFICATION

Telephone Numbers: 651-649-5451
800-422-0798

DESCRIPTION | DATE | REV NO.

DATED 09/00/00
DESIGN BY: JWB
DRAWN BY:
CHECKED BY:
DWG FILE:
FILE NO.: 14-0104.00
1PP Cover

I hereby certify that this plan, specification 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.

Signed: Jon Bogart
Date: Reg. No. 19800

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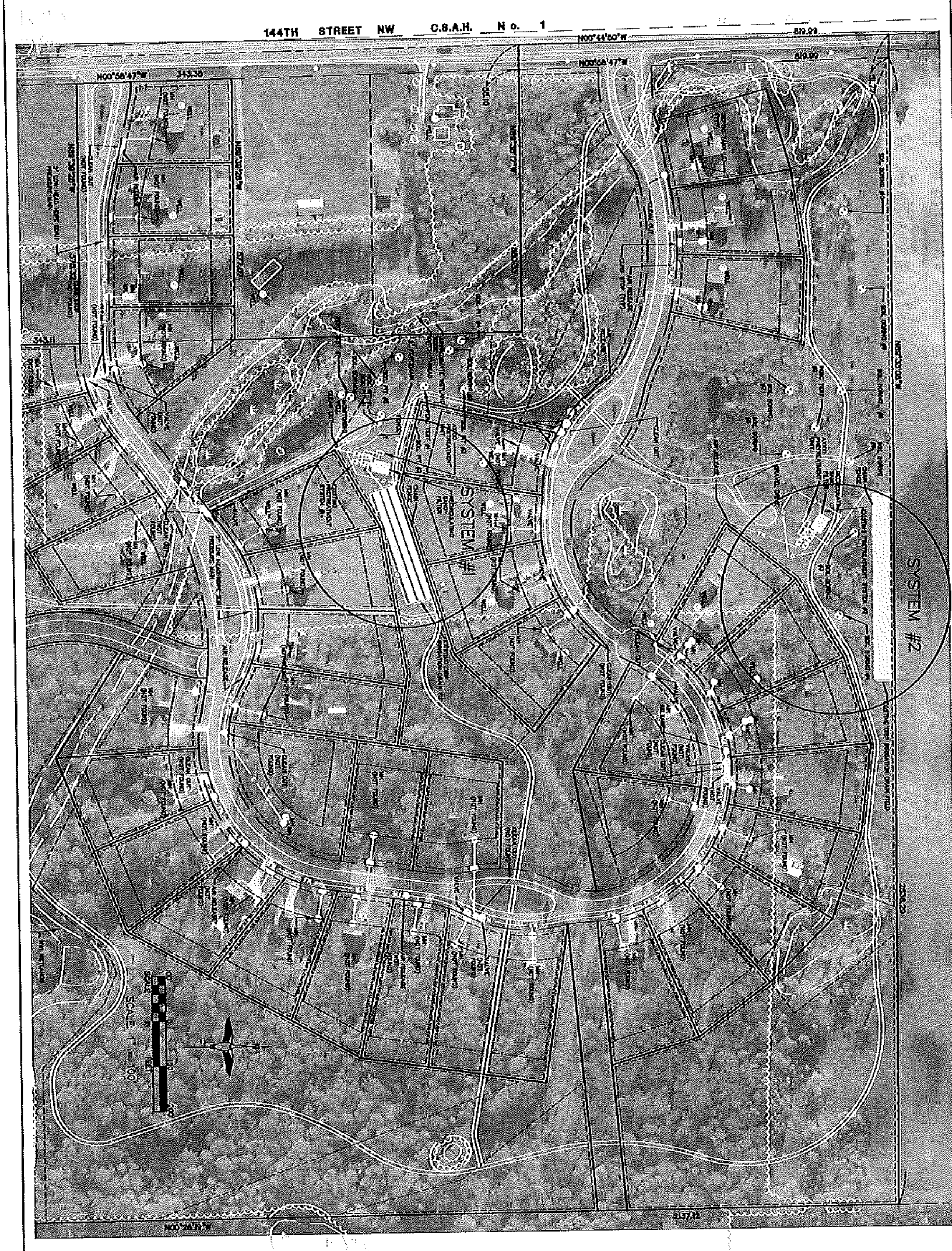
(763) 261-4602 FAX (763) 261-4641

FRONTIER TRAILS
BALDWIN TOWNSHIP
SEPTIC SYSTEM MOD
SWPPP

SHEET NO.
2
15



SHEET NO.	3 / 15

FRONTIER TRAILS
BALDWIN TOWNSHIP
SEPTIC SYSTEM MOD
EX SEPTIC SYS LAYOUT

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TEL: 763-262-8822 FAX: 763-262-8844

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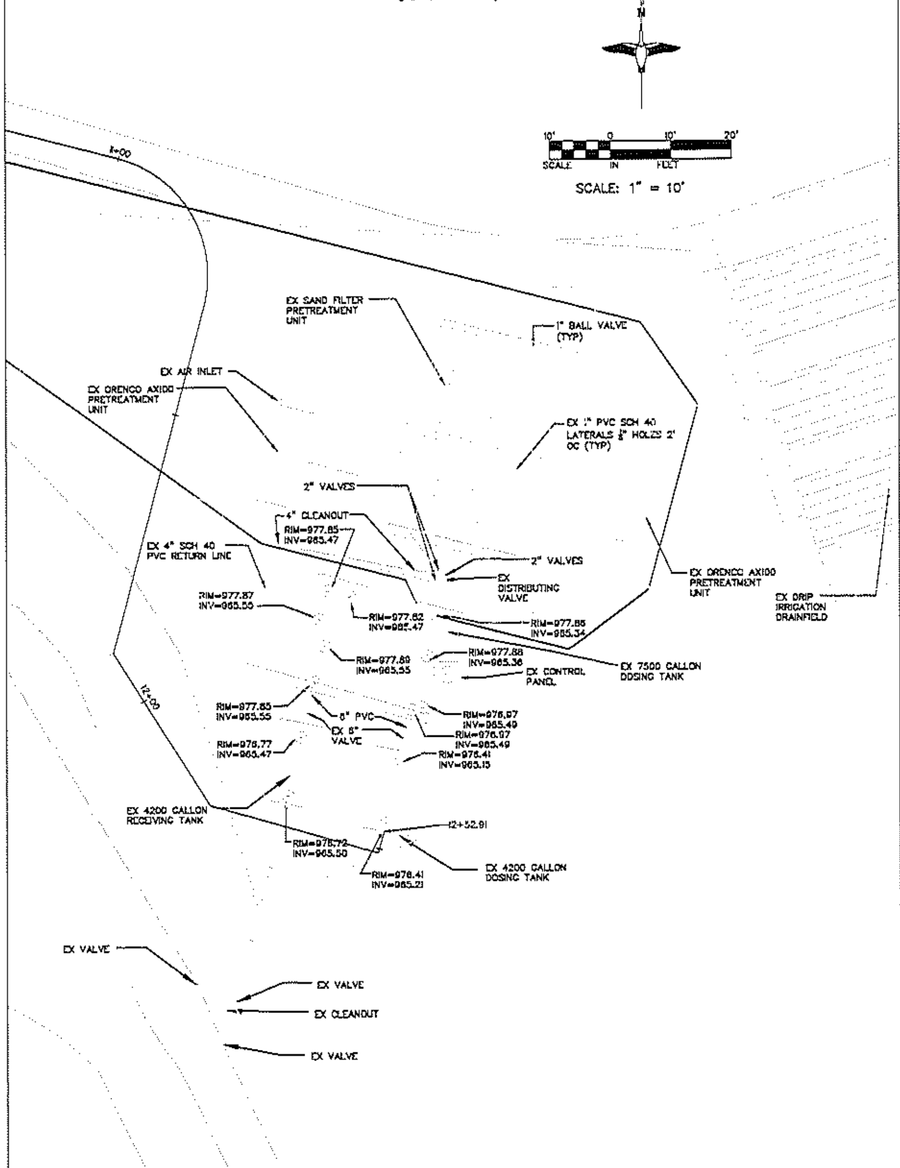
Signed: Jon Bogart
Date: 10/18/2016 Reg. No. 19900

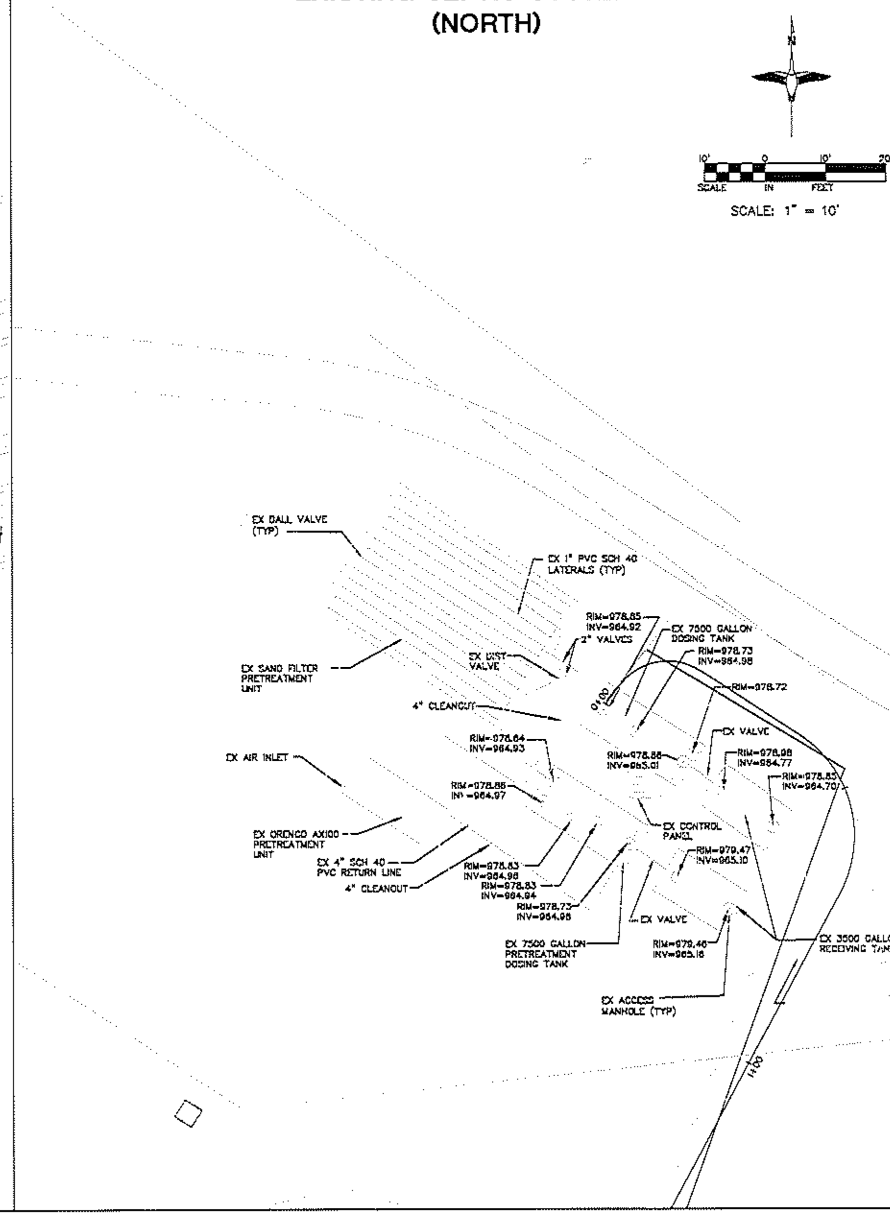
DATE: 8/19/2016
DESIGN BY: JKB
DRAWN BY:
CHECKED BY:
DWG FILE:
FILE NO.: 14-0104.00

REV NO.	DATE	DESCRIPTION

EXISTING SEPTIC SYSTEM #1 (SOUTH)



EXISTING SEPTIC SYSTEM #2 (NORTH)



REV NO.	DATE	DESCRIPTION

DATE: 00/00/00
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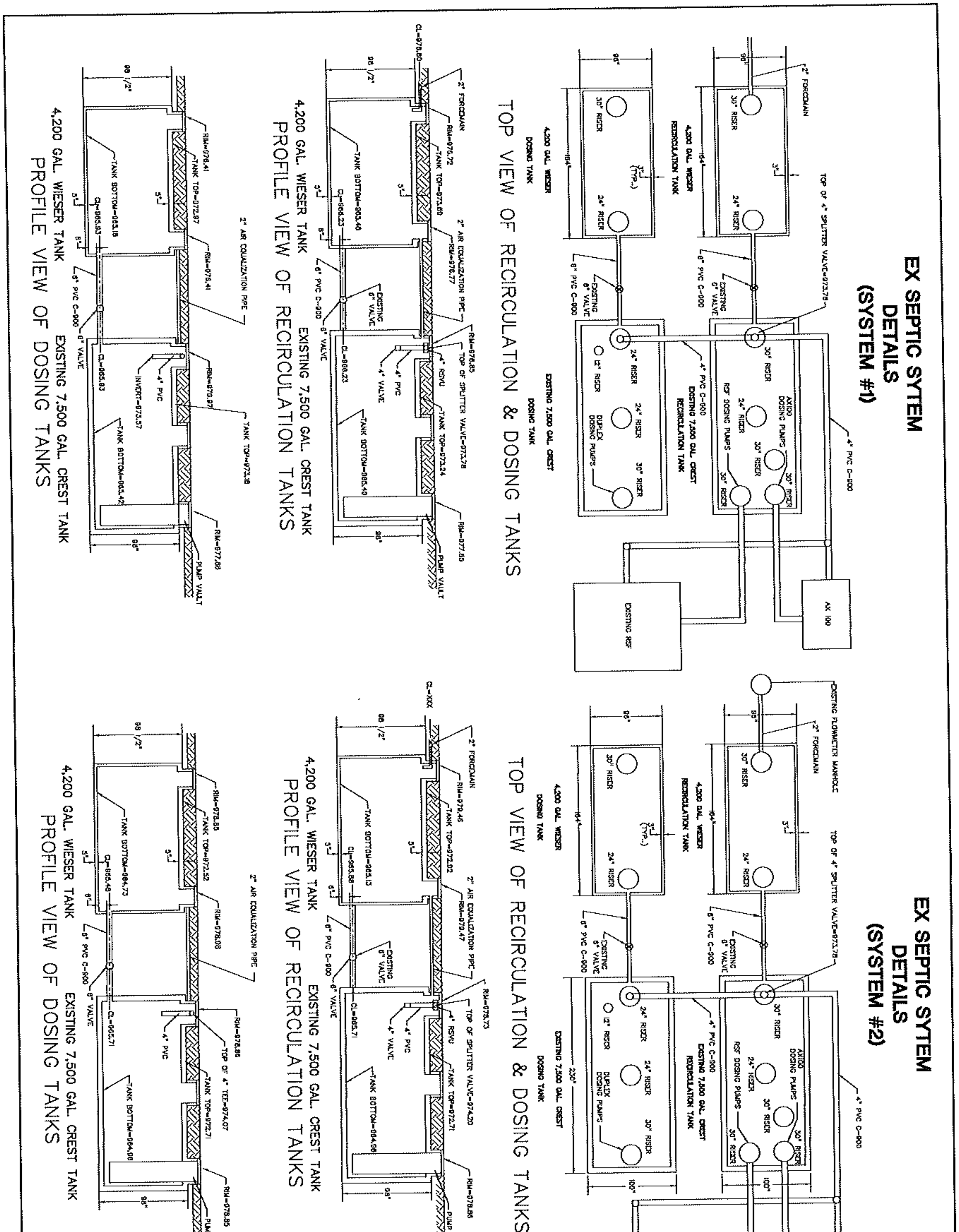
FRONTIER TRAILS
BALDWIN TOWNSHIP
SEPTIC SYSTEM MOD
EX SEPTIC SYTEM DETAILS

SHEET NO. 4 / 15



DATE: 00/00/00	REV NO.	DATE	DESCRIPTION
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CHECKED BY:			
DWG FILE:			
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Date: ________ Reg. No. 19900

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13076 FIRST STREET, BECKER, MN 55308-9322
TEL: 763-262-8822 FAX: 763-262-8844

FRONTIER TRAILS
BALDWIN TOWNSHIP
SEPTIC SYSTEM MOD
EX SEPTIC SYSTEM DETAIL

SHEET NO.
5
15

SHEET NO. 6 of 15

FRONTIER TRAILS
BALDWIN TOWNSHIP
SEPTIC SYSTEM MOD
DEMOLITION PLAN

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VOICE 763-262-6822 FAX: 763-262-8444

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Signed: _____
Jon Bogart
Date: _____ Reg. No. 19900

DATE: 00/00/00
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FILE NO.: 14-0104.00

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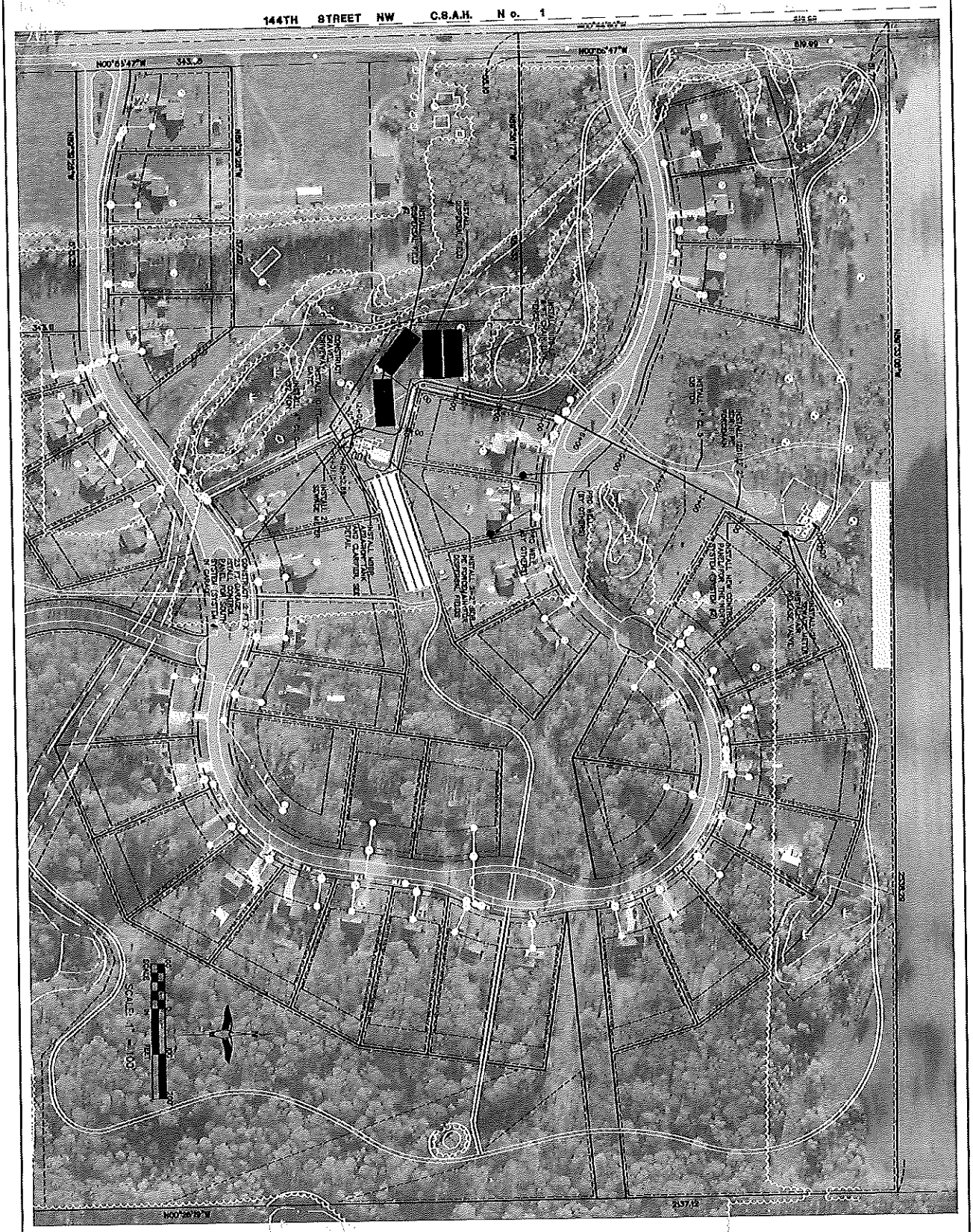
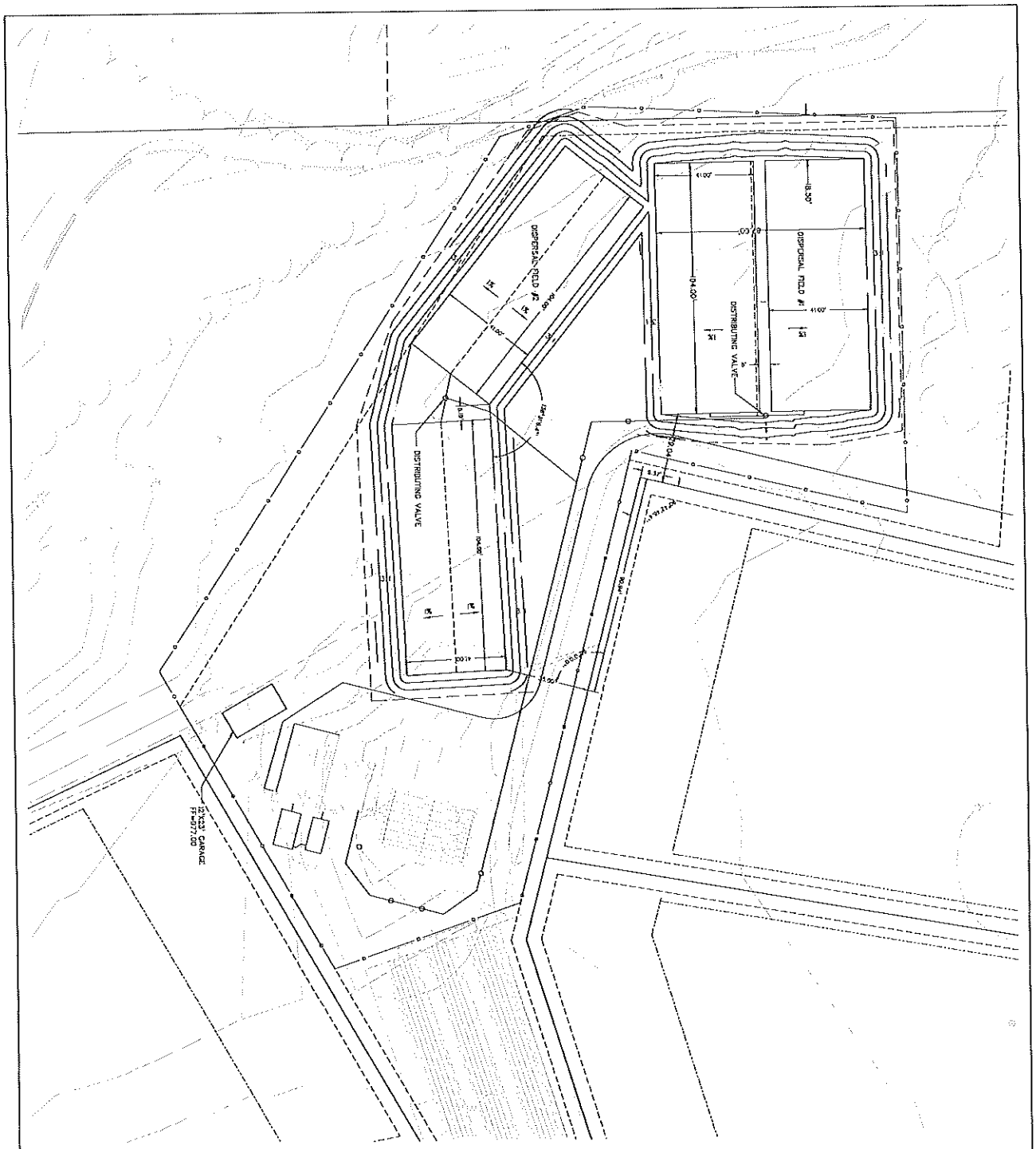


SHEET NO. 7 of 15	FRONTIER TRAILS BALDWIN TOWNSHIP SEPTIC SYSTEM MOD PRO SEPTIC SYS LAYOUT	BOGART, PEDERSON & ASSOCIATES, INC. LAND SURVEYING CIVIL ENGINEERING MAPPING 13078 FIRST STREET, BECKER, MN 55308-9323 TEL 763-262-0672 FAX 763-262-0674	I hereby certify that this plan, specification or report 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. Signed: Jon Bogart Date: 10/18/2016 Reg. No. 19300	DATE: 8/19/2016 DESIGN BY: JKB DRAWN BY: CHECKED BY: DWG FILE: FILE NO.: 14-0104.00	REV NO.	DATE / DESCRIPTION



SHEET NO. 03 of 05

FRONTIER TRAILS
BALDWIN TOWNSHIP
SEPTIC SYSTEM MOD
GRADING PLAN

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Signed: Jon Bogart
Date: _____ Reg. No. 19900

DATE: 00/00/00
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FILE NO.: 14-0104.00

REV NO.	DATE	DESCRIPTION

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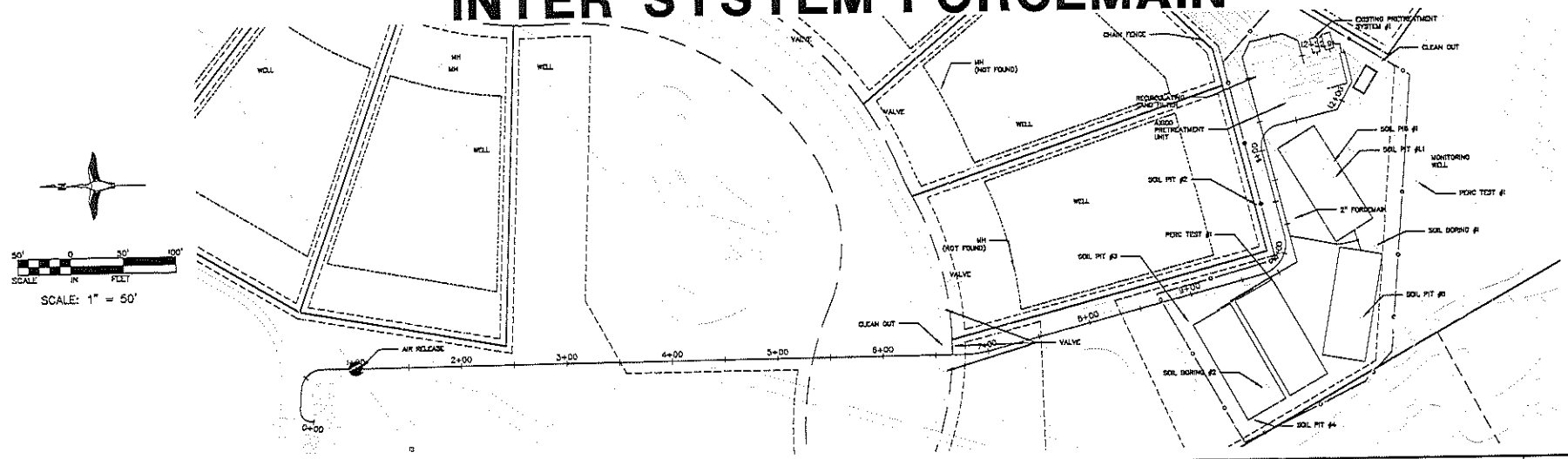

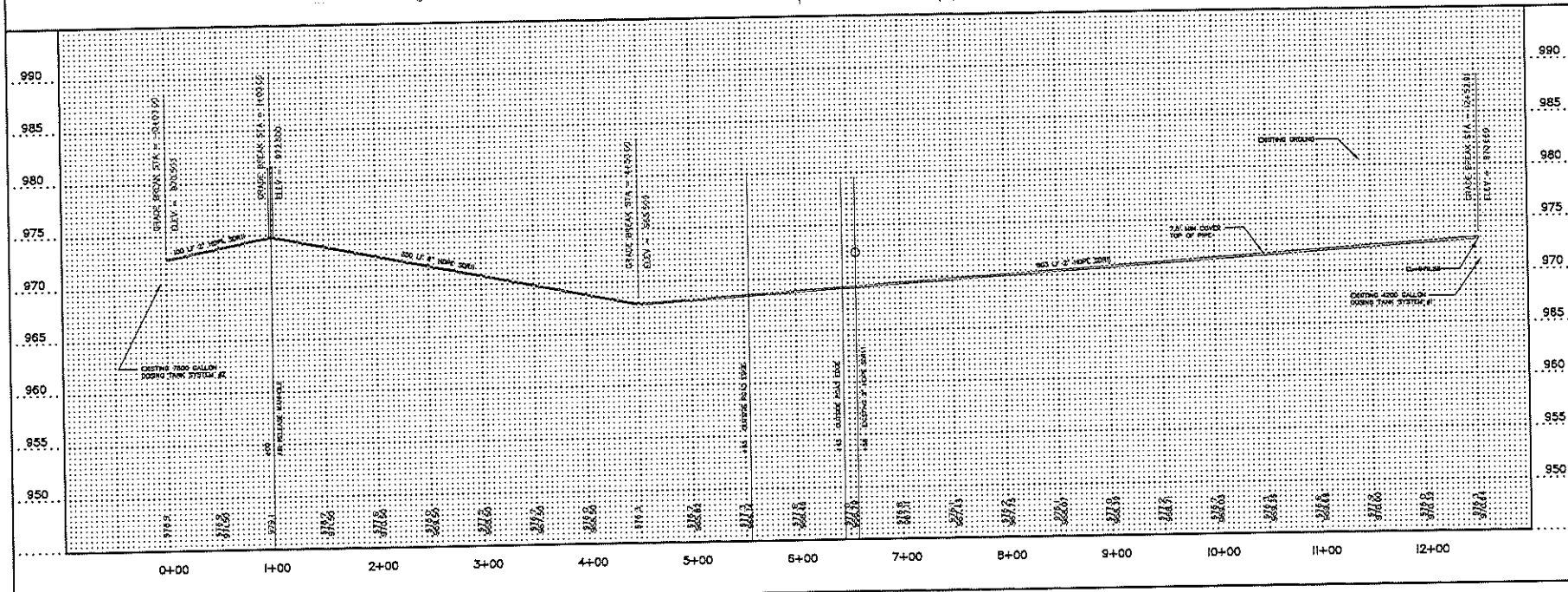

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DWG FILE: 10.PP
FILE NO.: 14-0104.00

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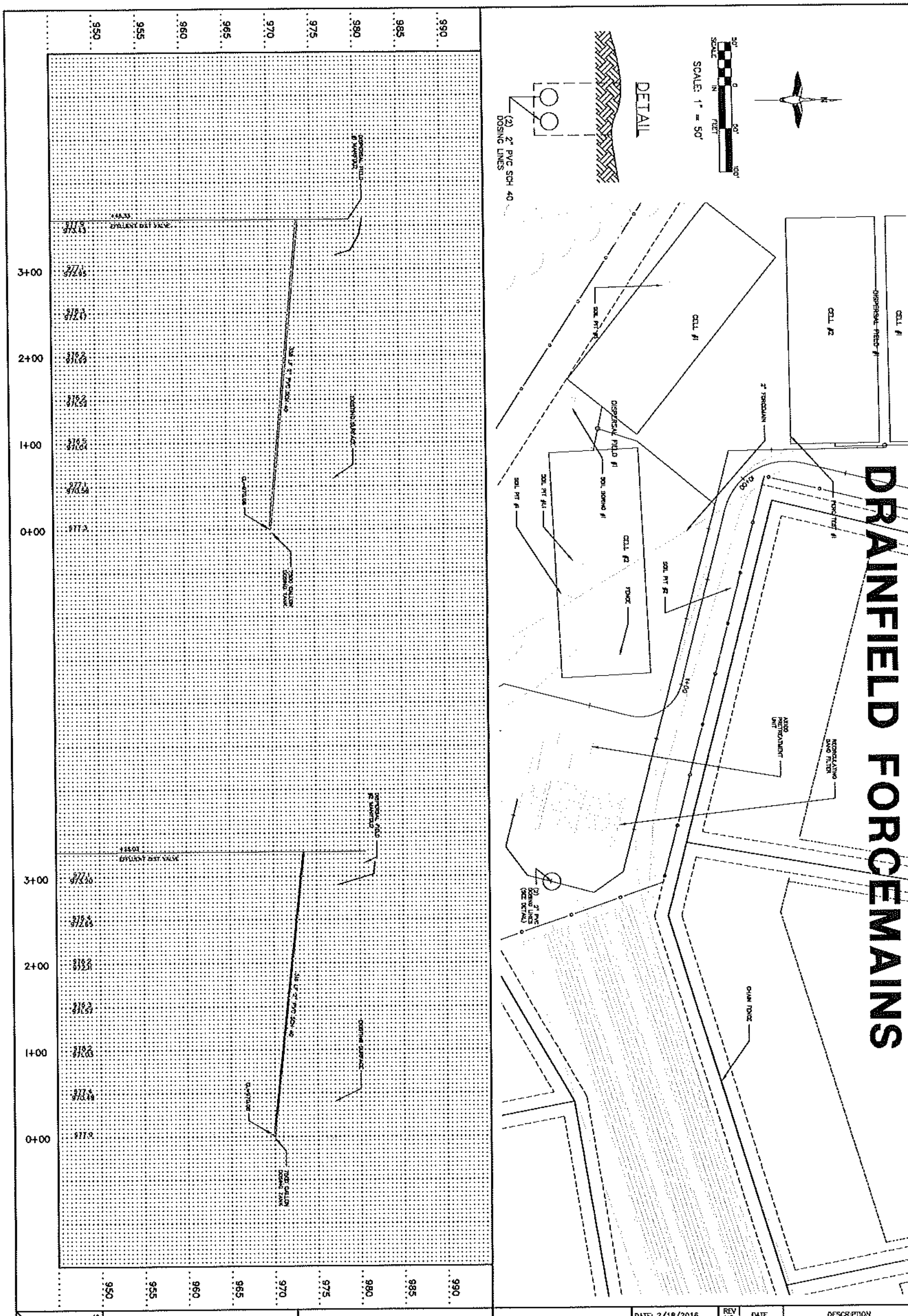
FRONTIER TRAILS
BALDWIN TOWNSHIP
SEPTIC SYSTEM MOD
PLAND AND PROFILE

SHEET NO. 9 / 14



SHEET NO.	
10	14

FRONTIER TRAILS
BALDWIN TOWNSHIP
SEPTIC SYSTEM MOD
PLAND AND PROFILE

BOGART, PEDERSON & ASSOCIATES, INC.
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DATE: 2/18/2016
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FILE NO.: 14-0104.00

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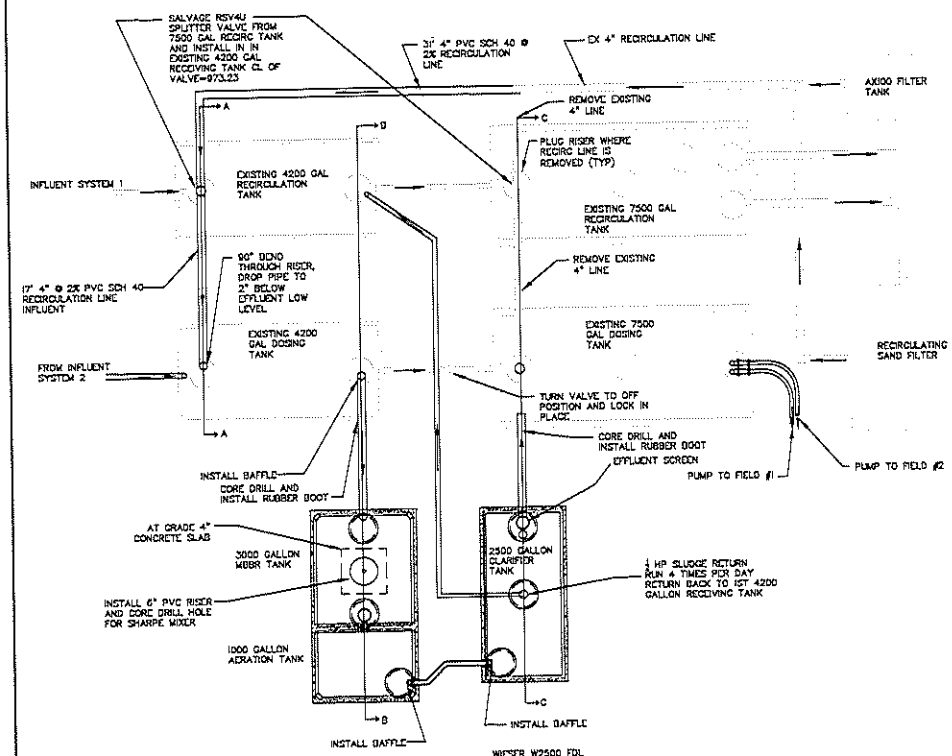
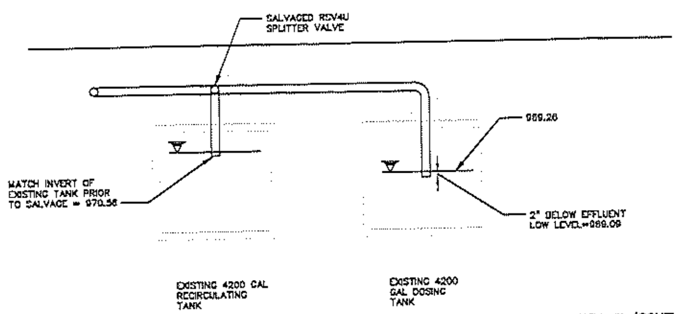
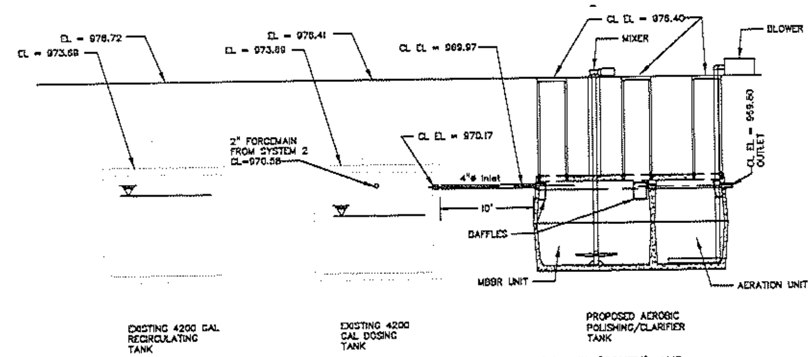


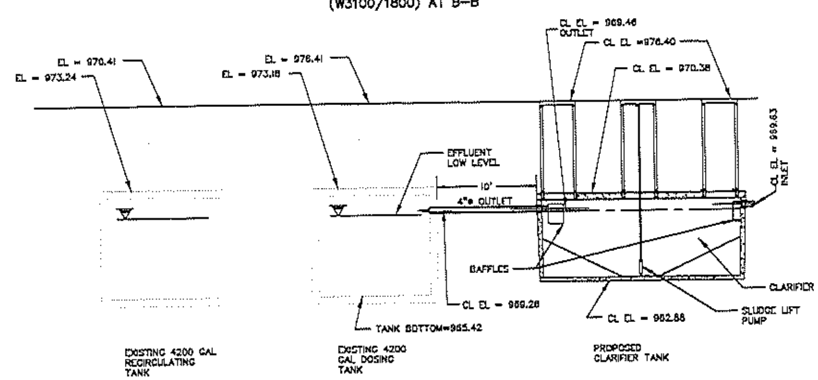
TOP VIEW OF RECIRCULATION & DOSING TANK SYSTEM #1 (SOUTH) AND NEW MBBR, AERATION AND CLARIFIER TANK



PROFILE VIEW OF 4200 GALLON RECIRCULATION & DOSING TANK SYSTEM #1 (SOUTH) AT A–A



PROFILE VIEW OF 4200 GALLON RECIRCULATION & DOSING TANK SYSTEM #1 (SOUTH) AND NEW MBBR/AERIFIER TANK (W3100/1800) AT B–B



PROFILE VIEW OF 7500 GALLON RECIRCULATION & DOSING TANK SYSTEM #1 (SOUTH) AND NEW CLARIFIER TANK (W2500) AT C–C

REV NO.	DATE	DESCRIPTION

DATE: 00/00/00
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Signed: Jon Bogart
Date: ______ Reg. No. 19900

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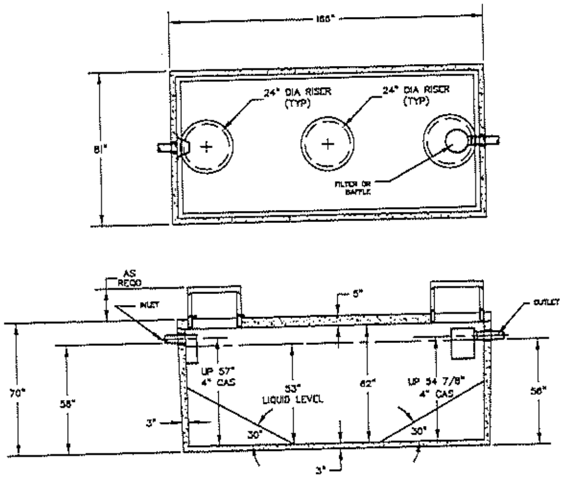
FRONTIER TRAILS
BALDWIN TOWNSHIP
SEPTIC SYSTEM MOD
PRO SEPTIC DETAILS

SHEET NO.
11
15



DIMENSIONS:
WALL: 3"
BOTTOM: 3"
COVER: 5"
MANHOLE: 24" I.D. PRECAST CONCRETE RISER
HEIGHT: 70" O.D.
LENGTH: 166" O.D.
WIDTH: 81" O.D.
BELOW INLET: 58" O.D.
LIQUID LEVEL: 53"
WEIGHT: 18,000 LBS.

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

INLET AND OUTLET BAFFLE AND FILTER: SEE DETAIL #10

LIQUID CAPACITY: 49.17 GAL/IN

HOLDING TANK:
OUTLET HOLE PLUGGED
ACTUAL CAPACITY: 2704 GALLONS

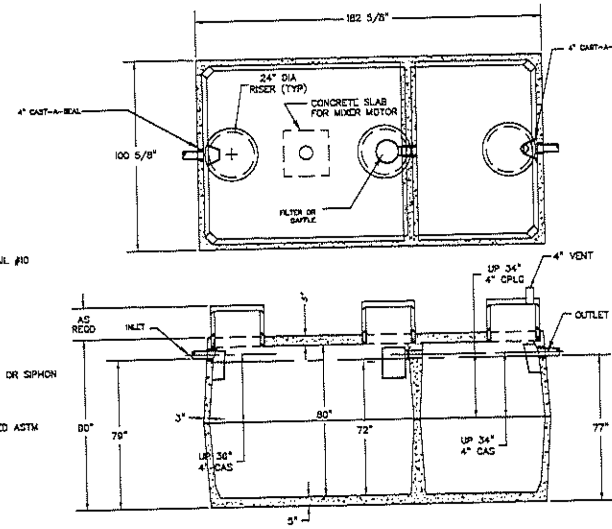
LOADING DESIGN:
8' 0" UNSATURATED SOIL

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

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

TANKS TO BE MANUFACTURED TO MEET OR EXCEED ASTM C-1227 REQUIREMENTS

W2500-FDL
TANK SPECIFICATIONS



DIMENSIONS:
WALL: 3"
BOTTOM: 5"
COVER: 5"
MANHOLE: 24" I.D. PRECAST CONCRETE RISER HEIGHT: 90" O.D.
LENGTH: 182-5/8 " O.D.
WIDTH: 100-5/8 " O.D.
BELOW INLET: 79 " O.D.
LIQUID LEVEL: 72" WEIGHT: 15,300 LBS PER SECTION

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

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

LIQUID CAPACITY:
41.67 GAL/IN (SEPTIC)
25.00 GAL/IN (PUMP)

LOADING DESIGN: 8'-0" UNSATURATED SOIL

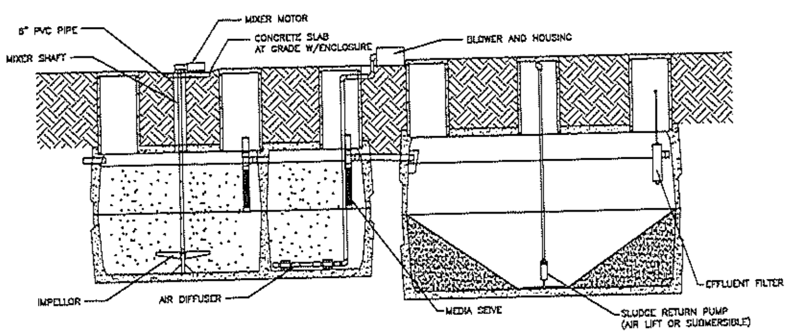
TANK CAN BE USED AS: SEPTIC/SEPTIC, SEPTIC/PUMP OR SEPTIC/SIPHON

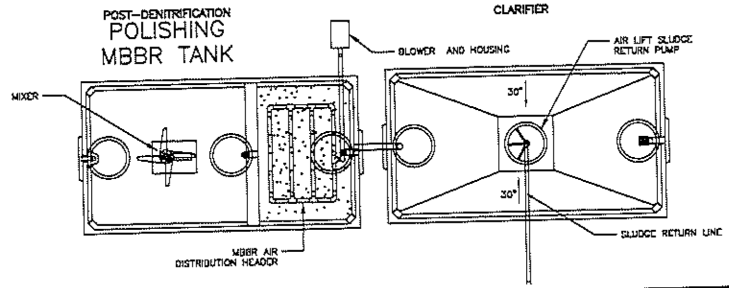
TANK: MIX DESIGN #9 (SMALL FIBER) CUSTOMIZED TANKS: FOR CUSTOM TANKS CONTACT WIESER CONCRETE

TANKS TO BE MANUFACTURED TO MEET OR EXCEED ASTM C-1227 REQUIREMENTS

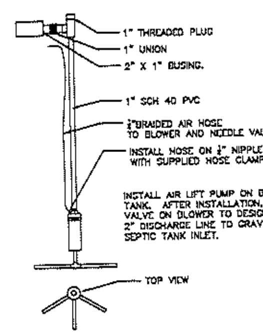
W3000/1800
TANK SPECIFICATIONS

MOVING BED BIOREACTOR POST DE-NITRIFICATION DESIGN



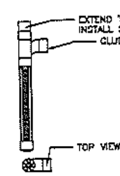


AIR LIFT SLUDGE RETURN PUMP



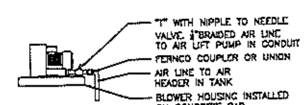
INSTALL AIR LIFT PUMP ON BOTTOM OF TANK. AFTER INSTALLATION, ADJUST NEEDLE VALVE ON BLOWER TO DESIGNED PUMP RATE. 2" DISCHARGE LINE TO GRAVITY FEED TO SEPTIC TANK INLET.

MBBR Biofilm Carrier Element Strainer/Sieve Information



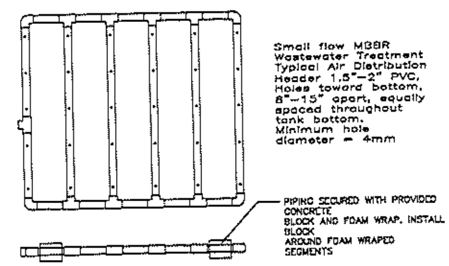
Standard Diameter: 4" (other sizes available)
Standard Material: SCH 40 PVC
Standard Length: 2.5' (30")
Standard Slot Size: 0.20"
Slots per circumference: 5 Typical Flow Range: 10-17 GPM/ft
–Dependent on biofilm growth, internal cleaning frequency
Note: Bottom end is capped, multiple or partial lengths may be used, top fitted with Access Tee and 4" PVC extension toward manhole access for maintenance ease.

TYPICAL BLOWER DETAIL



INSTALL BLOWER INSIDE PROVIDED HOUSING OR IN BUILDING. INSTALLED ABOVE GRADE TO PREVENT MOISTURE FROM ENTERING THE HOUSING. INSTALL AIR FILTER FOR EASY MAINTENANCE. COMPACT SUBGRADE PRIOR TO INSTALLING PAD TO PREVENT SETTLING. AIR LINE TO BE LESS THAN 75'

Typical MBBR Air Distribution Header (Length and width dependent on tank size)



Small flow MBBR Wastewater Treatment Typical Air Distribution Header 1.5"-2" PVC, Holes toward bottom, 8"-15" apart, equally spaced throughout tank bottom. Minimum hole diameter = 4mm

REV NO.	DATE	DESCRIPTION

DATE: 00/00/00
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DWG FILE:
FILE NO.: 14-0104.00

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Signed: Jon Bogart
Date: ______ Reg. No. 19900

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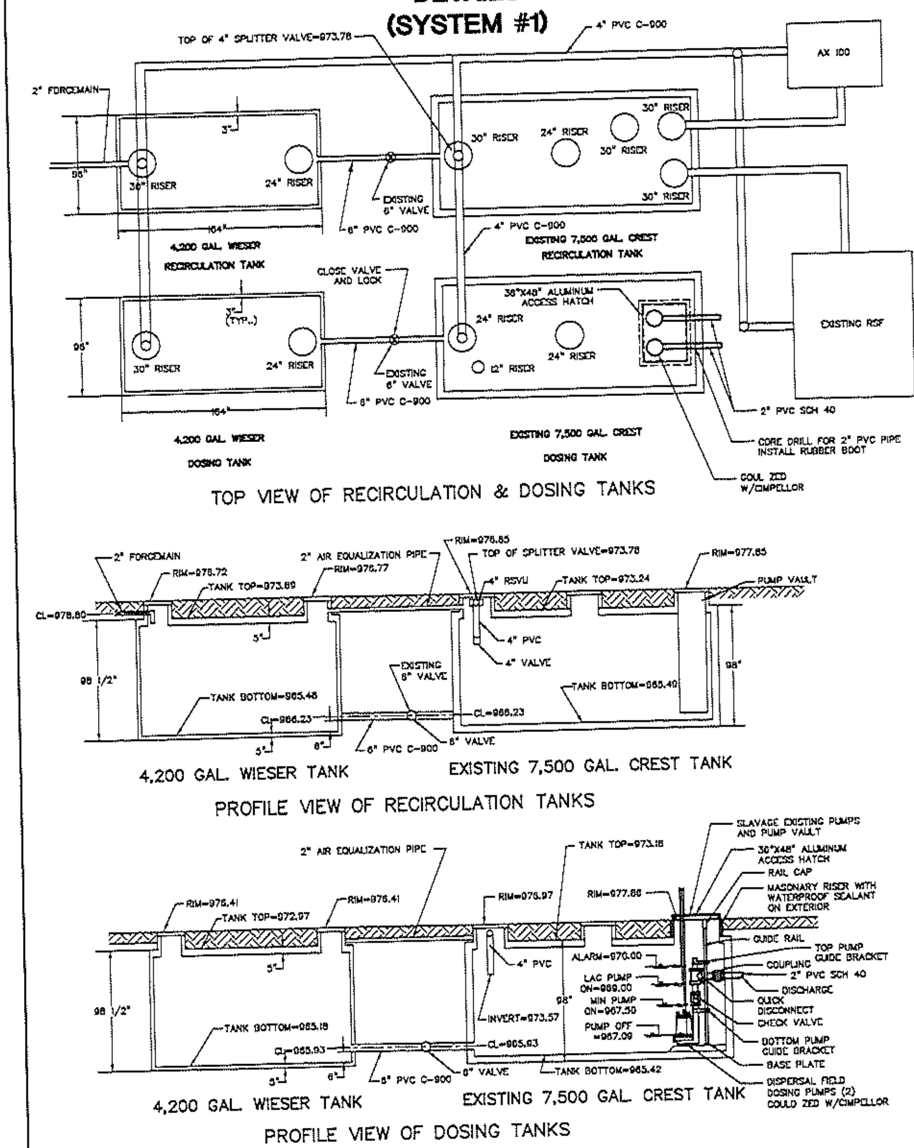
TEL: 763-262-8822 FAX: 763-262-8844

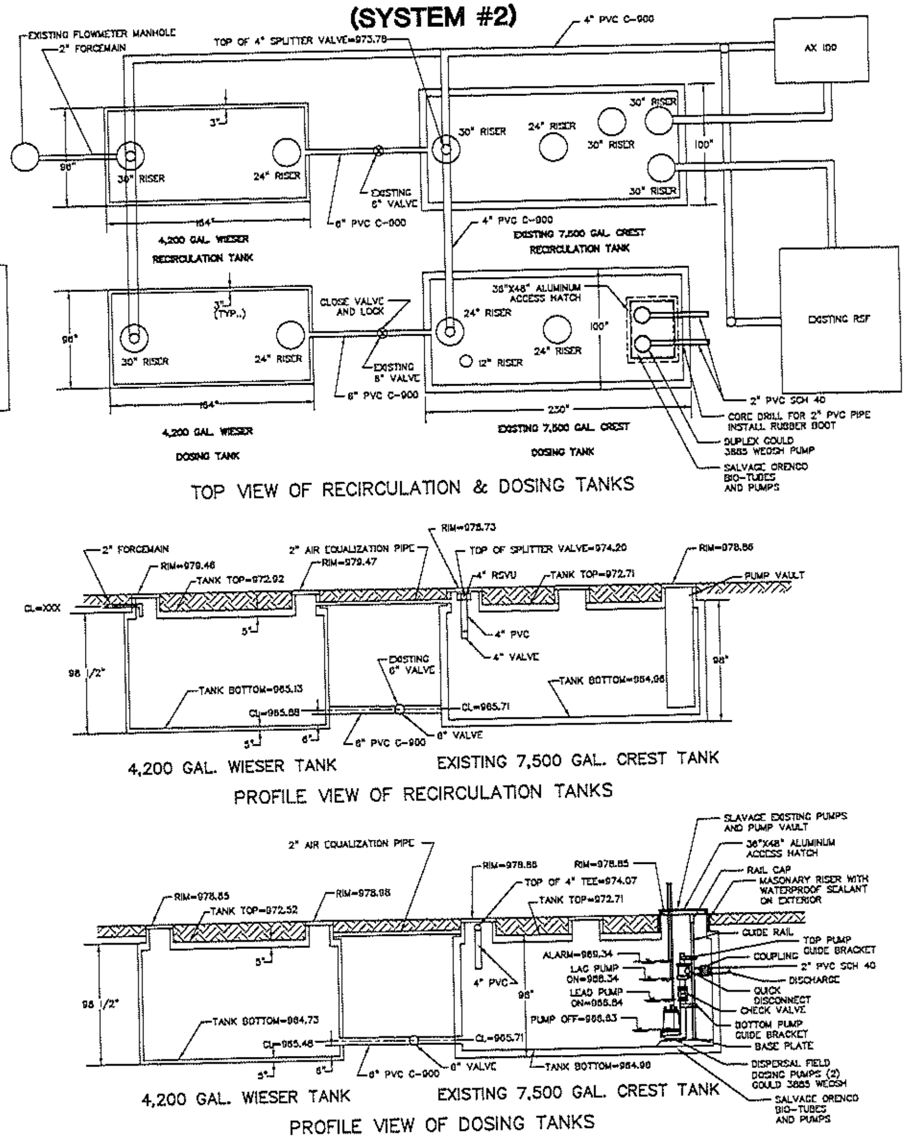
FRONTIER TRAILS
BALDWIN TOWNSHIP
SEPTIC SYSTEM MOD
PRO SEPTIC DETAILS

SHEET NO. 12 / 15

MODIFIED EXISTING SEPTIC SYTEM DETAILS (SYSTEM #1)



MODIFIED EXISTING SEPTIC SYTEM DETAILS (SYSTEM #2)



REV NO.	DATE	DESCRIPTION

DATE: 00/00/00
DESIGN BY: JKB
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DWG FILE:
FILE NO.: 14-0104.00

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Signed: Jon Bogart
Date: ________ Reg. No. 19900

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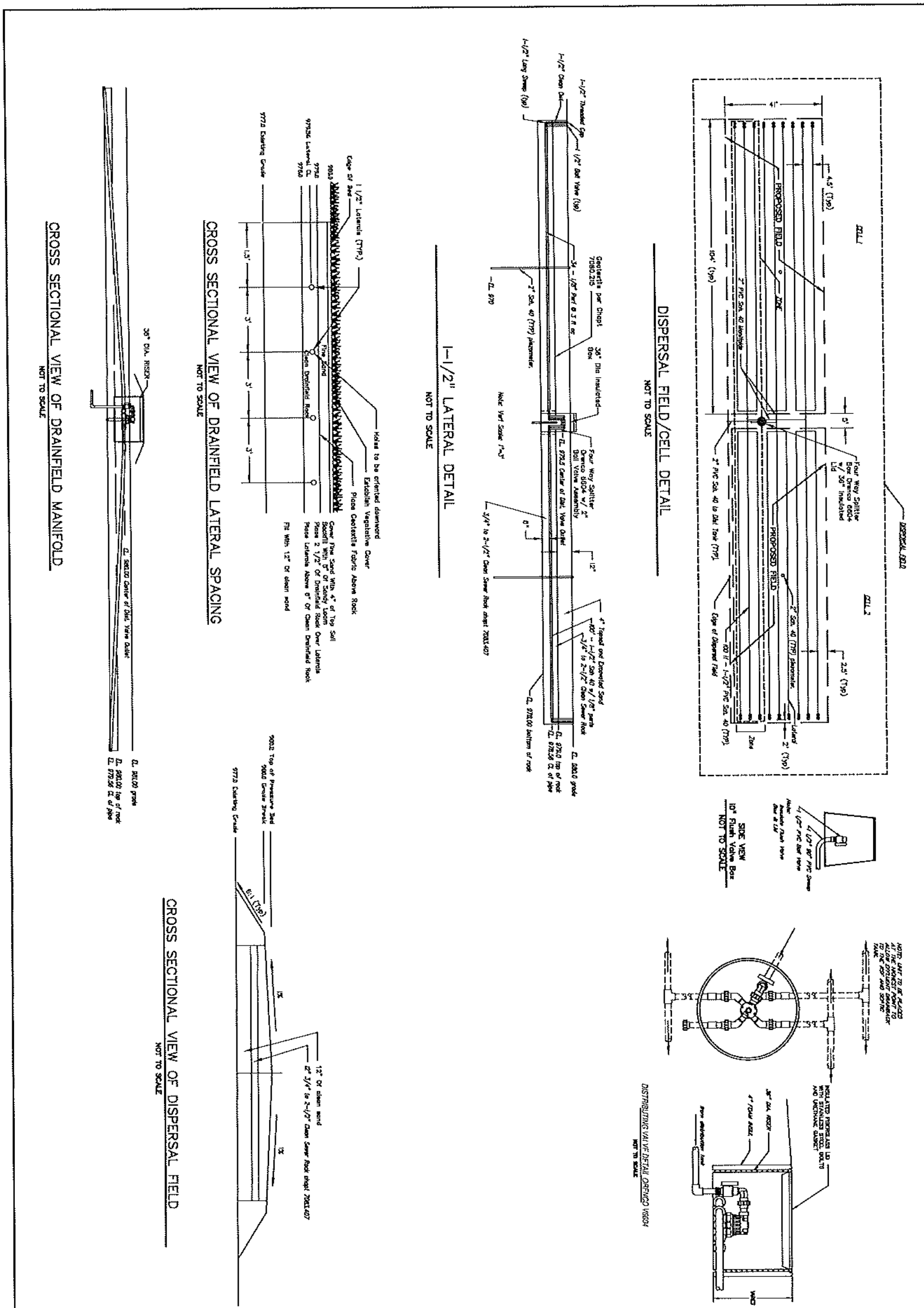
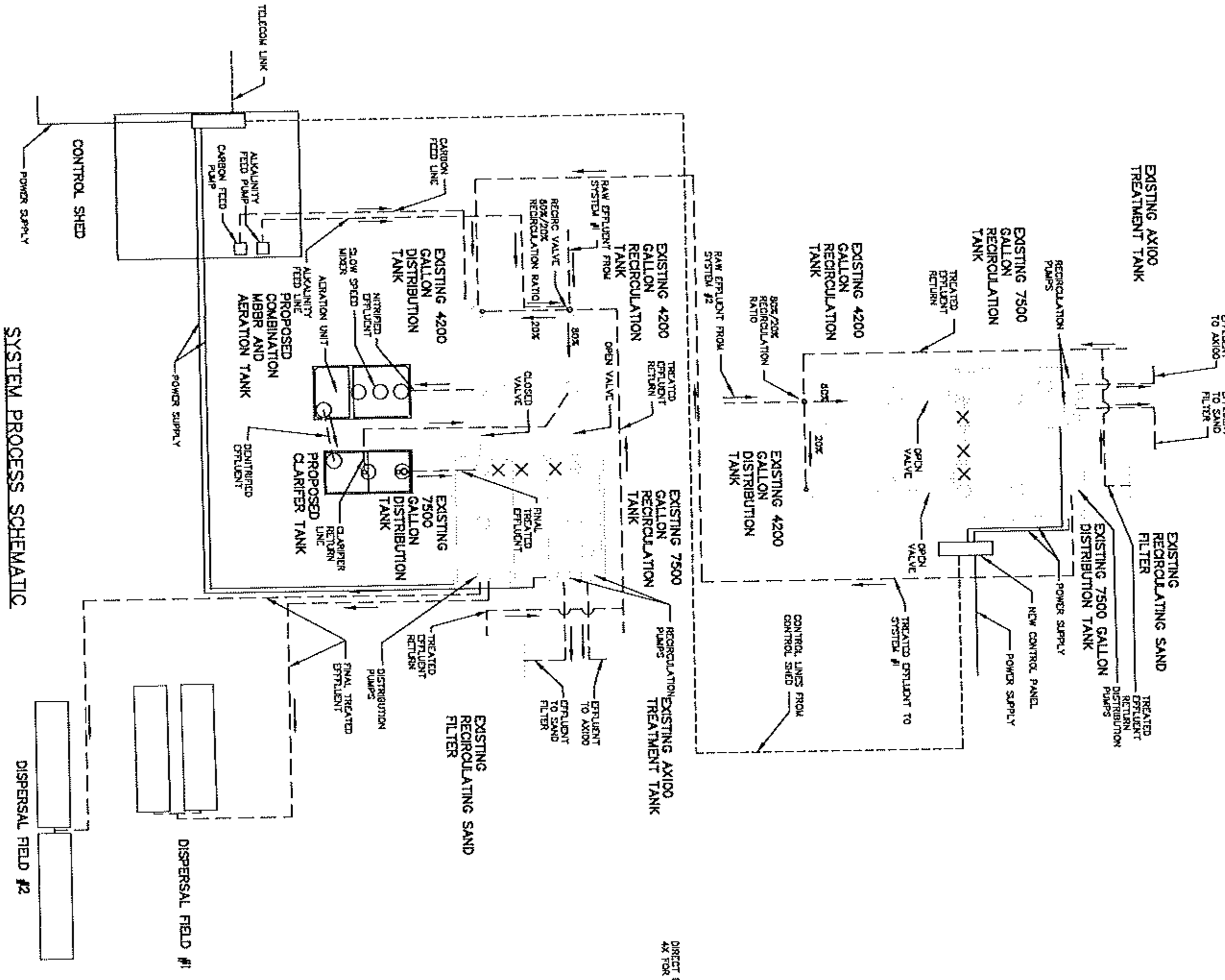
FRONTIER TRAILS
BALDWIN TOWNSHIP
SEPTIC SYSTEM MOD
PRO SEPTIC SYSTEM DETAIL

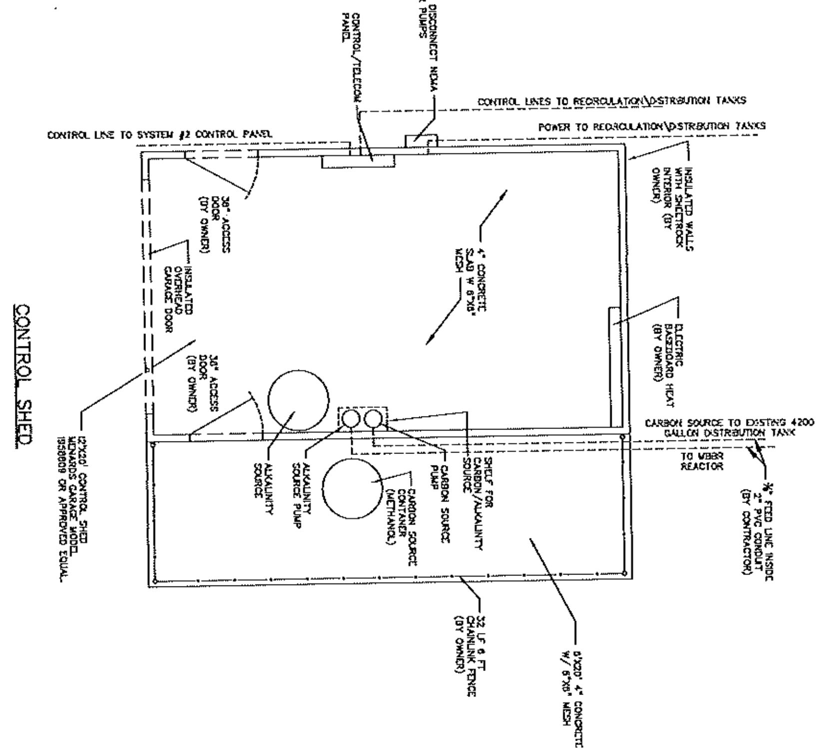
SHEET NO. 13 / 15



SHEET NO. 14 / 15	FRONTIER TRAILS BALDWIN TOWNSHIP SEPTIC SYSTEM MOD PRO DISPERSAL FIELDS	BOGART, PEDERSON & ASSOCIATES, INC. LAND SURVEYING CIVIL ENGINEERING MAPPING	I hereby certify that this plan, specification 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. Signed: Jon Bogart Date: ______ Reg. No. 19900

DATE: 00/00/00	REV NO.	DATE	DESCRIPTION
DESIGN BY: JXB			
DRAWN BY:			
CHECKED BY:			
DWG FILE:			
FILE NO.: 14-0104.00			





REV NO.	DATE	DESCRIPTION

DATE: 00/00/00
DESIGN BY: JKB
DRAWN BY:
CHECKED BY:
DWG FILE:
FILE NO.: 14-0104.00

I hereby certify that this plan, specification, 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.

Signed: Jon Bogart
Date: ________ Reg. No. 19900

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FRONTIER TRAILS
BALDWIN TOWNSHIP
SEPTIC SYSTEM MOD
SYSTEM DETAILS

SHEET NO. 15

15

APPENDIX C

SYSTEM SPECIFICATIONS

2006 SPECIFICATIONS

Part 1 - General

1 .01 Description of Site

This plan is being submitted for the plat known as Frontier Trails, located in the Northwest Quarter of Section 7, Township 35, Range 26, Sherburne County, MN. See attached maps in Appendix A.

1 .02 Overview of the Onsite Wastewater Treatment Systems

This project consists of adding two Advantex AX100 filters, one at each of the existing systems. The project will also consist of adding four 4,200 gallon flow equalization tanks in front of the four existing 7,500 gallon recirculation and dosing tanks and the necessary pumps and piping to connect the new Advantex AX100 filters and new flow equalization tanks with the existing system. The north and south system was designed to treat sewage from 20 homes and 21 homes, respectively. Average design flows for the north and south systems are 4,000 gpd and 4,200 gpd, respectively. Peak design flows for the north and south systems are 6,700 gpd and 7,035 gpd, respectively. The design will use the existing recirculation floats for both the existing RSF and the AX100 pumps. The existing floats are setup to time dose the pretreatment units. Flow distribution calculations estimate that 44% of the flow will be distributed to the RSF and 56% to the AX100. The recirculation pumps are designed to dose for 1.57 min./dose. Run time for average and peak flows are estimated at 16% and 27%, respectively.

Typical concentration of BOD_5, TSS, FOG and total nitrogen for residential sewage was determined by the EPA to be between 155-286, 155-330 mg/L, 70-105 mg/L and 26-75, respectively. Typical treatment from a recirculating geotextile filter will consist of removing >90% BOD_5 and TSS, and 60-80% total nitrogen. The purpose of the Advantex filter is to increase the longevity of the wastewater treatment system and reduce the amount of constituents released to the soil.

1 .03 Mode of Treatment

A. **Pretreatment** - Recirculating Advantex AX100 Geotextile Filter: Each AX100 filter pod is designed to treat an average flow of 2,500 gallons of septic effluent.

Part 2 - Treatment Process and System Description

2.01 Description of Treatment Process

A. **Pretreatment** - Recircultion tanks will serve the Advantex AX100 geotextile filter. The recirculation pumps will time dose the AX100 filter. The AX100 filters consist of preassembled fiberglass pods filled with geotextile filters. Within the geotextile filter, microorganisms will begin to multiply and thrive. These microorganisms consume sewage as a food source, breaking down organic matter in the sewage and destroying undesirable organisms living in the sewage.

2.02 Detailed Description of the Treatment System

A. **Recirculating Geotextile Filter**

A. A 4,200 gallon concrete tank and an existing 7,500 gallon concrete tank will serve as the recirculating tanks for the recirculating Advantex AX100

geotextile filter. One existing and one new screened pump vaults with dual alternating pumps will recirculate the effluent through the RSF and AX100 filters. The pumps are operating on a time controlled basis by means of a control panel. Three mercury floats are wired to the control panel and will control redundant off/timer on, timer override, high level water alarm functions. The filtered effluent will gravity drain out of each filter pod to a 4" Schedule 40 PVC drainback pipe. The filtered effluent will return to the existing recirculating splitter valve placed in an access riser of the existing 7,500 gallon recirculation tank. The splitter valve allows the returning filtrate to recirculate through the filters and back to the recirculation tank during low flow periods. During high flow periods the splitter valve directs the filtrate to the existing 7,500 gallon dosing tank for disposal to the drainfield. Effluent recirculation ratio can be controlled by adjusting the pump time or float settings. A 4:1 recirculation ratio is recommended. Details on the recirculating Ax100 filter, float settings, tank placement and design calculations are shown in the septic plans and in Appendix B.

2.03 Special Construction Considerations

A. All construction is to be in accordance with ISTS regulations. The installer of the system must be licensed by the MPCA, and demonstrate a knowledge of the system outlined within the plans.

B. System start up must be completed on all components of the system by the contractor before system completion. The system start up checklist in Appendix C must be completed and submitted to the designer or a representative of Orenco System, Inc. System start up must also be observed by the designer or a representative of Orenco System, Inc.

C. Infiltration - It is crucial to the operation of this system that infiltration of water from other sources, i.e., non watertight septic tanks, tank and riser joints, tank and building sewer pipe connection do not exist. All possible care and attention to the details of the following specifications must be adhered to. Orenco Systems, Inc material specification and installation guide is shown in Appendix D.

D. All drainfield areas must be roped or fenced off before road or grading construction begins.

E. All disturbed areas must be seeded and mulched as soon as it is complete to establish turf and protect the system from freezing during the winter months.

Part 3 - Maintenance and Monitoring

3.01 System Maintenance and Monitoring Program

A Sewage Management Plan is shown in Appendix E.

A. **Monitoring**
   a. Monitoring of the system is in accordance with the State Disposal System (SDS)

permit.

b. Semiannual monitoring of the treatment system is recommended. Schedule monitoring activities during both a summer month and a winter month.
c. Analytical testing of AX100 filter effluent should be performed biannually to include; BOD5, Total Suspended Solids, pH, and Total Nitrogen.

B. Contract - A maintenance contract with a licensed contractor or licensed firm must be in place at all times. The contract will be between the contracting individual or company and the development association or it's agent.

C. Geotextile Filter -

a. The AX100 filter will be checked semi annually for evidence of ponding or slow drain back, or freezing in the winter months.
b. Clean top of filter if sludge accumulation occurs.
c. The filter can be cleaned by holding the filter over the septic tank maintenance hole and spraying off any attached debris using a garden hose or high pressure washer. Water can be pumped from the dosing tank for use of cleaning the filter only.

D. Recirculation Tank - Check for sludge layer annually, if sludge layer is more than 2" then tank shall be pumped. Screened pump vaults will be removed and cleaned.

E. Dosing Tank - Check for sludge layer annually, if sludge layer is more than 2" then tank shall be pumped. Screened pump vaults will be removed and cleaned.

F. Pumps and Controls - Check every 6 months and adjust as necessary.

G. Record Keeping - The maintenance contractor shall record all maintenance activities. A maintenance report shall be sent to the association and the local unit of government.

3.02 **Installation Observation** - The installation of this system must be observed by the designer or a representative for the designer. Installation of the recirculating AX100 filter must be observed by a representative of Orenco System, Inc. The installer must call the designer and Orenco System, Inc. to setup system installation training, an observation schedule and receive observation requirements.

3.04 **Limitations** - Our investigation, layout, design and recommendations are based on data submitted. If conditions considerably different from those described in this report are encountered, we should be called to observe the conditions. If proposed construction is changed, we must be notified to evaluate the effect of the changes on the wastewater system.

3.05 **Disclaimer** - No claim of warranty is made beyond the manufacturers warranty for a specific part or item. Neither the designer, nor the installer will be held liable for failures do to unforeseen events, or misuse and neglect by the homeowner.

Greg S. Bowles
Bogart Pederson & Associates
License # 2399

SECTION 02100 - SITE PREPARATION AND DEMOLITION

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Site preparation and demolition work as specified and shown on drawings, including, but not necessarily limited to, the following:

1. Clearing, grubbing and demolition and removal of inplace structures and surfaces.
2. Locate and identify all utilities above and below ground in the field.
3. Remove, or disconnect, or abandon utility services as indicated in the plans or as directed in the field.
4. Abandon or remove all designated septic system components in accordance with MN Rules 7080
5. Obtaining and paying for permits required for execution of this work.

1.02 RELATED SECTIONS

A. Section 02105 - Earthwork.

B. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.03 SUBMITTALS

A. Demolition procedures and operational sequence for review and acceptance by the Engineer.

B. Record Drawings: Indicate points of disconnection and capping, or abandonment, or removal of existing utility services; include utility names, sizes and locations, relationship to permanent structures located on site and on adjacent property and certificates of severance of utility services from respective utility companies or owners.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable requirements of federal, state, and local laws, regulations and codes having jurisdiction at project site or applicable requirements of these standards and specifications, whichever is more stringent.

1.05 REFERENCES

A. Comply with the following codes, specifications and standards except where more stringent requirements are shown on the Drawings or specified herein:

1. Standard Utilities Specifications by the City Engineers Association of Minnesota.

2. MN Rules Chapter 7080

1.06 PROJECT CONDITIONS

A. Coordination: Coordinate this work with the work of other Sections to avoid any delay or interference with other work.

B. Nuisances: Keep dirt, dust, noise and other objectionable nuisances to a minimum. Use temporary enclosures, calcium chloride, coverings and sprinkling, or combinations thereof, as necessary to limit dust to lowest practicable level, except do not use water to the extent that it causes flooding, contaminated runoff, or icing.

C. Traffic: Conduct work to ensure minimum interference with vehicular or pedestrian traffic and to permit unencumbered access to site and adjacent properties.

1. Do not close or obstruct streets, sidewalks, alleys or other public passageways without permission from authorities having jurisdiction.

2. If required by governing authorities, provide alternate routes around closed or obstructed traffic ways.

D. Protections:

1. Prevent movement and settlement of adjacent structures. Install temporary barriers, fences, guard rails, enclosures, shoring, bracing, planking, barricades, lights, warning signs and other protections required to protect structures, utilities, landscaping, and other items that are to remain in place.

2. Protect bench marks movements and reference points from displacement or damage and, if displaced or damaged, replace at no cost to the owner.

3. Install and maintain required bracing, shoring and supports when removing structural elements and be responsible for safety and support of structure. If safety of structure appears to be endangered, cease operations and immediately notify the Engineer ad the owner; do not resume operations until safety is restored.

4. Place protective tape around dispersal field areas to keep traffic off.

SECTION 02100 - SITE PREPARATION AND DEMOLITION

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas in which work is to be performed. Report in writing to the Owner and Engineer all prevailing conditions that will adversely affect satisfactory execution of work. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Starting work constitutes acceptance of the existing conditions and this Contractor shall then, at his expense, be responsible for correcting all unsatisfactory and defective work encountered.

3.02 EROSION AND SEDIMENT CONTROL

A. Seed all disturbed areas within ten days of completion of all grading operations.

3.03 CLEARING

A. Remove trees, shrubs, stumps, bushes, vines, rubbish, undergrowth, deadwood as well as fences and incidental structures from entire site except as otherwise designated on the drawings to remain.

3.04 GRUBBING

A. Remove all stumps and roots in their entirety, brush, organic materials and debris. When indicated, such materials as topsoil and leaf mold, or other organic materials above the ground surface suitable for use as mulch or topsoil shall be salvaged and stockpiled.

3.05 UTILITIES

A. Contact local utility companies, (Gopher State One Call, 1 800 252 1166 or 651-454-0002), 48 hours minimum prior to start of demolition work. Confirm verbal notices and written notices. Verify locations of all utilities entering site and their locations on site.

B. Cooperate with utility companies, adjacent property owners, and other building trades in maintaining, protecting, rerouting or extending of utilities passing through work areas which serve structures located on project site and on adjacent properties.

C. Verify that utilities that are to be removed, capped or abandoned are turned off, or are disconnected, or are rerouted to new locations before starting demolition.

3.06 DEMOLITION

A. General:

1. Remove and demolish materials in orderly and careful manner.
2. If departures from drawing requirements are deemed necessary by Contractor, submit details and reasons therefore to the Engineer for action. Make no departures without prior written approval.
3. Repair or replace all demolition work performed in excess to that required, at no cost to the owner. Repair or replacement shall match and equal construction, condition, and finish existing at time of award of contract.

B. Remove following from locations to extent shown on drawings:

1. Designated utility services occurring within demolition areas, including disconnection, capping and complete removal or abandonment as shown and noted on drawings. Perform all abandonment and removal in accordance with MN Rules 7080.2500
2. Trees and their roots where they will interfere with new construction
3. Backfill and compact areas excavated and open pits and holes resulting from demolition operations. Comply with requirements specified in Section 02105 for backfill materials, compaction, and installation methods.

C. Rough grade site, within demolition areas, to meet adjacent contours and to provide positive drainage. Leave site in clean condition acceptable for performance of subsequent construction operations.

3.07 CLEAN-UP AND DISPOSAL

A. Transport trash, rubbish and debris daily from site and legally dispose of.

1. Remove and promptly dispose of contaminated, vermin infested, or dangerous materials encountered.
2. Do not burn or bury materials on site, unless otherwise approved by local authorities having jurisdiction and the owner.

B. Remove tools, equipment and protections when work is complete and when authorized to do so by local authorities having jurisdiction and the owner or the Owner's representative.

END OF SECTION

SECTION 02105 - EARTHWORK

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Common Excavation as directed by plans or by the engineer.

B. Trenching and backfilling for sanitary sewer, lift station and manholes.

C. Excavation for dispersal areas is covered under Section 02628 Dispersal Field

1.02 RELATED SECTIONS

A. Section 2100 - Site Preparation and Demolition

B. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.03 DEFINITIONS

A. Subgrade: The undisturbed earth or the compacted soil layer immediately below aggregate base, drainage fill, or topsoil materials.

C. Excavation consists of removal of material encountered to subgrade elevations indicated and subsequent backfill and/or disposal of materials removed.

D. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be at Contractor's expense.

1. In locations under pavements, buildings and other structures, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Engineer.

E. Subgrade Correction: When excavation has reached required subgrade elevations, notify Engineer, who will make an inspection of conditions. If Engineer determines that bearing materials at required subgrade elevations are unsuitable, continue excavation until suitable bearing materials are encountered and replace excavated material as directed by Engineer. When the depth of unsuitable material exceeds two feet below subgrade elevations, any additional excavation below said two foot level shall be considered subgrade correction. The Contract Sum may be adjusted by an appropriate Contract Modification.

1. Compensation for subgrade correction, as directed by the Engineer, will be

paid on basis of Conditions of the Contract relative to changes in work.

F. Structure: Buildings, foundations, slabs, tanks, curbs, or other man-made stationary features occurring above or below ground surface.

1.04 QUALITY ASSURANCE

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of authorities having jurisdiction.

B. Testing and Inspection Service: Owner may employ and pay for a qualified independent geotechnical testing and inspection laboratory to perform soil testing and inspection service during earthwork operations.

C. Retests of materials failing initial testing shall be paid for by the Contractor.

1.05 PROJECT CONDITIONS

A. Site Information: Data in subsurface investigation reports were used for the basis of the design and are available to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings. The Owner will not be responsible for interpretations or conclusions drawn from these data by Contractor.

1. Additional test borings and other exploratory operations may be performed by Contractor, at the Contractor's option; however, no change in the Contract Sum will be authorized for such additional exploration.

B. Existing Utilities: Locate existing underground utilities in areas of excavation work. If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.

1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

2. Do not interrupt existing utilities serving facilities occupied by Owner or others, during occupied hours, except when permitted in writing by Engineer and then only after acceptable temporary utility services have been provided.

a. Provide minimum of 48-hour notice to Engineer, and receive written notice to proceed before interrupting any utility.

3. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shutoff of services if lines are active.

C. Use of Explosives: Use of explosives is not permitted.

D. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.

1. Operate warning lights as recommended by authorities having jurisdiction.

2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

3. All barricades and traffic control devices required due to excavations in proximity to existing and/or newly constructed roadways shall be incidental to the site grading or common excavation quantities.

1.06 REFERENCES

A. Comply with the following codes, specifications and standards except where more stringent requirements are shown on the Drawings or specified herein:

1. Standard Utilities Specifications by the City Engineers Association of Minnesota.

2. MN Rules Chapter 7080

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. Satisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, SP, GC and SC. Dependent upon soil moisture conditions, subgrade correction methods may be required by the Engineer.

B. Unsatisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups ML, MH, CL, CH, OL, OH, and PT.

C. Aggregate Base Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, and natural or crushed sand.

D. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or

uncrushed gravel, with 100 percent passing a 1-1/2 inch sieve and not more than 5 percent passing a No. 4 sieve.

E. Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Excavation is unclassified and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.

3.02 STABILITY OF EXCAVATIONS

A. General: Comply with local codes, ordinances, and requirements of agencies having jurisdiction.

B. Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

3.03 DEWATERING

A. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

a. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey stormwater and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

3.04 STORAGE OF EXCAVATED MATERIALS

A. Stockpile excavated materials acceptable for backfill and fill where directed.

Place, grade, and shape stockpiles for proper drainage.

1. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.

2. Dispose of excess excavated soil material and materials not acceptable for use as backfill or fill.

3.05 EXCAVATION FOR PAVEMENTS

A. Cut surface under pavements to comply with cross-sections, elevations and grades as indicated.

3.06 TRENCH EXCAVATION FOR PIPES AND CONDUIT

A. Excavate trenches to uniform width, sufficiently wide to provide ample working room and a minimum of 6 to 9 inches of clearance on both sides of pipe or conduit.

B. Excavate trenches and conduit to depth indicated or required to establish indicated slope and invert elevations and to support bottom of pipe or conduit on undisturbed soil. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

1. Where rock is encountered, carry excavation 6 inches below required elevation and backfill with a 6-inch layer of crushed stone or gravel prior to installation of pipe.

2. For pipes or conduit less than 6 inches in nominal size, and for flat-bottomed, multiple-duct conduit units, do not excavate beyond indicated depths. Hand-excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.

3. For pipes and equipment 6 inches or larger in nominal size, shape bottom of trench to fit bottom of pipe for 60 degrees (bottom 1/6 of the circumference). Fill depressions with tamped sand backfill. At each pipe joint, dig bell holes to relieve pipe bell of loads ensure continuous bearing of pipe barrel on bearing surface.

3.07 SUBGRADE CORRECTION

A. The presence of unsuitable and/or saturated subgrade soils, not anticipated in the design process, will require removal if so directed by the Engineer. Compensation for subgrade correction will be based on a negotiated price in

accordance Conditions of the Contract relative to changes in work.

B. Subgrade Correction is defined in paragraph 1.03D. In general, subgrade correction will consist of removal of unsuitable and/or saturated soils to a depth as directed by the Engineer, placement Type V geotextile fabric at the bottom of the excavation and replacement of unsuitable soils with granular soil to the prescribed subgrade elevations.

3.08 COLD WEATHER PROTECTION

A. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

3.09 BACKFILL AND FILL

A. General: Place soil material in layers to required subgrade elevations, for each area classification listed below, using materials specified in Part 2 of this Section, and as noted in the Plans.

1. Under grassed areas, use satisfactory excavated or borrow material.

2. Under piping and conduit and equipment, use aggregate materials where required over rock bearing surface and for correction of unauthorized excavation. Shape excavation bottom to fit bottom 60 degrees of cylinder.

B. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Inspection, testing, approval, and recording locations of underground utilities have been performed and recorded.

2. Removal of concrete formwork.

3. Removal of trash and debris from excavation.

3.10 PLACEMENT AND COMPACTION

A. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

1. When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact

to required depth and density.

B. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

C. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen or contain frost or ice.

D. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

E. Control soil and fill compaction in accordance with the Method of Quality Compaction (Visual Inspection). Correct improperly compacted areas or lifts as directed by Engineer if soil density is inadequate.

1. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.

a. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

b. Stockpile or spread soil material that has been removed due to moisture content too high for compaction. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

3.11 GRADING

A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated or between such points and existing grades.

B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes and as follows:

1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 foot above or below required subgrade elevations.

2. Walks: Shape surface of areas under walks to line, grade, and cross-section, with finish surface not more than 0.10 foot above or below required subgrade elevation.

3. Pavements: Shape surface of areas under pavement to line, grade, and cross-section in accordance with the provisions of Mn/DOT 2105.

C. Compaction: After grading, compact subgrade surfaces in accordance with the Method of Quality Compaction (Visual Inspection).

3.12 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Allow testing service to inspect and approve each subgrade and fill layer before further backfill or construction work is performed.

3.13 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

D. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.14 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal from Owner's Property: Remove waste materials, including unacceptable excavated material, trash, and debris, and dispose of it off Owner's property.

B. Excess excavated material may be spread on the site as directed by the engineer.

END OF SECTION

2016 SPECIFICATIONS

SECTION 02575 – SEEDING AND EROSION CONTROL

PART 1 - GENERAL

1.01 GENERAL

A. Related requirements specified elsewhere:

1. Site Preparation and Site Demolition: Section 2100.
2. Earthwork: Section 02105.
3. Mn/DOT Standard Specification for Construction, Current Edition and all current Supplemental Specifications thereto.
4. MPCA Minnesota NPDES/SDS General Storm-water Permit, Permit No: MN R100001, wq-strm2-51.

B. The Contractor shall comply with all applicable laws, ordinances, regulations, orders, and decrees pertaining to erosion and sediment control affecting the conduct of the work. The contractor shall obtain the National Pollution Discharge Elimination System (NPDES) permit prior to starting work. The owner and operator shall submit a completed application form (or a photocopy thereof) with the appropriate fee for project size to the Minnesota Pollution Control Agency (MPCA) for each project which disturbs one (1) or more acres of land. The Owner and Operator are Permittee(s). The owner who signs the application is a Permittee and is responsible for compliance with all terms and conditions of this permit. The operator (usually the general contractor) who signs the application is a Permittee of this permit and is jointly responsible with the owner for compliance with portions of the permit outlined in Section 2.01.

1. Permit Coverage - The commencement of any construction activity (e.g., land disturbing activities) covered under the permit is prohibited until coverage becomes effective or, if applicable, until the MPCA has issued an individual NPDES/SDS construction storm water permit for the project.

   (a) Permit coverage will become effective seven (7) days after the postmarked date of the completed application form except for projects disturbing 50 acres or more, that have a discharge point on the project that is within 2000 feet of, and flows to, a special water or waters listed as impaired under section 303(d) of the federal Clean Water Act, the applicants must submit a completed application and SWPPP to the MPCA at least thirty (30) days prior to the commencement of construction activities. MPCA staff will review the SWPPP submitted with the completed application and unless the Permittee is notified in writing that the SWPPP does not meet the general permit requirements, permit coverage will become effective 30 days after the postmarked date or MPCA date-stamp (whichever is first) of the completed application.

(b) In accordance with MPCA protocol Permittee(s) will receive a permit letter and certificate acknowledging permit coverage, usually within 30 days of the postmarked date of the completed application.

i. No work shall be initiated until the permit card has been posted on site by the contractor or the contractor verifies to the Engineer that the permit has been applied for.

2. The Contractor shall schedule and conduct construction activities in a manner that will minimize soil erosion. The contractor shall comply by the requirements herein regardless whether an NPDES permit for the work is required.

1.02 General NPDES Construction Activity Requirements

1. Stormwater Pollution Prevention Plan (SWPPP)

(a) The Permittee(s) must implement the SWPPP and the requirements of this part. The Best Management Practices (BMPs) identified in the SWPPP and in this permit must be installed in an appropriate and functional manner.

2. Erosion Prevention Practices

(a) The Contractor shall install temporary erosion control measures in areas tributary to public waters before construction in a drainage area.

(b) The Contractor shall schedule and install temporary and permanent erosion control measures, construct drainage facilities, finish earth work operations, place topsoil, establish turf, and conduct other Contract work that will contribute to the control of erosion and sedimentation. Unless precluded by snow cover, all exposed soil areas with a continuous positive slope within 200 feet of surface waters, or from a curb, gutter, storm sewer inlet, temporary or permanent drainage ditch, or other storm water conveyance system, shall have temporary protection or permanent cover for the exposed soil areas within the following time frames (For the purposes of this provision, exposed soil areas do not include stockpiles or surcharge areas of sand, gravel, aggregate, concrete, or bituminous.):

Type of Slope: Temporary protection or permanent cover where the area has not been, or will not be, worked by the Contractor for 7 days

The bottom of temporary or permanent drainage ditches constructed to drain water from a construction site must be stabilized within 200 feet of surface waters. Stabilization shall be initiated within 24 hours of connecting the drainage ditch to an existing gutter, storm sewer inlet,

drainage ditch, or other storm water conveyance system that discharges to surface waters and shall be completed within 5 calendar days.

The Contractor may limit the surface area of erodible soil that can be exposed to possible erosion at any one time when the permanent erosion control features are not completed and operative.

(c) The normal wetted perimeter of any temporary or permanent drainage ditch that drains water from a construction site, or diverts water around a site, must be stabilized within 200 lineal feet from the property edge, or from the point of discharge to any surface water. Stabilization must be completed within 24 hours of connecting to a surface water.

(d) Pipe outlets must be provided with temporary or permanent energy dissipation within 24 hours of connection to a surface water.

3. Sedimentation Control Practices

(a) Sediment control practices must minimize sediment from entering surface waters, including curb and gutter systems and storm sewer inlets.

i. Temporary or permanent drainage ditches and sediment basins that are designed as part of a treatment system (e.g., ditches with rock check dams) require sediment control practices only as appropriate for site conditions.

ii. If the down gradient treatment system is overloaded, additional upgradient sediment control practices must be installed to eliminate the overloading, and the SWPPP must be amended to identify these additional practices.

iii. In order to maintain sheet flow and minimize rills and/or gullies, there shall be no unbroken slope length of greater than 75 feet for slopes with a grade of 3:1 or steeper.

(b) Sediment control practices must be established on all down gradient perimeters before any upgradient land disturbing activities begin. These practices shall remain in place until final stabilization has been established.

(c) The timing of the installation of sediment control practices may be adjusted to accommodate short-term activities such as clearing or grubbing, or passage of vehicles. Any short-term activity must be completed as quickly as possible and the sediment control practices must be installed immediately after the activity is completed. However,

sediment control practices must be installed before the next precipitation event even if the activity is not complete.

(d) All storm drain inlets must be protected by appropriate BMPs during construction until all sources with potential for discharging to the inlet have been stabilized.

(e) Temporary soil stockpiles must have silt fence or other effective sediment controls, and cannot be placed in surface waters, including storm water conveyances such as curb and gutter systems, or conduits and ditches.

(f) Vehicle tracking of sediment from the construction site must be minimized by BMPs such as stone pads, concrete or steel wash racks, or equivalent systems. Street sweeping must be used if such BMPs are not adequate to prevent sediment from being tracked onto the street.

4. Vehicle Tracking

(a) The Contractor shall minimize vehicle tracking of sediment or soil off site at locations where vehicles exit the construction site onto paved surfaces. Tracked sediment shall be removed from paved surfaces, which do not drain back into the construction site, within 24 hours of discovery.

5. Related Work

(a) The Contractor shall control drainage and erosion on the work related to the Project including: haul roads, temporary construction, waste disposal sites, plant and storage locations, and borrow pits other than commercially operated sources. The Contractor shall maintain the area, shape the area to allow storm runoff with minimum erosion, replace topsoil, and establish vegetative cover to the satisfaction of the Engineer on areas where the potential for pollution has been increased due to the Contractor's operations.

6. Quality Control

(a) The contractor shall be responsible for maintaining a quality control program to ensure that erosion is controlled, that sedimentation is prevented and that provisions of permits are adhered to. The quality control program shall consist of:

i. Ensuring that permit requirements related to the contractors construction activities are adhered to.
ii. Conducting the inspections required in the NPDES permit.
iii. Maintaining the NPDES inspection log

iv. Ensuring that erosion control is incorporated into the work in a timely manner and that disturbed areas are stabilized with mulch/seed or vegetative cover on a section by section basis.
v. Ensuring that temporary erosion control devices are maintained.
vi. Ensuring that temporary erosion control devices are removed when they are no longer necessary.

(b) The contractor shall have a competent individual available to the project to conduct the quality control program. The Contractors quality control and inspection procedures shall be subject to review by the Engineer. NPDES inspection records shall be maintained by the contractor at the project site and made available at all times for verification by the Engineer. Records of each inspection and maintenance activity shall include:

i. Date and time of inspections;
ii. Name of person(s) conducting inspections;
iii. Findings of inspections, including recommendations for corrective actions;
iv. Corrective actions taken (including dates, times, and party completing maintenance activities);
v. Date and amount of all rainfall events greater than 1/2 inch (0.5 inches) in 24 hours; and
vi. Documentation of changes made to the SWPPP.

(c) All erosion prevention and sediment control BMPs must be inspected to ensure integrity and effectiveness. All nonfunctional BMPs must be repaired, replaced, or supplemented with functional BMPs. The Permittee(s) must investigate and comply with the following inspection and maintenance requirements:

i. All silt fences must be repaired, replaced, or supplemented when they become nonfunctional or the sediment reaches 1/3 of the height of the fence. These repairs must be made within 24 hours of discovery, or as soon as field conditions allow access.
ii. Temporary and permanent sedimentation basins must be drained and the sediment removed when the depth of sediment collected in the basin reaches 1/2 the storage volume. Drainage and removal must be completed within 72 hours of discovery, or as soon as field conditions allow access. Surface waters, including drainage ditches and conveyance systems, must be inspected for evidence of sediment being deposited by erosion. The Permittee(s) must remove all deltas and sediment deposited in surface waters, including drainage ways, catch basins, and other drainage systems, and restabilize the areas where

sediment removal results in exposed soil. The removal and stabilization must take place within seven (7) days of discovery unless precluded by legal, regulatory, or physical access constraints. The Permittee shall use all reasonable efforts to obtain access. If precluded, removal and stabilization must take place within seven (7) calendar days of obtaining access. The Permittee is responsible for contacting all local, regional, state and federal authorities and receiving any applicable permits, prior to conducting any work.

7. Erosion Control Schedule

   (a) The Contractor shall prepare and submit a weekly schedule of proposed erosion control activities for the Engineer's approval. The Engineer may require schedules to be submitted orally or in writing. The schedule shall provide a discussion of:

      i. Proposed erosion control installations and when they will be installed.
      ii. Areas ready for permanent turf establishment and when it will be accomplished.
      iii. Grading operations and how erosion control will be incorporated into the work.
      iv. Repair or maintenance required on erosion control installations and when it will be accomplished.
      v. Proposed erosion control measures during periods of suspension of work.

8. Compensation

   (a) The Contractor will receive compensation for erosion control as provided for in the Contract. All other expenses incurred in complying with these provisions shall be borne by the Contractor. Temporary and permanent erosion or pollution control measures ordered by the Engineer, which are necessitated by additional Contract work will be paid for at the appropriate Contract prices for like work or as Extra Work in the absence of comparable items of work. All maintenance of erosion and sediment control measures, including repair and/or replacement of failed measures, are considered incidental to the contract item.

9. Withholding of Payment—Noncompliance

   (a) If the Contractor fails to install erosion or sediment control measures ordered by the Engineer, the Engineer may withhold payment from related work until the control measures are undertaken by the Contractor. When the contractor fails to conduct the quality control program, doesn't conduct the inspections required in the NPDES permit, or fails to take

action ordered by the Engineer to remedy erosion or sediment control problems: The Engineer shall issue a written order to the Contractor. The Contractor shall respond within 24 hours with sufficient personnel, equipment and/or materials and conduct the required work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Silt Fence

1. Silt fence must be of a type specified in the project plans and details and must conform to Mn/DOT 3886.0.
2. Geotextile shall be uniform in texture and appearance and shall have no defects, flaws, or tears that would affect its physical properties. It shall contain sufficient ultraviolet rays (U.V.) inhibitor and stabilizers to provide a minimum two year service life from outdoor exposure.
3. Fastening and sewing methods shall be consistent with Mn/DOT specification 3886.0 for heavy duty, machine sliced and preassembled type silt fence.

B. Erosion Control Blanket

1. The contractor must supply an erosion control blanket of the type specified in the project plans and details. Erosion control blankets shall conform to Table 3885-1 of the Mn/DOT of the standard specification manual and the following requirements:

   (a) Each erosion control blanket shall consist of a uniform web of interlocking fibers with net backing. The blanket shall be of uniform thickness with the material fibers being evenly distributed over the entire area of the blanket. All blankets shall be smolder resistant.
   (b) The net backing on each blanket shall consist of polypropylene mesh. For Category 1 blankets, the net backing shall start to break down after one month with 80 percent breakdown occurring within three months. For Category 2 and 3 blankets, the netting shall contain sufficient UV stabilization for breakdown to occur within a normal growing season. For Category 4 and 5 blankets, the netting shall be UV stabilized to provide a service life of two to three years. For blankets designated as 2S, the fiber material shall be sandwiched between an attached top and a bottom layer of net backing.

C. Rip-Rap (not used)

D. Sedimentation Logs

1. Type 3 Ditch check shall consist of two components; wood excelsior filled roll, placed on top of a Category 3, specification 3885 erosion control blanket.
2. The Bioroll shall consist of wood excelsior that has been compressed and stuffed into a polyester or plastic netting.

E. Seeding and Fertilizer

1. Fertilizer shall be delivered to the site in bags, or other convenient containers, each labeled and bearing the name, trademark, and warranty of the producer.
2. Seed shall be labeled in accordance with the U.S. Department of Agriculture Rules and Regulations and shall be furnished in sealed standard containers.
3. Grass seed shall consist of the species listed below; the aggregate percentage of material other than grass seed not exceeding one (1) percent of the total weight of the mixture.

   (a) Mn/DOT Mix 260 Seed Mixture. (General Seeding)

4. Application Rates: 100 Pounds per acre.

PART 3 - EXECUTION

3.01 PROCEDURE

A. Silt Fence

1. The geotextile of the heavy duty silt fence shall be attached to the upstream side of the net backing. The bottom edge of the geotextile shall be buried at least six inch deep in a vertical trench with the soil pressed firmly against the embedded geotextile. The geotextile of the machine sliced silt fence shall be inserted by machine in a slit in the soil eight to 12 inch deep. The slit shall be created such that a horizontal chisel point at the base of a soil slicing blade slightly disrupts soil upward as the blade slices through the soil. The geotextile shall be mechanically inserted directly behind the soil slicing blade in a simultaneous operation, achieving consistent placement and depth. No turning over (plowing) of soil is allowed for the slicing method. Compact the soil immediately next to the silt fence fabric by operating the wheels of a tractor or skid steer on each side of the silt fence a minimum of two times. The bottom edge of the geotextile on the preassembled silt fence shall be buried at least six inches deep in a vertical trench and the soil pressed firmly against the embedded geotextile.

2. Each post shall be securely fastened to the geotextile by zip ties, clips or staples suitable for each purpose. Standard T metal posts with a welded plate shall be used on the machine sliced and heavy duty installations. Wooden posts used on the preassembled silt fence shall have a sharpened end and shall protrude below the bottom of the geotextile to allow for a minimum of 18 inch embedment. Maximum post spacing shall be eight foot for heavy duty; six foot for machine sliced and six foot for preassembled. When machine sliced is used for ditch check installations the maximum post spacing shall be four foot.

B. Erosion Control Blanket

1. The material fiber in each blanket shall be securely attached to the net backing to prevent movement of the fiber in relation to the netting. For blankets consisting of three inch material fibers, the blanket shall be fastened together at a spacing not to exceed two inches. For blankets consisting of six inch material fibers, the blanket shall be fastened together at a spacing not to exceed four inches.

2. The staples used to anchor Category 1 and 2 blankets shall be U shaped, 11 gauge or heavier steel wire having a span width of one inch and a length of six inches or more from top to bottom after bending. Staples used to anchor Category 3, 4 and 5 blankets shall have a minimum length of eight inches .

C. Rip-Rap

1. Random Riprap

(a) Random riprap shall be positioned in a manner that will provide uniform distribution of the various sizes of stone and produce a dense, well-keyed layer of stones with the least practical quantity of void space. The surface shall be leveled as necessary, to produce a reasonably uniform appearance and the required thickness.

2. Hand-Placed Riprap

(a) The stones for hand-placed riprap shall be firmly embedded in the foundation material, with the axis of the stone that most nearly approximates the specified thickness of riprap laid perpendicular to the foundation slope. Stones shall be laid with minimum practicable quantity of space between them and positioned to stagger the joints up the slope. Each stone shall be so placed that its mass is carried by the foundation material as well as adjacent stones. The ends and edges of each riprap area shall be well defined using selected stones set to line and grade. After the larger stones have been laid, the spaces between the stones shall be filled with firmly seated, smaller stones to produce a uniform surface.

D. Sedimentation Logs

1. The erosion control blanket shall be rolled out across the ditch and trenched in/on the upgrade side. The blanket shall be stapled with eight inch staples at a spacing of one foot on center. Dimensions of each roll shall be approximately six inches in diameter by 12 feet long. The bioroll shall be anchored with wooden stakes. The stakes shall be nominal 2 x 2 inch cross section, at least 18 inches long and with a pointed end. Maximum spacing between the stakes shall be two feet.

E. Seeding and Fertilizer

1. All existing vegetated areas disturbed by construction activities shall be fertilized and seeded.

2. Fertilizer or seed which has become wet or otherwise damaged in transit or in storage will not be acceptable.

3. Upon completion of spreading topsoil to the depth specified, the surface shall be hand raked or other means used that will provide a comparable job of fine grading prior to seeding. If the topsoil has become packed after spreading, it shall be disked and harrowed until the surface has been thoroughly loosened to a depth of three to four inches, after which it shall be fertilized and raked as specified above.

4. The seed shall be uniformly distributed over all disturbed areas inside the construction limits by sowing half the seed in one direction; the balance at right angles to the first. The seed shall then be covered to an average depth of 1/4 inch to 1/2 inch by means of disc anchoring. Seeding shall not be done during windy weather.

5. All seeding work shall be dormant seeding.

6. When conditions are such by reason of drought, high winds, excessive moisture or other factors, that satisfactory results are not likely to be obtained, the work shall be stopped and it shall be resumed only when conditions are favorable again, or when approved alternate or corrective measures and procedures have been adopted.

7. In the event that for any reason, whether it be caused by wind, rain, heat, cold, drought, or lack thereof, the seeding in the Engineer's opinion is not successful in producing a uniform and normal grass covering with the normal germination period, the Contractor shall at his own expense re-prepare the seed bed, re-fertilize and reseed until such time as a normal stand of growing grasses has been achieved.

END OF SECTION

SECTION 02624 - CONCRETE TANKS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. The installation of MBBR/Aeration Tank and a clarifier tank tank.

1.02 RELATED SECTIONS

A. Section 02105 - Earthwork.

B. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.03 SUBMITTALS

A. Manufacturers literature.

B. Record Drawings: indicate elevations of inlet and outlet pipes, rim elevations.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable requirements of federal, state, and local laws, regulations and codes having jurisdiction at project site or applicable requirements of these standards and specifications, whichever is more stringent.

1.05 REFERENCES

A. Comply with the following codes, specifications and standards except where more stringent requirements are shown on the Drawings or specified herein:

1. Standard Utilities Specifications by the City Engineers Association of Minnesota.

2. MN Rules Chapter 7080

PART 2 - PRODUCTS

2.01 CONCRETE TANKS

A. General: The manufacturer shall provide the structural design and certification to the engineer for review. The design shall be in accordance with accepted engineering practice. Precast concrete shall have been designed by a registered engineer and approved by state or local regulatory agencies, or authorities.

B.. Tanks shall meet MN Rule 7080.1900.

C. Tanks shall be manufactured by Weiser Concrete or shall be approved by the Engineer.

D. Loading Criteria:

1. There shall be 140 pcf for minimum weight of saturated backfill, or 127 pcf for unsaturated backfill (500 psf minimum).
2. Minimum lateral loading shall be 62.4 pcf. Lateral loading shall be determined from ground surface and shall include HS20 loadings for tank sidewalls.
3. 5 ft. Bury + Full Exterior Hydrostatic Load + 2500 lb. Wheel Load for Anoxic/Septic tank, and Clear Tank.
4. Tank Full, Interior Hydrostatic Load and Unsupported by Soil

5. All tanks shall be structurally sound and watertight and shall be guaranteed in writing by the tank manufacturer for a period of two years from the date of final acceptance. Manufacturer's signed guarantee shall accompany bids. The tank guarantee/warranty shall be furnished at the time of submittal. Tank warranty shall not have a limited liability in regards to replacement cost of the tanks. The septic tank shall be capable of withstanding long-term hydrostatic loading, in addition to the soil loading, due to a water table maintained at ground surface.

6. Tanks shall be manufactured and furnished with a minimum access opening of 24 inches in diameter and of the configuration shown on the manufacturer's drawings. Modification of completed tanks will not be permitted.

7. Tanks shall be capable of successfully withstanding an aboveground static hydraulic test and shall be individually tested.

8. Tanks shall be installed in strict accordance with the manufacturer's recommended installation instructions.

9. Tanks shall not be moved from the manufacturing site to the job site until the tank has cured for seven (7) days or has reached two-thirds of the design strength.

10. Tanks shall be manufactured and furnished with access openings of the size and configuration necessary to accommodate individual packaged pump systems. For

24-inch diameter access risers, the tank manufacturer shall cast in place a flanged tank adapter to facilitate the bonding of a 24-inch diameter access riser. The flanged tank adapter shall be made of 1/4" thick ABS and shall have an outside diameter of 27 inches and an inside diameter of 22-3/4 inches. The flanged adapter shall be Orenco Systems®, Inc. Model PRTA24 or engineered approved equal. The adapter must have an overall height of no less than 3 inches to allow 1-1/2" exposed for sufficient bonding area once the adapter is installed in the tank.

11. In order to demonstrate watertightness, tanks shall be tested twice prior to acceptance. Inlets to the septic tank will be watertight pipe seal Cast-A-Seal™ (Manufactured by Press-Seal Gasket Corporation) or equal or engineer approved equal. Each tank shall be tested at the factory, prior to shipping, by filling with water to the soffit and letting stand. After 24 hours, the tank shall be refilled to the soffit and the exfiltration rate shall be determined by measuring the water loss during the next two (2) hours. Any leakage shall be cause for rejection. After installation is completed, each tank shall be filled with water to a point two (2) inches into the access riser and retested as previously described (the field test period may be reduced to not less than two (2) hours). Backfill of a depth equal to the water height in the riser must be in place over the tank to prevent damage due to hydrostatic uplift. No tank will be accepted if there is any leakage over the two (2) hour period.

12. The septic tank and the top slab shall be sealed with a preformed flexible plastic gasket. The flexible plastic gasket shall be equal to the flexible butyl resin sealant congeal CS-102 or CS-202 as manufactured by Concrete Sealants, Inc. of New Carlisle, Ohio, and shall conform to federal specification SS-S-00210(2iOA) and AASHTO M-198. A mechanical fastening method shall be used if the seasonal groundwater level may reach the top slab seam of the tank.

PART 3 - EXECUTION

3.01 TANK PLACEMENT

A. Place tank on a level surface previously prepared.

END OF SECTION

SECTION 02626
ADVANCED TREATMENT SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The work under this section includes furnishing, and testing the integration of new components installed in conjunction of the existing treatment system. The system shall use a CMFF – Pre DN AE-post DN system as prepared by Biowater Technology. The system shall be installed by the contractor in accordance with the manufacturer's guidelines and in accordance with the details on the plans and specifications. The components of the system shall to include but are not limited to the following: MBBR internals (i.e. slow speed mixer, aeration blower and associated piping, methanol feed system(s), alkalinity mix and feed system, the clarifier internals and return pump system, and system process control panel, etc.

B. New distribution pumps and tank modifications to the proposed dispersal fields.

C. Telecom System linked to an internet line as constructed by the contractor. Both the north system and the south system control panels shall be accessible by the internet

D. Modifications to the existing treatment system as described in the plans and specifications

E. Repairs to portions of the septic system at individual homes within the subdivision.

1.02 PROCESS PERFORMANCE

A. The pretreatment system shall be designed to produce an effluent that meets the design basis as indicated in Table 1, Design Criteria.

Table 1. Design Criteria

INFLUENT		EFFLUENT
Flow =	11,294 gpd	
CBOD =	292 mg/L	CBOD total, mg/L $\leq$ 30.0
TKN =	65 mg/L	
NH_3 – N =	45 mg/L	
Total Nitrogen =	35 mg/L	TN, mg/L $\leq$ 10.0
TSS =	246 mg/L	TSS, mg/L $\leq$ 30.0
pH =	6.9	
Alkalinity =	150 mg/L	
Phosphorus =	9 mg/L	Phosphorus, mg/l $\leq$ 20mg/l
Min. Temperature =	10.0 °C	

1.03 SYSTEM SUMMARY

A. This design is a modification of two existing systems one system on the north side of the project and one lying south of that in the center of the subdivision. Each of the two systems consist of a 4200 gallon recirculation tan, a 7500 gallon recirculation tank, a 4200 gallon dosing tank and a 7500 gallon dosing tank. In addition the existing system each have a sand filter and an advantex ax100 filter system. The two systems act independently of each other currently.

B. Each of the two existing systems dispose of their effluent to two separate drip irrigation systems.

C. The north system (System #2) shall pump its effluent to System #1 the south system (System #1). A new forcemain shall be constructed from the north system to the south system with 2" HDPE forcemain. The final disposal of the effluent shall be to a new dispersal field system.

D. The south system shall be augmented with a MBBR/Aeration tank and a clarifer tank. The MBBR shall be filled with 122 cuft biofilm carrier elements. A Sharpe mechanical mixer.

E. A blower shall supply the aeration tank with 20 cfm. The blower shall be connected to two inch pvc air manifold system. The manifold system shall be constructed as per plan.

F. Two MBBR media filters from Biowater Technologies shall be installed, one in each compartment of the MBBR/Aeration Tank.

G. A mechanical sludge return pump shall be constructed at the bottom of the clarifier tank.The return pump shall a ½ hp, 230 volt 2" solids handling pump meeting 30 gpm @ 10 TDH. The return pump shall lift the sludge via a 1" pvc return line to an existing 4200 gallon recirculation tank.

H. In addition the system will include a control unit and dosing pumps and tanks for methanol and alkalinity. These will be housed in a pole shed supplied by the owner.

I. The clarifier shall have installed a effluent filter installed at its outlet. The contractor to submit an effluent filter to the engineer for approval.

J. A control panel for the south system shall control function of the all the pumps including the existing system pumps. The control panel shall have an integrated telecom capabilities.

K. A new Control Panel for the North System shall shall be installed to operate the north system independently of the south system including an integrated telecom system.

1.04 RELATED SECTIONS

A. Section 2105 - Earthwork

B. Section 2604 - Concrete Tanks

1.05 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for all wastewater treatment system components.

1. Shop drawings for all products shall be submitted to the design engineer for review and approval.
2. Operation and maintenance manual materials for each supplied component.

1.06 References

A. MN Rules Chapter 7080

1.07 SHOP DRAWINGS, INSTALLATION INSTRUCTIONS AND O& M MANUALS

A. Six (6) copies of each shop drawing and/or submittal shall be submitted to the design engineer for review and approval of all materials, equipment, furnishings and other items incorporated in the work.

B. Installation and start-up manuals shall be furnished for all new equipment items installed as part of this project. A total of four (4) copies shall be provided: one (1) copy shall be with the equipment when shipped, one (1) copy shall be sent directly to the office of the purchasing contractors and two (2) copies shall be sent directly to the design engineer.

C. Six (6) copies of operations and maintenance manuals shall be furnished for all new equipment items as part of this project. One (1) copy shall be with the equipment item when shipped and the remaining five (5) shall be sent directly to the design engineer. Installation and start-up manuals cannot be substituted as operations and maintenance manuals.

1.08 The proposing contractor may propose an "or equal" for equipment if the contractor can demonstrate and guarantee the capability of the proposed equipment to meet the quality requirements of Section 1.02 of this section. The Engineer shall make the final decision as to the capability of the equipment to meet Section 1.02

PART 2 - PRODUCTS

2.01 MBBR Media: Biowater Technologies media, 122 cuft including biofilm carrier elements

2.02 Mixer: Sharpe mechanical mixer Model #0.33E05-40 with single HYF-218 impellor turning at 44 rpm

2.03 ½ hp Gast blower and control panel for aerobic tank

2.04 Air manifold and header for aeration unit: 1"-1.5"" pvc for aerobic tank

2.05 Sieve Strainer: MBBR Biofilm carrier element strainer/sieve from Biowater technologies.

2.06 Dosing pumps in North 7500 gallon dosing tank: (2) Gould 3885 WEOSH pumps in duplex configuration complete with guide rail system and quick disconnect. Pump to be 230 volt single phase.

2.07 Dosing Pumps in South 7500 gallon dosing tank: (2) Gould 2ed-C pumps in duplex operation. Each pump with its own dedicated discharge line, guide rail system and quick disconnect. . Pump to be 230 volt single phase.

2.08 Mechanical sludge pump in clarifier: The pump shall be a ½ hp, 230 volt 2" solids handling pump meeting 30 gpm @ 10 TDH. Submit pump for approval by the engineer.

2.09 Effluent filter at clarifier outlet: Submit filter for engineer approval.

2.10 Supplemental carbon feed system:

A. The carbon feed system will include one (1) LMI-E701-498SI (Liquid Metronics) explosion proof pump or equal if approved by the engineer. The pump will be 120 volt, 1 phase, and have a capacity of 1.3 gph at 300 psi. The system will also include one (1) LMI-10783 safety wand.

2.11 ALKALINITY FEED SYSTEM

A. The alkalinity feed system will include the following: The pump shall be LMI-A151-390SI, 120 volt, 1 phase, capable of pumping 1.0 gph at 110 psi or equal if approved by the engineer.. The system will also include one (1) LMI-26350-1 polyethylene storage tank, and one (1) LMI-10590 agitator with suction shield.

2.12 ALUM FEED SYSTEM (Not used)

2.13 FLOAT SWITCHES

A. Float switches, for locations as indicated on the plans, will be furnished with electrical control cord of sufficient length to reach the control panel for either the north or south systems.

2.14 CONTROL SYSTEM

A. The operational scheme of the control system shall be initially set by the system supplier and shall be under the control of the system supplier until the performance testing is complete.

B. There shall be separate control panel one for the north system and one for the south system. Each shall be capable of the following functions.

1. North System
   a. 7500 gallon recirculation tank
      i. AX100 Tank pumps
         A. Pump off
         B. Pump on
         C. Lag Pump On
         D. High Water Alarm
      ii. Sand Filter Pumps
         A. Pump on
         B. Pump off
   b. Dosing Tank
      i Duplex dosing pumps
         A. Pumps off
         B. Pump on
         C. Lag Pump on
         D. High Water Alarm
         E. Timer

2. South System
   a. 7500 gallon recirculation tank
      i. AX100 Tank pumps
         A. Pump off
         B. Pump on
         C. Lag Pump On
         D. High Water Alarm
      ii. Sand Filter Pumps
         C. Pump on
         D. Pump off

   b. MBBR Tank
      i. Mixer on/off
      ii. Blower on/off

   c. Clarifier Tank
      i sludge pump on/off timer

   d. Dosing Tank
      i Duplex dosing pumps
         A. Pumps off (no operation)
         B. Pump on (timer based)
         C. Lag Pump on

D. High Water Alarm

e. 4200 gallon receiving tank from the north system

i High water alarm

2.15 PANEL AND INSTRUMENTS

The South System

A. A separate main control panel shall be supplied to operate the process of the south system. The main control panel inside the control building shall be a wall-mounted NEMA 4X enclosure. The panel shall be shop wired to terminal strips for connection to field wiring as necessary.

B. The panel shall contain the necessary equipment, instruments, ancillary control devices, hardware and programmable logic control to perform the stated functions of the process system. Panel devices shall also enable the operator to perform operate of pumps, blowers and auxiliary equipment including the effluent pumps to the dispersal fields. The panel will also include a dialer, touch screen, modem and Ethernet module.

C. The Control Panel shall contain the following attributes.

1. The proposed panel includes separate on times for recirc pumps, with common off time. Timers are required for
   a. mixer
   b. blower
   c. sludge return pump
   d.. drain field dose pumps. Each pump to have its own timer.

2. Enclosure, Steel, Saginaw, 42"X36"X12", 3 PT Padlockable Latch
3. 1 Inner Dead Front Door
4. 1 Main Circuit Breaker
5. 1 Distribution Terminal Block
6. 1 1 Phase Lighting Arrestor
7. 1 125 Watt Thermostat Anti Condensation Heater w/ Overcurrent Protection
8. 1 5" Fan Kit w/ Gray Rainhood & Overcurrent Protection
9. 1 Control Circuit Breaker with Separate Alarm and Control Fuses
10. 9 Heavy Duty 22mm HOA Switch
11. 9 Pump/Motor Circuit Breaker Type QOU
12. 8 IEC Magnetic Motor Contactor, 18A
13. 1 Current Sensor for Blower
14. 1 Schneider Electric, ATV312, VFD, 1 Phase Input, 1HP, 208/230V, 4.8A
15. 1 Speed Pot for VFD
16. 1 IDEC 24 VDC w/ Required I/O
17. 1 IDEC 5.7" Color Touchscreen w/ Remote Internet Connection, email alarms
18. 1 24 VDC Power Supply
19. 1 24 VDC Battery Backup w/ Edwards Red Alarm Strobe Beacon
20. 1 Alarm Buzzer w/ Heavy Duty Test-Silence Rotary Switch

21. 4 20' Pipe Clamp Mechanical Float Switches Recirculation Tank: Low/Off, Timer Enable, Peak Enable, High
22. 4 20' Pipe Clamp Mechanical Float Switches Dosing Tank: Low/Off, Timer Enable, Peak Enable, High
23. 1 Required Terminal Blocks/Control Relays/Wire Duct
24. 1 Numbered Wires
25. 1 UL Label

C. The panel shall contain all motor starters, and relays for the pumps and blowers for the South System.

D. The panel shall also contain the necessary control and monitoring functions for the lift station to the anoxic tank.

E. All alarms will be set to dial out with an auto dialer.

F. Number of starts for each motor shall be recorded for 30 days or as otherwise approved by the engineer.

G. Pump motor notes:
1. Four recirculation pumps 230 volt, single phase 60, hz, 8 FLA
2. Two Duplex dosing pumps, 230 volt, single phase, 60 hz, 8 FLA
3. One Blower, ½ hp, 230 volt single phase, 60 hz
4. One sludge pump, 230 volt, single phase, 60 hz
5. One mixer, 3/4hp, 230 volt, single phase 60 hz

H. Misc
1. All breakers on standoff with handles accessible through inner door
2. The recirculation pumps shall have an alternating sequence of 1,3,2,4
3. Pumps 1,2 go to the sand filter, pumps 3,4 go to the advantex filter

The North System

A. The North System shall have its own Control Panel and shall be supplied to operate the process of the North System.(System #2). It shall be mounted to a sheet of treated plywood near the north system. It shall be a wall mounted NEMA 4X enclosure.

B. The panel shall contain the necessary equipment, instruments, ancillary control devices, hardware and programmable logic control to perform the stated functions of the process system. Panel devices shall also enable the operator to perform operate of pumps, blowers and auxiliary equipment including the effluent pumps to the dispersal fields. The panel will also include a dialer, touch screen, modem and Ethernet module.

C. The Control Panel shall contain the following attributes.

1. The proposed panel includes separate on times for recirc pumps, with common off time. Timers are required for
   a. dose pumps to the South system, one for each pump
2. Enclosure, Steel, Saginaw, 42"X36"X12", 3 PT Padlockable Latch
3. 1 Inner Dead Front Door
4. 1 Main Circuit Breaker
5. 1 Distribution Terminal Block
6. 1 1 Phase Lighting Arrestor
7. 1 125 Watt Thermostat Anti Condensation Heater w/ Overcurrent Protection
8. 1 5" Fan Kit w/ Gray Rainhood & Overcurrent Protection
9. 1 Control Circuit Breaker with Separate Alarm and Control Fuses
10. 6 Heavy Duty 22mm HOA Switch
11. 6 Pump/Motor Circuit Breaker Type QOU
12. 6 IEC Magnetic Motor Contactor, 18A
13. 1 IDEC 24 VDC w/ Required I/O
14. 1 IDEC 5.7" Color Touchscreen w/ Remote Internet Connection, email alarms
15. 1 24 VDC Power Supply
16. 1 24 VDC Battery Backup w/ Edwards Red Alarm Strobe Beacon
17. 1 Alarm Buzzer w/ Heavy Duty Test-Silence Rotary Switch
18. 4 20' Pipe Clamp Mechanical Float Switches Recirculation Tank: Low/Off, Timer Enable, Peak Enable, High
19. 4 20' Pipe Clamp Mechanical Float Switches Dosing Tank: Low/Off, Timer Enable, Peak Enable, High
20. 1 Required Terminal Blocks/Control Relays/Wire Duct
21. 1 Numbered Wires
22. 1 UL Label

C. All motor starters, and relays for the pumps and blowers for the North System

D. The panel shall also contain the necessary control and monitoring functions for the lift station to the anoxic tank

E. All alarms will be set to dial out with an auto dialer.

F. Number of starts for each motor shall be recorded for 30 days or as otherwise approved by the engineer.

I. Pump motor notes:
1. Four recirculation pumps 230 volt, single phase 60, hz, 8 FLA
2. Two Duplex dosing pumps, 230 volt, single phase, 60 hz, 8 FLA

J. Misc

4. All breakers on standoff with handles accessible through inner door
5. The recirculation pumps shall have an alternating sequence of 1,3,2,4
6. Pumps 1,2 go to the sand filter, pumps 3,4 go to the advantex filter

2.16 JUNCTION DISCONNECT BOXES

A. Disconnect junction boxes shall be provided for all submersible pump motors. The disconnect junction box assembly shall be NEMA 4X fiberglass and shall contain an individual disconnect switch for each motor serviced. In addition to meeting NEC requirements for a local disconnect switch, the disconnect junction box also serves to isolate the wet-well wiring from the plant wiring. Disconnect boxes must be clearly identified with stenciled paint letters. Each pump disconnect must be labeled, for example, "Effluent Pump Disconnect".

B. Plant wiring from the main control panel will enter the upper compartment of the disconnect junction box and terminate on the pump disconnect switches. The upper compartment will also contain terminal blocks for termination of the float switches and main panel float switch control wiring.

C. Disconnect switches shall be furnished adequately sized for the motor loads served and shall have a minimum rating of 40 amps at 600 VAC. Strain relief cord grips shall be provided to accommodate each pump and all float switches. In the event that any of the cord grips provided are not used, a short piece of cord shall be inserted into the unused connectors in order to insure the proper sealing between compartments.

D. In general, for two and four pump installations, the dimensions of the upper enclosure shall be 12" wide x 12" high. The lower enclosure dimensions shall be 12" wide x 7" high.

E. Disconnect junction boxes manufactured for installations of more than four motors shall be sized to accommodate the actual number of disconnects and float switches required.

2.17 PROVISION FOR FUTURE PHOSPHOROUS REMOVAL (Not used)

2.18 CONTROL PANEL OPERATION

A. Control Operations North System:
Transfer tank: (North System) System #2 7500 Gallon Dosing Tank

1. This section includes operations controlled by the floats in each of the tanks controlled by demand only

a. Lowest float - Float 1- pumps off
This float controls the minimum depth that all pumps in the effluent tank can operate. It is set at the minimum depth to safely operate anyone of the pumps in the tank. If the water level in the tank is above the elevation set for the float, the pumps may operate. If the water level is below this elevation no pump shall be switched on.

b. Float 2- pumps on
This float insures that there is sufficient liquid in the tank for the complete operation required for the pumps to pump one dose.

c. Timer
The PLC as part of the Control panel will operate the transfer pumps according to a scheduled operation. It will be adjustable by the operator of the system to meet conditions as necessary.

d. Float 3
This float shall control the lag pump. The two pumps shall operate in duplex fashion with the lag pump alternating during cycles. If this float is triggered, it means the system is not keeping up in the dosing tank. The lag pump is then turned on when this float is triggered and turned off when the water level reaches float 1.

e. Highest float - Float 4
This float is for emergency operations. It acts as the on switch if the water level in the clear tank gets to high. If the water level is below the elevation set for this switch then operations of the tank continue normally. If the water level rises above this elevation both dispersal field pumps kick on until the water level in the tank reaches the elevation of float 2. When the elevation in the clear tank exceeds this elevation a alarm will be sent to the system operator.

f. Transfer pumps
The pumps in this tank shall be used to trqansfer effluent from the North System to the South System. These pumps will be used in duplex operation..

A. Control Operations
Timer controlled pump tanks
System #1 and System #2, 7500 gallon tanks, pumps dosing the RSF and AX100 Filter treatment tank. Also
System #1 7500 Gallon dosing tank

1. This section includes operations controlled by the floats in each of the tanks controlled by demand only

   a. Lowest float - Float 1- pumps off
   This float controls the minimum depth that all pumps in the effluent tank can operate. It is set at the minimum depth to safely operate anyone of the pumps in the tank. If the water level in the tank is above the elevation set for the float, the pumps may operate. If the water level is below this elevation no pump shall be switched on.

   b. Float 2- Min pumps on
   This float insures that there is sufficient liquid in the tank for the complete operation required for the pumps to pump one dose.

   c. Timer
   The PLC as part of the Control panel will operate the dispersal field pumps according to a scheduled operation. It will be adjustable by the operator of the system to meet conditions as necessary.

   d. Float 3
   This float shall control the lag pump. The two pumps shall operate in duplex fashion with the lag pump alternating during cycles. If this float is triggered, it means the system is not keeping up in the dosing tank. The lag pump is then turned on when this float is triggered.

   e. Highest float - Float 4
   This float is for emergency operations. It acts as the on switch if the water level in the clear tank gets to high. If the water level is below the elevation set for this switch then operations of the tank continue normally. When the elevation in the clear tank exceeds this elevation an alarm will be sent to the system operator.

   f. Dispersal field pumps
   These pumps will be used in duplex operation. Each pump is used to distribute effluent to a different dispersal field. Over the short term the existing percolation rate in each dispersal field should be able to take the entire daily flow from the wastewater system.

G. OPERATOR CONTROLS WITHIN THE CONTROL PANEL

The operator shall be able to operate either the north system or the south system from its appropriate control panel either at the site or be able to dial in and be able to manipulate both system controls remotely.

1. Control Operations
   a. Read meter from low head collection system from houses.
   b. Turn off/on all pumps in the system individually.
   c. Change timer settings.
   d. Read float setting.
   e. Read which pumps are operating.

2.19 CONTROL PANEL SUMMARY

A. All reactor operations are controlled from the main control panel (MCP). There are two (2) modes of operations: automatic and manual.

B. The operator shall be able to control the systems by either being on site at each panel that controls either System #1 or System #2. The operator shall also be able to dial in to either control panel to control each of the two systems. Each Panel shall control the operation of each pump within its given system.

C. Each motor shall be capable of being operated from the main control panel through automatic and manual modes.

2.20 REPAIR MATERIAL FOR INDIVIDUAL HOME SITES

A. Tank riser replacement: Ultra Rib 24" dia PVC risers, riser to tank adapter, and a riser to lid adapter all by Orenco
B. 24" insulated PVC lid
C. Alarm replace using same alarm manufacturer
D. Wiring to be per electric code
E. Internal plumbing for effluent pipe to be PVC Sch 40
F. 1000 gallon concrete septic tank conforming to MN Rules Chapter 7080
G. Sod is to be Kentucky Bluegrass.

2.21 INDIVIDUAL HOME SITE REPAIRS REQUIRED

A. List of sites and required repairs

Address	Required Repairs
14247 316TH Avenue N	Replace 2 - 24" cracked lids
14145 316TH Avenue N	Repair corroded electrical, Replumb effluent filter
14208 314th Avenue N	Clean effluent filter
14305 314th Avenue N	Replace control box. Replace 4 - 24"x 48" risers and lids
14320 314Th Avenue N	Replace corroded electrical and alarm. Replumb effluent filter
14138 316th Avenue N	Replace alarm and replumb effluent filter. Replace 1000 gallon Pump tank. Replace 2 - 24" x 48" risers and 2 - 24" lids
14118 316th Avenue N	Replace alarm, Replace 2 - 24"x48" risers and lids
31575141ST Street N	Replumb effluent filter
14233 316TH Avenue N	Replace alarm, Replumb effluent filter

19224 314TH Avenue N	Replace alarm, Replace corroded electrical wiring, Replace 2 - 24" x 48" risers and lids
14247 314Th Avenue N	Replace control box. Replace 4 - 24"x 48" risers and lids. Replace 2-24" lids. Clean effluent filter
14346 314TH Avenue N	Replace o-ring for pump connection
14312 314TH Avenue N	Replace alarm
14132 316TH Avenue N	Replace Test Switch, Reseal 2 risers
14139 316Th Avenue N	Replace 2-24"x72" risers and lids, clean effluent filter, Replace check valve by the street
14318 316TH Avenue N	Replace Alarm
14221 316TH Avenue N	Rewire into house wiring, Replace effluent filter and plumbing
14334 314TH Avenue N	Replace Alarm
14142316TH Avenue N	Clean effluent filter
31597 141ST Street N	Replace plumbing for efflent filters, clean filter, Replace 4 – 24" x 48" risers and lids from tanks to grade
14113 316TH Avenue N	Replace Alarm, replumb effluent filter, clean filter, replace 4 - 24" x 48" risers and lids
31486 141ST Street N	Replace alarm, replumb effluent filter, clean filter
31513141ST Street N	Replace 24" lid
31455 141ST Street N	Replace 1 24" x 48" septic tank riser and lid, clean filter
14107 314TH Avenue N	Remove roots around riser, Replace 1-24"x48" riser and lid
14119 314TH Avenue N	Replace plumbing for efflent filter, Replace 2 - 24"x48" risers and lids, Replace electrical post remount electrical box to new post.
31402 141ST Street N	Replace Test Switch, Replumb effluent filter, replace 2 - 24"x48" risers
31471 141ST Street N	Replumb effluent filter

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation by the contractor shall be in strict accordance with the manufacturer's instruction and recommendations. Control panel plans will be so signed and stamped by a registered Electrical Professional Engineer

3.02 REPAIRS

A. Risers

1. Inspect risers to be replaced. Measure depth from tank to grade. Replace riser from top of septic tank to existing grade. Top of lid shall be set such that surface water runoff will not enter the riser. Each riser is expected to be approximately 4 feet in length but may vary. Payment shall be per 4' riser unless otherwise noted in these specifications. Additional length for each riser shall include up to 6" additional inches as incidental. Payment

per riser shall be adjusted for each additional foot used in a riser as a pay item.

2. Remove existing riser. Clean concrete surfaces and attach riser to concrete tank using adapter. Use adapter to set lid on riser. Set top of lid to be ¼" to ½" above grade.
3. Seal at tank and at riser to be watertight.
4. Resod area damaged by excavation for replacement of riser.

3.03 EFFLUENT FILTER REPLUMBING

A. A number of effluent filters need to be replumbed as that the filter cannot be removed for cleaning. These filters are to be reinstalled with new plumbing incorporating unions such that the filters can be removed and replaced or cleaned.

3.04 REPLACE SEPTIC TANK

A. A leaking septic tank shall be replaced shall be replaced in accordance with MN Rules Chapter 7080.

B. The lawn shall be resodded in the area damaged by replacing the tank.

3.05 REPLACE ELECTRIC POST

A. A wooden electric post has been damaged and shall be replaced by a treated 4 x4 wooden post set 48" into the ground into concrete..

3.04 INSPECTION AND TESTING

A. The Contractor shall provide startup services for the two systems.

B. A mechanical performance test shall be performed prior to the plant being placed into service. The design engineer, the contractor and the Town's designated operator shall be present. The installing contractor shall furnish all labor, materials and equipment required for such tests and shall correct any deficiencies noted by repairing or replacing the defective equipment and completing the testing.

C. Construction shall conform to MN Rules 7080

3.05 GUARANTEE

A. The contractor and manufacturer shall guarantee for twelve (12) months from date of MPCA approval to discharge, that the equipment furnished will be free from defects in design, material and workmanship. Warranties and guarantees of the suppliers of various components in lieu of a single source responsibility by the manufacturer will not be acceptable.

B. In the event a component fails to perform as specified or is proven defective in service during the guarantee period, the manufacturer shall repair or replace, at the discretion of the engineer, upon return of such defective part to the systems supplier. The repair or replacement of those items normally consumed in service, such as seals, grease, etc., shall be considered as part of routine maintenance and upkeep.

END OF SECTION 02626

SECTION 02628 - DISPERSAL FIELD

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes sanitary sewerage dispersal system piping and appurtenances.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 2 Section "Earthwork" for excavation and backfill required for sanitary sewerage system piping and structures.

1.03 SUBMITTALS (not used)

1.04 QUALITY ASSURANCE

A. Environmental Compliance: Comply with applicable portions of local environmental agency regulations pertaining to sanitary sewerage systems..

1.05 REFERENCES

A. Comply with the following codes, specifications, and standards except where more stringent requirements are shown on the Drawings or specified herein.

1. MN Rules Chapter 7080

PART 2 - PRODUCTS

2.01 Pressurized Drainfield

A. Piping and Fittings

All pipe and fittings shall meet minimum pressure requirements for Schedule 40.

B. Drainfield Rock

Drainfield rock used as a distribution medium shall be igneous rock, or similar insoluble, durable, and decay-resistant material between three-fouths inch and 2 2 inches in size, with on more than five percent by weight passing a three-fourths inch sieve and no more than one percent by weight passing a No. 200 sieve. Materials greater than 2 2 inches in size shall not exceed five percent by weight. The material shall conform to MPCA MN Rule Chapter 7080

C. Clean sand used as a base under the drainfield rock. It shall conform to MPCA Chapter 7080

C. Orenco 6606 automatic distribution valve.

PART 3 - EXECUTION

3.01 INSTALLATION OF DRAINFIELD

A. Comply with MN Rules Chapt 7080

B. Contractor to hold MPCA certification for "Installer" and comply with Chapt 7080 for installation.

END OF SECTION

SECTION 02638
SEWAGE FORCEMAIN

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Installation of sewage forcemain from the North System to the South System and from the South System to the dispersal fields.
   2. Installation of force main meters on the low head collection system.

B. Related Sections:
   1. Section 02105 – Earthwork
   2. Section 02626 – Advanced Treatment System

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM), latest edition.
B. Minnesota Department of Transportation (MN/DOT), "Standard Specifications for Construction", 2000 Edition, including Supplements current as of bid date.
C. Standard Utilities Specifications by the City Engineer's Association of Minnesota.
D. ASTM D1785 Standard Specification for PVC Plastic pipe Schedule 40, 80, and 120
E. ASTM D2239 Standard Specification for polyethleyne (PE) Plastic Pipe

1.03 DELIVERY OF MATERIALS

A. Inspect all pipe and materials during the unloading process.

B. Notify Engineer of any cracked, flawed or otherwise defective material.

C. Remove all materials found to be unsatisfactory by the Engineer from the site.

PART 2 PRODUCTS

2.01 PIPE AND FITTINGS

A. Dispersal field forcemain:
The pipe shall be PVC pressure pipe and fittings shall conform to the requirements of ASTM D1785 for the size and pressure class indicated on the Plans.

B. Provide all pipe and fittings of each material type from the same manufacturer.

C. North System forcemain:

The pipe shall be HDPE SDR11

d. South system forcemains shall be PVC SCH 40

2.02 SEWAGE METERS

A. 2" mag meter with capability to be read from control panel.

PART 3 EXECUTION

FORCEMAIN FROM SYSTEM #1 SOUTH SYSTEM TO THE DISPERSAL FIELDS

3.01 PIPE INSTALLATION

A. Inspect pipe for defects and cracks while suspended.

B. Remove all dirt and foreign material from the pipe interior prior to lowering into the trench.

C. Install pipe at the elevations and grades indicated by the plans and field stakes.

3.02 FITTING INSTALLATION

A. Anchor all fittings by means of restrained joint devices installed according to manufacturer's recommendations.

3.03 FIELD QUALITY CONTROL

A. Perform the following tests upon completion of the forcemain construction and prior to connection to the lift station.

1. Pressure Test:
    a. Subject the entire length of forcemain to hydrostatic pressure test of 100 psi for a period of 1 hour.
    b. Measure pressure at lowest pipe elevation.
    c. Maintain constant pressure throughout test period.
    d. Provide all pumps, gauges, connections and other necessary apparatus.
2. Leakage Test:
    a. Measure the water volume required to maintain the test pressure.
    b. Allowable leakage shall be determined by the formula:

$$L = \frac{SD\sqrt{P}}{133{,}200}$$

L = Allowable leakage in gallons
S = Length of pipe tested in feet
D = Nominal diameter of pipe, in inches
P = Test pressure in PSI

B. Provide corrective measures for any line which exceeds the allowable leakage.

3.04 CLEANING

A. Remove all dirt and foreign material from the pipe interior prior to testing.

FORCEMAIN FROM SYSTEM #2 NORTH SYSTEM TO SYSTEM #1 THE SOUTH SYSTEM

3.05 PIPE INSTALLATION

A. Inspect pipe for defects and cracks while suspended.

B. Remove all dirt and foreign material from the pipe interior prior to lowering into the trench.

C. Install pipe at the elevations and grades indicated by the plans and field stakes.

D. Fuse all ends to form one pipe.

E. Bore forcemain wherever possible. Do not disturb the roadway during installation.

3.06 FITTING INSTALLATION

A. Anchor all fittings by means of restrained joint devices installed according to manufacturer's recommendations.

3.07 FIELD QUALITY CONTROL

A. Perform the following tests upon completion of the forcemain construction and prior to connection to the lift station.

1. Pressure Test:
    a. Subject the entire length of forcemain to hydrostatic pressure test of 100 psi for a period of 1 hour.
    b. Maintain constant pressure throughout test period.
    c. Provide all pumps, gauges, connections and other necessary apparatus.

2. Leakage Test:
    a. Measure the water volume required to maintain the test pressure.
    b. Allowable leakage shall be determined by the formula:

$$L = \frac{SD\sqrt{P}}{133{,}200}$$

L = Allowable leakage in gallons
S = Length of pipe tested in feet
D = Nominal diameter of pipe, in inches
P = Test pressure in PSI

B. Provide corrective measures for any line which exceeds the allowable leakage.

3.08 CLEANING

A. Remove all dirt and foreign material from the pipe interior prior to testing.

END OF SECTION

APPENDIX D

SYSTEM COMPONENT INFORMATION

Material Specifications

Throughout this document you will find the term "or approved equal". For this project this term "approved equal" shall mean equal in the judgment of the engineer.

Should the bidder seek approval of a product other than the brand or brands named in the specifications, it shall furnish written evidence that such product conforms in all respects to the specified requirements, and that it has been used successfully elsewhere under similar conditions. Where the specified requirements involve conformance to recognized codes or standards the bidder shall furnish evidence of such conformance in the form of test or inspection reports, prepared by a recognized agency, and bearing an authorized signature.

Manufacturer's standard data and catalog cut sheets will not be considered sufficient in themselves, and the engineer will not be responsible for seeking further data from the manufacturer, or for otherwise researching the product. Failure to provide complete data will be cause for rejection of the product. The submission shall include any impacts that could be expected from the alternative product and shall also indicate any product that would require a license or royalty, the actual fees, and a note that these fees would be handled by the bidder.

The bidder shall provide submissions, meeting the above parameters no less than 96 hours prior to bid opening for review by the engineer.

A. PRIMARY AND SECONDARY TANKS

1. General:

The manufacturer shall provide the structural design and certification to the engineer for review. The design shall be in accordance with accepted engineering practice. Precast concrete or fiberglass tanks shall have been designed by a registered engineer and approved by state or local regulatory agencies, or authorities.

a. Loading Criteria:

- There shall be 140 pcf for minimum weight of saturated backfill, or 127 pcf for unsaturated backfill (500 psf minimum).
- Minimum lateral loading shall be 62.4 pcf. Lateral loading shall be determined from ground surface.
- The tank shall also support a concentrated wheel load of 2500 lbs.

There are four (4) Typical loading conditions that should be analyzed:

1. 4 ft. Bury + Full Exterior Hydrostatic Load
2. 4 ft. Bury + Full Exterior Hydrostatic Load + 2500 lb. Wheel Load.
3. 1 ft. Bury + 2500 lb. Wheel Load.
4. Tank Full, Interior Hydrostatic Load and Unsupported by Soil.

Load Case 4 represents the tank full of liquid at 62.4 lbs/cu.ft. This condition addresses seam and haunch stress-strain relationships that occur during watertightness testing, as well as poor soil bedding conditions that provide inadequate support.

b. Tanks requiring deep burial (>48") or subject to truck or heavy traffic loading require special consideration. (A minimum soil cover of 12 inches shall be used, unless specified otherwise by manufacturer.)
c. *All tanks shall be structurally sound and watertight and* shall be guaranteed in writing by the tank manufacturer for a period of two years from the date of final acceptance. Manufacturer's signed guarantee shall accompany bids. The tank guarantee/warranty shall be furnished at the time of submittal. Tank warranty shall not have a limited liability in regards to replacement cost of the tanks. The septic tank shall be capable of withstanding long-term hydrostatic loading, in addition to the soil loading, due to a water table maintained at ground surface.
d. Tanks shall be manufactured and furnished with a minimum access opening of 20 inches in diameter and of the configuration shown on the manufacturer's drawings. Modification of completed tanks will not be permitted.
e. Inlet plumbing shall include an inlet tee, which penetrates 18 inches into the liquid from the inlet flow line. (The depth may vary depending on the tank's height; in all cases, though, the inlet should extend to a level below the bottom of the maximum scum depth.) The inlet plumbing shall allow for natural ventilation back through the building sewer and vent stack.
f. Tanks shall be capable of successfully withstanding an aboveground static hydraulic test and shall be individually tested.
g. Tanks shall be installed in strict accordance with the manufacturer's recommended installation instructions.

2. Concrete Tanks:

a. Walls, bottom and top of reinforced concrete tanks shall be designed across the shortest dimension using one-way slab analysis. Stresses in each face of monolithically constructed tanks may be determined by analyzing the tank cross-section as a continuous fixed frame.
b. The walls and bottom slab shall be poured monolithically; alternatively, water stops may be provided.
c. Reinforcing steel shall be ASTM A-615 Grade 60, FY = 60,000 psi. Details and placement shall be in accordance with ACI 315 and ACI 318.
d. Concrete shall be ready-mix with cement conforming to ASTM CI50, Type II. It shall have a cement content of not less than six (6) sacks per cubic yard and maximum aggregate size of 3/4-inch. Water/cement ratio shall be kept low (0.35±), and concrete shall achieve a minimum compressive strength of 4000 psi in 28 days. The Contractor shall submit a concrete mix design to the Engineer for review and approval. Three (3) concrete sample cylinders shall be taken and tested until the manufacturer and Engineer are satisfied that the minimum compression strength is

being obtained. To ensure compliance, the manufacturer shall then make and set three (3) sample cylinders for a minimum of 20% of the remaining tanks at the discretion of the Engineer. If the minimum compressive strength is not being obtained, the manufacturer shall be required to make the test sample cylinders for each tank manufactured. Calcium chloride will not be allowed in the mix design. The cost of testing cylinders shall be the tank manufacturer's responsibility. The tank manufacturer may supply a Swiss hammer for compressive testing in the field in lieu of sample cylinders.

e. Tanks may be protected by applying a heavy cement-base waterproof coating (Thoroseal® or equal), on both inside and outside surfaces, in compliance with Council of American Building Officials (CABO) report #NRB-168; 6181, however, the tank should be watertight without the addition of seal coatings.
f. Form release used on tank molds shall be Nox Crete™ or equal. Diesel or other petroleum products are not acceptable.
g. Tanks shall not be moved from the manufacturing site to the job site until the tank has cured for seven (7) days or has reached two-thirds of the design strength.
h. Tanks shall be manufactured and furnished with access openings of the size and configuration necessary to accommodate individual packaged pump systems. For 24-inch diameter access risers, the tank manufacturer shall cast in place a flanged tank adapter to facilitate the bonding of a 24-inch diameter access riser. The flanged tank adapter shall be made of 1/4" thick ABS and shall have an outside diameter of 27 inches and an inside diameter of 22-3/4 inches. The flanged adapter shall be Orenco Systems®, Inc. Model PRTA24 or engineered approved equal. The adapter must have an overall height of no less than 3 inches to allow 1-1/2" exposed for sufficient bonding area once the adapter is installed in the tank. For 21 and 30-inch diameter access risers, either a grooved tank adapter plate (Model RRFTA or RRFTA30) or a flanged tank adapter (Model FRTA30) specified as cast-in-place, bolt down or FRP may be installed into or onto the tank. The adapter shall be manufactured of fiberglass or ABS and shall accommodate a 21 or 30-inch diameter access riser.
i. The septic tank and the top slab shall be sealed with a preformed flexible plastic gasket. The flexible plastic gasket shall be equal to the flexible butyl resin sealant congeal CS-102 or CS-202 as manufactured by Concrete Sealants, Inc. of New Carlisle, Ohio, and shall conform to federal specification SS-S-00210(2iOA) and AASHTO M-198. A mechanical fastening method shall be used if the seasonal groundwater level may reach the top slab seam of the tank.
j. In order to demonstrate watertightness, tanks shall be tested twice prior to acceptance. Inlets to the septic tank will be watertight pipe seal Cast-A-Seal™ (Manufactured by Press-Seal Gasket Corporation) or equal or engineer approved equal. Each tank shall be tested at the factory, prior to shipping, by filling with water to the soffit and letting stand. After 24 hours, the tank shall be refilled to the soffit and the exfiltration rate shall be determined by measuring the water loss during the next two (2) hours. Any leakage shall be cause for rejection. After

installation is completed, each tank shall be filled with water to a point two (2) inches into the access riser and retested as previously described (the field test period may be reduced to not less than two (2) hours). Backfill of a depth equal to the water height in the riser must be in place over the tank to prevent damage due to hydrostatic uplift. No tank will be accepted if there is any leakage over the two (2) hour period.

3. **Fiberglass Tanks:**
   a. Method of Calculations:
      1. Fiberglass tanks shall be analyzed using finite element analysis for buried structures.
      2. Calculations shall address the following:
         - strength
         - buckling
         - deflection of 5% of the tank diameter, based on service load (including long-term deflection lag)
         - buoyancy
      3. Performance testing

      Material Properties and Laminates
      The laminates considered in this analysis shall be fiberglass reinforced polyester resin, using grades of resin and fiberglass considered acceptable for use with septic tank construction. The thicknesses for different regions of the tanks shall be described and shown in shop drawings for each individual tank.

      Typical primary strength properties are listed below:

TensileModulus (psi)	1,000,000
Ultimate Tensile strength (psi)	10,000
Ultimate Compressive strength (psi)	21,000
Ultimate Flexural strength (psi)	18,000
Ultimate Shear In-Plane (psi)	7,000

   b. In lieu of calculations for fiberglass tanks, the supplier may elect in-situ performance testing.
   c. In-situ testing of each tank model shall include use of strain gauge and deflection gauge. The tank will be subjected to external forces equal to twice the actual load.
   d. Maximum initial deflection based on test loading shall not exceed 3% of the tank diameter.
   e. Performance testing will be evaluated by a Registered Professional Engineer (P.E.). The Engineer will have the sole responsibility to determine the maximum external loading on any of the tank models.
   f. The tank shall be constructed with a glass fiber and resin content specified by the manufacturer and with no exposed glass fibers. Any metal part shall be 300 series

stainless steel.

g. Inspections may be made by the engineer in the supplier's yard, within the plant, upon delivery and again after installation. The minimum wall thickness shall be 3/16-inch. If the wall thickness is suspected to be less than 3/16-inch or if delamination is suspected within any portion of the tank, the engineer may drill a 1/4-inch diameter hole through the tank wall for inspection purposes. If the required minimum 3/16-inch thickness is not found, repair if feasible shall be the responsibility of the contractor. If repair is judged not feasible, the tank shall be rejected. If twenty percent (20%) or more of the tanks are rejected for any of the aforementioned reasons, each tank under this bid will become suspect of substandard quality and subject to rejection by the engineer. If the required minimum 3/16-inch thickness is found and no delamination is present, the repair of the inspection holes shall be the responsibility of the engineer.
h. The engineer shall specify the minimum weight of each tank model that will be allowed. The manufacturer will permanently mark the weight of each tank on the top near the access hole.
i. The minimum tank weight shall be specified by the manufacturer's engineer (i.e., 330 lbs for 1,000-gallon tanks; 450 lbs for 1,500-gallon tanks; add 30 lbs for internal baffle).
j. Holes specified for the tank shall be provided by the manufacturer. Resin shall be properly applied to all cut or ground edges so that no glass fibers are exposed and all voids are filled.
k. Orenco Systems®, Inc. EPDM gaskets, or approved equal, shall be used at the inlet to join the tank wall and the inlet piping. ABS or Schedule 40 PVC pipe and fittings shall be used at the inlets.
l. Inlet plumbing shall include an inlet tee that penetrates 18-inches into the liquid from the inlet flow line. (The depth may vary depending on the tank's height; in all cases, though, the inlet should extend to a level below the bottom of the maximum scum depth). The inlet plumbing shall allow for natural ventilation back through the building sewer and vent stack.
m. Water testing shall be performed on each tank and shall be witnessed by the engineer. Every tank shall be filled with water to the brim of the access opening for a minimum of two (2) hours. The tank shall show no leakage from section seams, pin-holes or other imperfections. Any leakage is cause for rejection.
n. When leakage occurs, if the tank is not rejected by the engineer, an additional water test shall be made on the tank after repairs have been completed, upon request by the engineer. The tank provider shall be responsible for making all corrective measures in production or assembly necessary to ensure a completely watertight tank.
o. After installation of tank with riser is completed, each tank shall be filled with water to a point two (2) inches into the access riser and the water loss measured after a two-hour period. Every tank test shall be witnessed by the engineer. Any leakage shall be cause for rejection. Backfill of a depth equal to the water height in the riser must be in place over the tank to prevent damage due to hydrostatic uplift.
p. Each tank shall be marked in the upper most surface above or near the outlet and include a permit number or identification number, weight of tank, type of tank, and date

of manufacture.

q. Installation shall be in accordance with the manufacturer's recommendations, or as shown on the Contract Plans, whichever is more stringent; no variations.

C. RECIRCULATION / BLEND TANK PUMPING ASSEMBLY:

All pumping systems shall be supplied by a reputable manufacturer with at least five years of experience in supplying equipment for onsite wastewater treatment systems. References must be available on request from the engineer. Systems shall be Orenco Systems®, Inc. High-Head Pumping Assemblies or engineer-approved equal, composed of:

1. Risers:

Risers shall be required for access to internal vaults and access into the recirculation/blend tanks for septage pumping. All risers shall be constructed watertight. The risers shall be attached to the tanks such that a watertight seal is provided. Risers shall extend three inches (3") above original grade to allow for settlement and to ensure positive drainage away from the access. Risers for inspection ports shall be a minimum of 18 inches in nominal diameter. Risers containing pumping assemblies or electrical splice boxes shall be a minimum of 24 inches in diameter and shall be of sufficient diameter to allow removal of internal vaults without removing splice boxes, etc. Risers shall be a minimum of 30 inches in nominal diameter when the depth of bury is 36 inches or greater or when duplex pumping systems are used. All other risers shall be a minimum of 24 inches in nominal diameter and shall vary in height depending on the depth of bury on the various tanks. Adhesive required to adhere the PVC or fiberglass risers to either fiberglass or ABS tank adapter shall be either a two-part epoxy, Model MA320 or approved equal, or a single component adhesive Model ADH100 or approved equal. To ensure product compatibility, risers, lids, and attachment components shall be supplied by a single manufacturer.

2. Inlet and RSV Riser:

Risers shall be ribbed PVC as manufactured by Orenco Systems, Inc. or approved equal. The material shall be PVC as per ASTM D-1784 and tested in accordance with AASHTO M304M-89. The risers shall be constructed of non-corrosive material and designed to be buried in soil. Risers shall have a minimum stiffness of 10 psi, when tested according to ASTM D2412. Risers shall be capable of withstanding a truck wheel load (36 square inches) of 2500 pounds for 60 minutes with a maximum vertical deflection of 1/2-inch. Risers shall extend to three inches above the ground surface to allow for settlement and shall have a minimum nominal diameter of 30 inches. See section 4b below for adhesive requirements.

- Inlet & Outlet Grommets: EPDM grommets shall be installed by the manufacturer for discharge piping, to assure a watertight seal. The grommets shall be installed at the factory by the manufacturer of the access risers.

3. Recirculating Splitter Valve (see Alternate):

Orenco Systems®, Inc. Model RSV2U, RSV3U or RSV4U, 2, 3 or 4-inch diameter ball valve assembly to provide guaranteed return of treated effluent returning from filter. The ball valve is designed to redirect 100% of flow to recirculation/dilution tank during periods of low flow or 20% of return flow to final discharge and 80% to the recirculation/dilution tank during periods of high flow. Must be manufactured of corrosion resistant PVC and rubber components and allow for easy removal using unions. The item is patented and the engineer knows of no equivalent.

Alternate: Recirculating Ball Valve:

Orenco Systems, Inc. Model MM2, MM3 or MM4, 2, 3 or 4-inch diameter ball valve assembly to provide guaranteed return of treated effluent returning from filter. The ball valve is designed to redirect 100% of flow to recirculation/dilution tank during periods of low flow or 100% to final discharge during periods of high flow. Must be manufactured of corrosion resistant PVC and rubber components and allow for easy removal using unions. The item is patented and the engineer knows of no equivalent.

4. **Outlet Riser:**

Outlet risers shall be ribbed PVC as manufactured by Orenco Systems, Inc. or engineer-approved equal. The material shall be PVC as per ASTM D-1784 and tested in accordance with AASHTO M304M-89. The risers shall be constructed of non-corrosive material and designed to be buried in soil. Risers shall have a minimum stiffness of 10 psi, when tested according to ASTM D2412. Risers shall be capable of withstanding a truck wheel load (36 square inches) of 2500 pounds for 60 minutes with a maximum vertical deflection of 1/2-inch. Risers shall be at least 12" high, (18" recommended) and shall have a minimum nominal diameter of 30" when used in a duplex pumping application and shall be factory-equipped with the following:

a. Electrical and Discharge Grommets: EPDM grommets shall be installed by the manufacturer for discharge piping, vent piping, and/or the electrical conduit to assure a watertight seal. The grommets shall be installed at the factory by the manufacturer of the access risers.
b. Adhesive: When bonding to concrete or fiberglass grooves, a two-part epoxy, one pint required per 18-inch or 24-inch diameter riser and one quart required per 30-inch diameter riser, Model ADHP10 or ADHQ10, or approved equal shall be used. When bonding to a flanged riser tank adapter, either a two-part epoxy, Model MA320 or equal, or a single component adhesive Model ADH100 or approved equal shall be used.

5. **Riser-To-Tank Attachment:**

Risers shall be attached to tanks with one of the following attachment systems, or approved equal: (1) Orenco Systems®, Inc. Model RUBDKIT attachment kit; (2) Orenco Systems, Inc. Model PRTA24 tank adapter used with Model PRTA24BDKIT bolt down kit, and Model MA320 or ADH100 adhesives; (3) Orenco Systems, Inc.

Model RRFTA tank adapter used with Model RRFTABDKIT bolt down kit and Model ADHP10 adhesive; (4) Orenco Systems, Inc. Model FRTA30 tank adapter should be specified as either a cast in place, bolt down, or adapter for an Orenco FRP tank with use of Model ADH100 adhesive. All attachment components shall be constructed of waterproof, non-corrosive materials, such as PVC, ABS, fiberglass, or stainless steel. Adhesives and sealants shall be waterproof, corrosion resistant and approved for the intended application. The riser-to-tank connection shall be watertight and structurally sound. The riser-to-tank connection shall be capable of withstanding a vertical uplift of 5000 pounds to prevent riser separation due to tank settlement, frost heave, or accidental vehicle traffic over the tank.

6. **Lids:**

One lid shall be furnished with each access riser. Lids shall be Orenco Systems, Inc. Model FL24-4B, FL30G or engineer-approved equal, as appropriate, fiberglass with green non-skid finish, and provided with stainless steel bolts, and wrench. Manufacturer shall provide evidence that lids have been used successfully in continuous field service for a minimum of five years to demonstrate long-term integrity and suitability for the application. Lids shall be waterproof, corrosion resistant and UV resistant. Lids shall be flat, with no noticeable upward dome. A crown or dome of no more than 1/8-inch is allowable. Lids shall not allow water to pond on them. Lids shall have a green non-skid finish. Self-lubricating plastics, such as polyethylene, shall not be considered non-skid without addition of a non-skid coating. Lids shall form a watertight seal with the top of riser. Lids shall be capable of withstanding a truck wheel load (36 square inches) of 2500 pounds for 60 minutes with a maximum vertical deflection of 1-1/2-inch. Lids shall be provided with tamper-resistant stainless steel fasteners and a tool for fastener removal. Tamper-resistant fasteners include recessed drives, such as hex, Torx, and square. Fasteners that can be removed with common screwdrivers, such as slotted and Phillips, or fasteners that can be removed with standard tools, such as pliers or crescent wrenches, are not considered tamper-resistant. To prevent a tripping hazard, fasteners shall not extend above the surface of the lid.

Optional Components

a. Traffic bearing lid: The traffic bearing lid shall be a cast iron frame and cover, part number 6024, 3060, 4036, as manufactured by Sather Manufacturing Co., Inc., or approved equal, which will fit over a standard lid. The cover shall have the word SEWER cast into it.
b. Rigid closed-cell foam insulation of 2-inch thickness shall be mechanically attached to the underside of the lid. All fasteners shall be made of corrosion resistant stainless steel. The insulation shall have an R-value of no less than 10 per 2-inch increment.

7. **Riser Installation:**

Riser installation shall be accomplished according to the manufacturer's instructions.

8. Pump Vault:

Orenco Systems, Inc. Model PVU Series, Universal Biotube® Pump Vault or engineer-approved equal, installed in conformance with the engineer's plans. The filter shall have a minimum effective screen area of no less than 20.6 square feet. (Note: Commercial and multiple-user tanks may require a larger or duplex Biotube® Pump Vault, the sizes of which must be individually determined and spelled out in the specifications.) The Biotube Pump Vault shall consist of a 12-inch diameter HDPE vault with eight (8) 2-inch diameter holes evenly spaced around the perimeter, located appropriately to allow for maximum sludge and scum accumulation before requiring pumping (approximately 70% of minimum liquid level). Housed inside the polyethylene vault shall be the Biotube assembly consisting of 1/8-inch mesh polypropylene tubes. Attached to the vault is a flow inducer to accept one or two high-head effluent pumps.

9. Discharge Hose and Valve Assembly:

Orenco Systems®, Inc. Model HV200BC, 2-inch diameter, 150 psi PVC ball valve, 150 psi PVC check valve, PVC flex hose with minimum working pressure rating of 64 psi, and Schedule 40 PVC pipe. When pumping downhill, include anti-siphon assembly.

10. Float Switch Assembly:

Orenco Systems, Inc. Model MF3A with three switch floats mounted on a PVC stem attached to the filter cartridge. The floats must be adjustable and must be removable without removing the pump vault. The high- and low-level alarms, and override on/off function shall be preset as shown in the engineer's plans. Each float lead shall be secured with a nylon strain relief bushing at the splice box. The floats shall be UL or CSA listed and shall be rated for a minimum of 5.0A @ 120 VAC.

11. High-Head Effluent Pumps:

Must be approved for use in pump vault as described in D8. For most applications, an Orenco Systems, Inc. Model P500712, 3/4 hp, 230 VAC, single phase, 60 Hz, two-wire motor, with 10 foot long extra heavy duty (SO) electrical cord with ground. Pump shall be capable of providing a flow rate of 50 gpm against a head of 58 feet. Pump shall be UL and CSA listed as an effluent pump. Pump shall be provided with a non-prorated five-year warranty. Larger horsepower units are available (1 to 1-1/2 hp, 230 VAC).

12. Electrical Splice Box:

Orenco Systems, Inc. Model SB5, UL approved for wet locations, equipped with five electrical cord grips and a 1-inch outlet fitting. Also included shall be UL listed waterproof butt splice connectors. The use of a UL-approved conduit seal kit shall be required to prevent the passage of gases, vapors, or flames through the conduit. Substitute Model SB3, equipped with three electrical cord grips and a 3/4-inch outlet fitting and Model SBX-S for Class 1, Division 1 applications.

13. Installation:

All pumping system components shall be installed in accordance with the manufacturer's recommendations, the engineer's plans, and all state and local regulations.

D. ADVANTEX TREATMENT SYSTEM:

All components shall be supplied by a reputable manufacturer with at least five years of experience in supplying equipment for onsite wastewater treatment systems. References must be available on request from the engineer.

1. AdvanTex Treatment System:

Orenco Systems, Inc. AX100 AdvanTex Treatment System installed in conformance with the engineer's plans and manufacturer's guidelines. The AX100 is a packed bed filter consisting of a proprietary textile media. The media has been specifically engineered for wastewater applications. The item is patented and the engineer knows of no equivalent.

2. Transport Piping / Fittings:

a. All transport piping and fittings from the recirculation / blend tank shall meet a minimum pressure rating of Schedule 40.
b. The AdvanTex pod return lines shall be 4-inch diameter, Class 125 or higher pressure. All fittings shall be Schedule 40.

3. Installation

All AdvanTex components shall be installed in accordance with the manufacturer's recommendations, the engineer's plans, and all state and local regulations.

E. ADVANTEX VENTILATION SYSTEM:

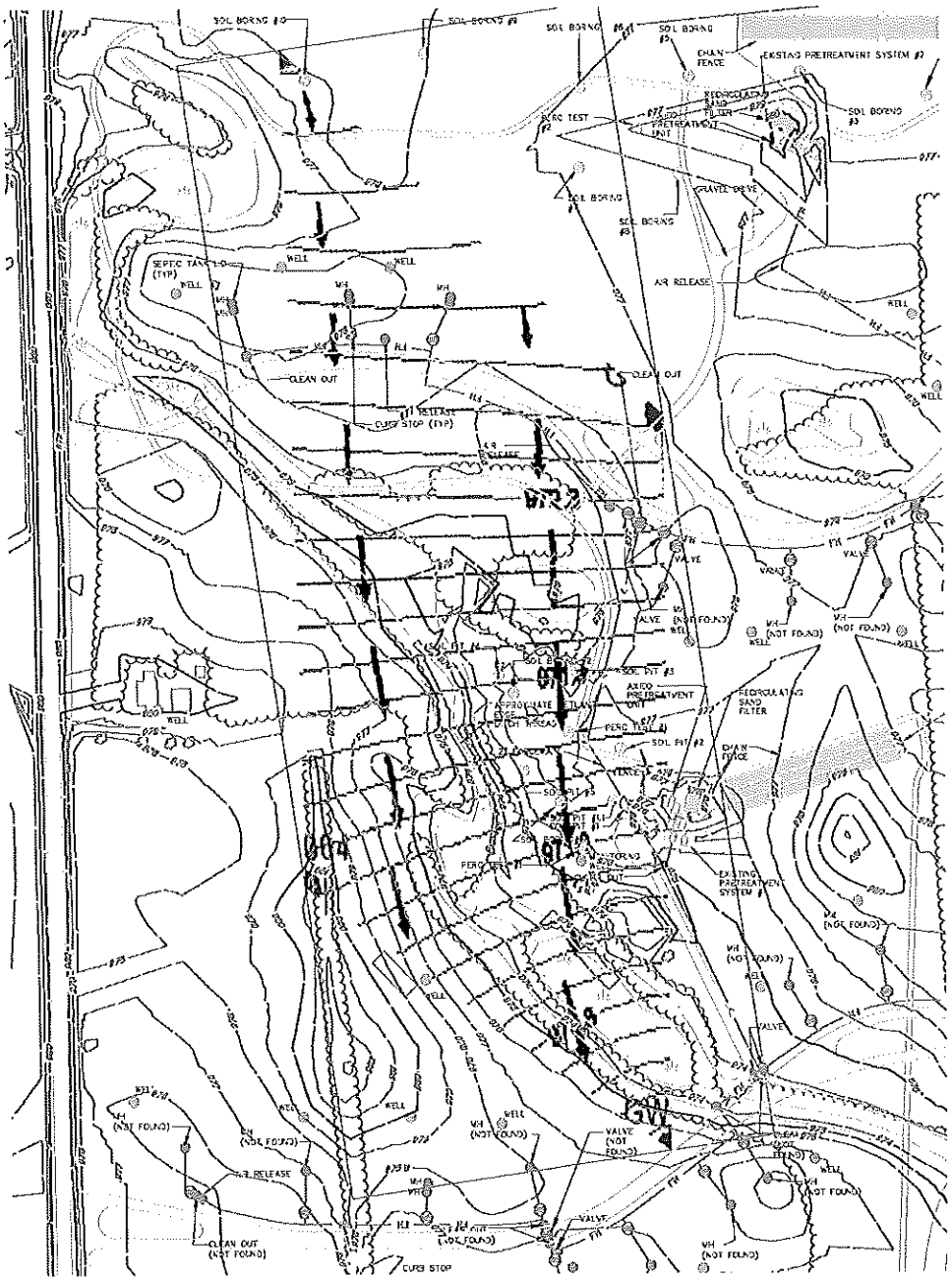
The vent for the AdvanTex treatment system is a passive air vent installed on the return line and on the end of the AdvanTex to provide a continuous flow of air though the filter. See construction plan for installation.

1. Transport Piping / Fittings:

a. All transport piping and fittings from the recirculation / blend tank shall meet a minimum pressure rating of Schedule 40.
b. The air return lines shall be 3 or 4-inch diameter, Class 125 or higher pressure. All fittings shall be Schedule 40.

APPENDIX E

GROUNDWATER MOVEMENT


SOIL BORING #9
SOIL BORING #8
SOIL BORING #7
SOIL BORING #6
CHAIN FENCE
EXISTING PRETREATMENT SYSTEM #2
PERC TEST
SOIL BORING #5
GRAVEL DRIVE
SOIL BORING #4
SEPTIC TANK (TYP)
WELL
MH
AIR RELEASE
CLEAN OUT
CURB STOP (TYP)
VALVE
VALVE (NOT FOUND)
MH (NOT FOUND)
SOIL PIT #3
AXEOO PRETREATMENT UNIT
RECIRCULATING SAND FILTER
PERC TEST #1
SOIL PIT #2
SOIL PIT #1
CHAIN FENCE
EXISTING PRETREATMENT SYSTEM #1
VALVE (NOT FOUND)
CLEAN OUT (NOT FOUND)
CURB STOP

APPENDIX F

SYSTEM CALCULATIONS

Frontier Trails

Septic Design Cales.

Orenco Sizing Requirement:

200 gal/day/home ⇒ Average Flow

335 gal/day/home ⇒ Peak Flow

AX100 Average Flow Treatment

Number of AX100 Pods:

Design Assumes 56% flow to AX100 and 44% flow to existing RSF

North System

20 homes * 200 gpd * 56% / 2500 gpd = 1 pa

South System

21 homes * 200 gpd * 56% / 2500 gpd = 1 pod

AdvanTex® (AX100) Textile Filter
Design Information

Frontier Trails MN

Orenco Systems® Incorporated
1-800-348-9843

Design Inputs

Actual Flow	2,350	gallons/day
Peak Flow	3,940	gallons/day
# of Cells	1	cell
# of Zones per Cell	1	zone
# of Nozzles Per Zone	32	nozzles
Total # of Pumps	2	pumps
# of Pumps Per Dose	1	pump
Design Pump Flow Rate	50	gallons/minute
Pump Model	P500712	3/4 hp; 230 volt
Actual Pump Flow Rate	51	gallons/minute
Normal Recirculation Ratio	5	to 1
Override Recirculation Ratio	5	to 1
Normal Flow Dose rate	2.5	gallons/nozzle/dose
Override Flow Dose rate	2.5	gallons/nozzle/dose

Pump Cycle Times

Normal Run Time %	16.00	Percent
Actual flow ON time	1.57	min./dose
Actual flow Pump Off time	8.20	min.

Override Run Time %	26.82	Percent
Peak flow ON time	1.07	min./dose
Peak flow OFF time	4.78	min.

Normal # of cycles/pump 73 cycles/day/pump

NOTES:
1. Recirculation ratios are typically set at 4:1 initially and should not exceed 5:1
2. Dose rates are preferrably set at 1.9 gnd and should not exceed 2.5 gnd
3. Pump "ON" times should initially be set around 1.5 minutes and should not exceed 2 minutes
4. Cycle/day/pump is base on the normal timer settings (Actual Flow)

Existing

Recirculating Sand Filter Design Information

Orenco Systems® Incorporated
1-800-348-9843

System Design: Frontier Trails RSF

Pump Cycle Times; *see Pump Cycle Times worksheet*

Input Values

Design Flow	3,100	gallons/day
Average Flow	1,850	gallons/day
Number of Cells	1	cell
Number of Zones per Cell	3	zones
Number of Orifices per Zone	72	orifices
Total Number of Pumps	2	pumps
Number of Pumps Per Dose	1	pump
Design Flow Rate	32	gallons/minute
Pump Model	P3005	1/2 hp, 115 V
Actual Pump Flow Rate	32	gallons/minute
Recirculation Ratio	4	to 1 ratio
Gallons/orifice/dose (Design Flow)	0.70	gal/orifice/dose
Gallons/orifice/dose (Average Flow)	0.70	gal/orifice/dose

Output Values

Design Flow		
Run Time %	26.9%	
Pumps On Time	1.58	min./dose
Pumps Off Time	4.28	min./dose
Number of Cycles Per Pump	123	cycles/day/pump
Average Flow		
Run Time %	16.1%	
Pumps On Time	1.58	min./dose
Pumps Off Time	8.23	min./dose
Number of Cycles Per Pump	73	cycles/day/pump

Recirc. Splitter Valve Settings; *see RSV Application Sheet*

Output Values

Q_{RSV} (return flow rate)	22.4	gpm
Q_D (flow rate to disposal)	4.48	gpm

Input Values, *see RSV Application Sheet, Chart 1*

Required Operating Head, h (for RSV3U); use Q_D	17.0	inches
Required Operating Head, h (for RSV4U); use Q_D	6.0	inches

PROJECT DESIGN MANUAL
FOR
FRONTIER TRAILS
BALDWIN TOWNSHIP
SHERBURNE COUNTY, MN

Prepared for: BALDWIN TOWNSHIP

Date:1/31/16

Rev 7/25/16

By BOGART, PEDERSON & ASSOC

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Registered Engineer under the State of Minnesota Statues Sections 326.02 to 326.16

Jon Bogart, P.E.

Date: 1/31/16 Reg. No.19900

file:14-0104.00

Bogart, Pederson
& Associates, Inc.

LAND SURVEYING
CIVIL ENGINEERING
MAPPING

Project information

Information for Attachment 1

Background:
Frontier Trails is a residential subdivision serving 41 single family homes. The system has been in service since 2000.

Description of Existing System:
The original system for the Frontier Trails subdivision was originally designed by John Oliver and Associates in 1999, and modified by Bogart, Pederson & Assoc. in 2006. The design of the system includes septic tanks and a effluent pump at each home, a low head pressurized collection system, a treatment system, and an in-soil disposal system. The facility is split into two roughly equal sized systems approximately 1200 ft apart. System #1 serves 21 homes It lies between 314th and 316th Ave roughly in the center of the subdivision. System #2

Each home has its own septic system. Size and configuration of tank varies with a typical tank being a two compartment tank with a 1000 gallon compartment and a 500 gallon pumping compartment. Each tank has a effluent pump with a filter which pumps to a low head collection system.

The collection system consists of a 4" HDPE SDR11 pipe, a valve between the effluent pump and the collection pipe, a number of valves along the collection pipe allowing isolation of individual sections.

There are two distinct treatment systems. Each consists of the same components. System #1 is located between The components include a 4200 gallon and 7500 gallon recirculation tanks, a 864 sf sand filter, an Advantex AX100 filter, and a 4200 gallon and a 7500 gallon dosing tank.

The in-soil disposal system consists of two subsurface drip irrigation areas.

DMR reports for the years 2011 to 2015 are appended to the end of this report

Location:
Part of Section 7, Township 35, Range 24, Baldwin Township, MN
Current MPCA Permit 0064459

Ultimate release to environment:

Subsurface soil infiltration using a timed dosed pressure bed.

Types of subsurface sewage treatment systems:

Typical effluent being treated will be residential strength waste. The original design called for the following waste strengths to be treated:

BOD: 265mg/l

TSS: 300mg/l

TN: 60 mg/l

These are the expected input strengths to the system from the homes.

The original septic systems were separate but identical treatment systems. These systems together were designed to treat over 10,000 gpd

Attachment 2

Permit flow determination

*Permit flow = the total flow from the ten highest flow dwellings + (total flow from the remaining dwellings * 0.45) + I/I*

Largest size house in the subdivision is 3 bedroom type 1 dwelling. Flow per house is 450gpd. Total number of houses is 41. No additional construction is anticipated. The collection system is 6560 lf of fused 2" HDPE forcemain.

*Qpermit=(10*450gpd)+(31*450gpd*0.45)+200*3450/5280*4=11,294 gpd (7)*

Design Flow
(LSTS Guidance)

Assume 3 bedroom homes
Classification 1 dwellings
Flow per dwelling @ 3 bedroom/dwelling = 450 gpd

North system
Dwellings 20 Permit Flow = 6525 gpd

South Side
Dwellings 21 Permit Flow = 6727.5 gpd

Combined
Dwellings 41 Permit Flow = 10777.5 gpd

Total length of collection system = 6560 LF
Dia of Collection line = 2 in
Infiltration = 200 Gal/in/mile
Total I/I= 516.5354 gpd

Design flow = 11294 gpd use for AWW

System #2 (North) Dosing Tank Design

Assume 3 bedroom homes
Classification 1 dwellings
Flow per dwelling @ 3 bedroom/dwelling = 450 gpd

North system
Dwellings 20 Permit Flow = 6525 gpd

Total length of collection system = 2350 LF
Dia of Collection line = 4 in
Infiltration = 200 Gal/in/mile
Total I/I= 370 gpd

Total Inflow over 24 hours 6895 gpd
Pump to Cycle ever hour
Total Flow per dose 287 Gallons per dose
Assume actual flow is over 16 hours, hourly flow 431 Gallons
Storage required 1152 Gallons
Length of 2" Forcemain to air release 100 ft
Pump is Orenco P200511

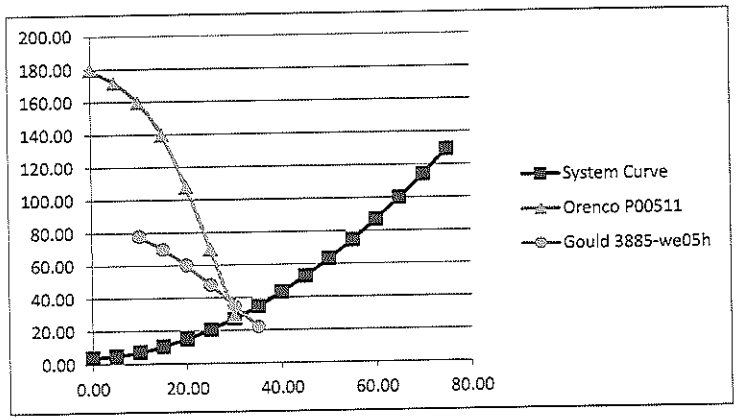
Tank Bottom 964.96 7500 Gallon Dosing tank, System #2
Set Pump Off 966.63 Elevation,
Gallons/in 83.04 Gal/in
Pump On 966.91

2" Forcemain 1261 lf
Elevation at exit 970.58
Elevation at pump off 966.63
Static head 3.95 ft

Pipe C 150 Hazen Williams C $H_L=10.44*L*(Q^{1.85})/(C^{1.85}*D^{4.87})$
Exit Loss: K*q^2/(2g*A^2)

System Curve to System #1

	2 " Pipe															
Q (gpm)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00
Static Head (ft)	3.95	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08
Friction Head (ft)	0.00	0.84	3.01	6.38	10.86	16.41	23.00	30.58	39.15	48.69	59.17	70.57	82.90	96.13	110.26	125.27
Minor Losses (ft)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
Total Head (ft)	3.95	4.92	7.09	10.46	14.94	20.49	27.08	34.66	43.23	52.77	63.25	74.65	86.98	100.21	114.34	129.35
Orenco P200511	180	172	160	140	108	70	29									
Gould 3885-we05h			78	70	60	48	35	22								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System Curve
Orenco P00511
Gould 3885-we05h

System #1 (South) Dosing Tank

Tank is 240"x144"x113"

Use Time Dose

System Curve Dispersal Field #2

Static Head

CL of pipe exit	978.56	ft
Estimated Pumps Off	967.09	ft
Total Static Head	11.47	ft

Dynamic Head

Length of 1.5" Pipe	100	in
Length of 2" Pipe	330	ft

Desc of fitting	No of fittings	K Factor	Eq length/fitting (feet)		
2" 45 deg Elbows	6	0.5	7	43 ft	L=k*d/f
2" 90 deg Elbows	3	0.9	13	38 ft	

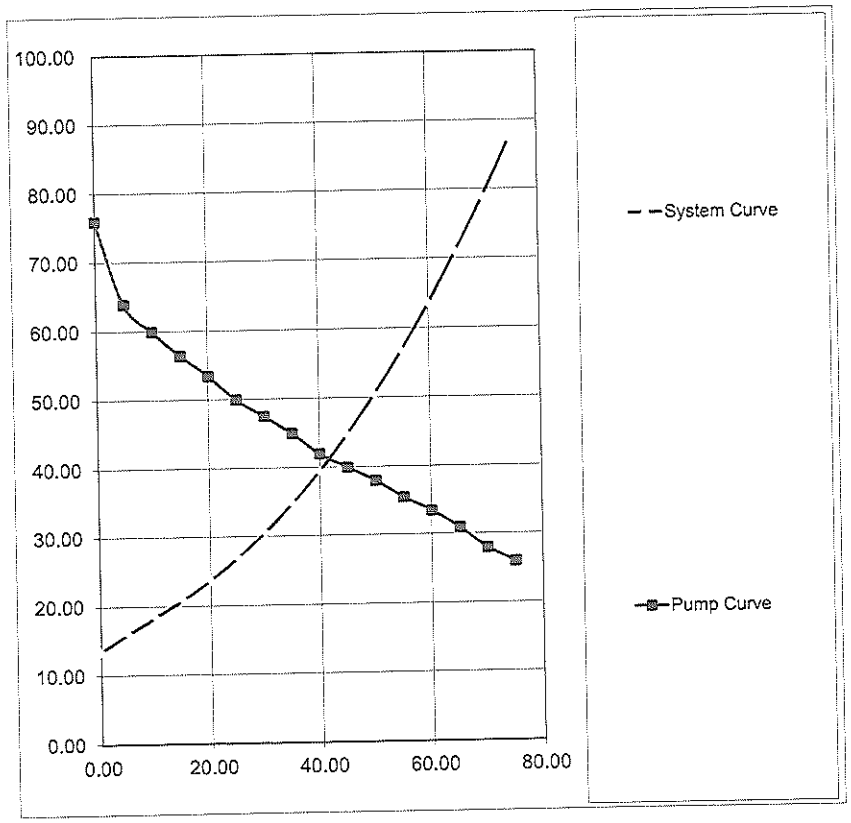
Flowrate 2" pipe	43.56	gpm
Flowrate 1.5"	7.26	gpm
Distribution Valve Loss	14.73	ft
Dynamic Head Laterals	0.54	
Dynamic Head Main line	14.93	
TDH	26.94	
Pipe C	150	

From Orenco model 6606 $h=0.0049*q^2+5.5*(1-e^{(-0.1*q)})$

$H_L=10.44*L*(Q^{1.85})/(C^{1.85}*D^{4.87})$

System Curve At end of Manifold

2 " Pipe																
Q (gpm)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00
H (ft)	0.00	0.27	0.98	2.08	3.54	5.35	7.49	9.96	12.75	15.86	19.27	22.99	27.00	31.31	35.91	40.80
Dist Valve	6606															
Q (gpm)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00
H (ft) from Orenco	0.00	2.29	3.97	5.38	6.72	8.11	9.64	11.34	13.24	15.36	17.71	20.30	23.13	26.19	29.50	33.06
Static Head (ft)	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47
Q (gpm)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00
TDH (ft)	11.47	14.03	16.42	18.93	21.73	24.93	28.60	32.77	37.46	42.69	48.45	54.76	61.60	68.97	76.88	85.33
Residual Head	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
TDH with Residual head (ft)	13.47	16.03	18.42	20.93	23.73	26.93	30.60	34.77	39.46	44.69	50.45	56.76	63.60	70.97	78.88	87.33
Gould 2ed-c	76	64	60	56.5	53.5	50	47.5	45	42	40	38	35.5	33.5	31	28	26



Operation point =	40.5 gpm	41.5 ft TDH
Reqd Dose Volume/Zone =	156.86 Gal	
Pipe Dia from Tank to Valve	2.00 In	
Drainback Volume=	53.82 Gal	

System Curve Dispersal Field #1

Static Head

CL of pipe exit	978.56 ft
Estimated Pumps Off	967.09 ft
Total Static Head	11.47 ft

Dynamic Head

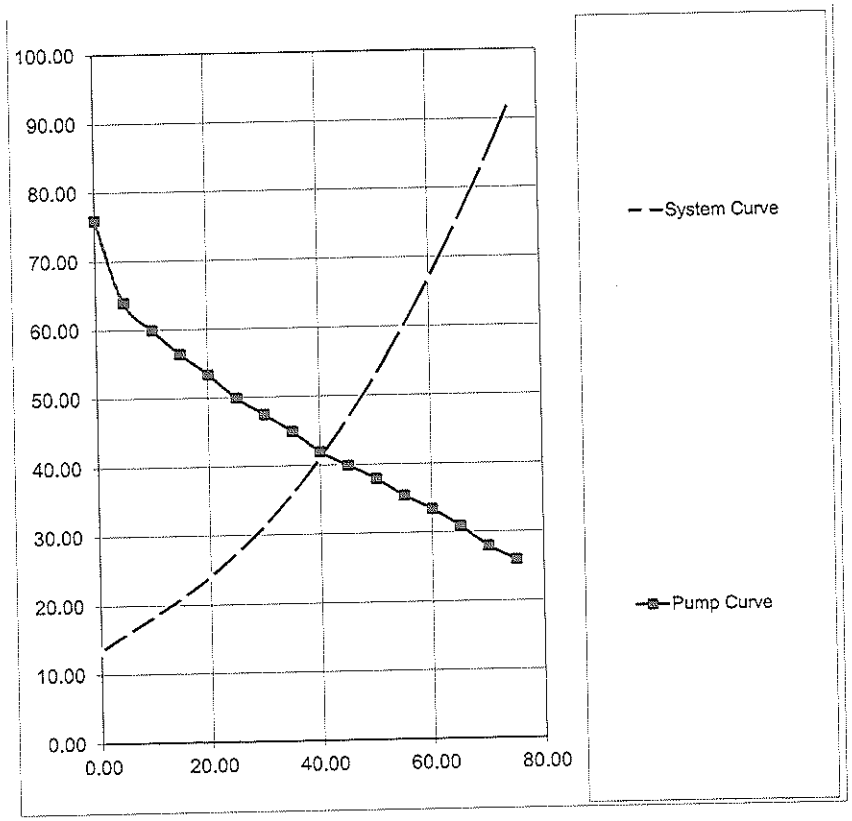
Length of 1.5" Pipe	100 in
Length of 2" Pipe	375 ft

Desc of fitting	No of fittings	K Factor	Eq length/fitting (feet)		
2" 45 deg Elbows	5	0.5	7	35 ft	L=k*d/f
2" 90 deg Elbows	4	0.9	13	51 ft	

Flowrate 2" pipe	43.56 gpm		
Flowrate 1.5"	7.26 gpm		
Distribution Valve Loss	14.73 ft	From Orenco model 6606	h=0.0049*q^2+5.5*(1-e^(-0.1*q))
Dynamic Head Laterals	0.54		
Dynamic Head Main line	16.78	$H_L=10.44*L*(Q^{1.85})/(C^{1.85}*D^{4.87})$	
TDH	28.79		
Pipe C	150		

System Curve At end of Manifold

2 " Pipe																
Q (gpm)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00
H (ft)	0.00	0.31	1.10	2.33	3.97	6.01	8.41	11.19	14.33	17.82	21.65	25.82	30.33	35.18	40.34	45.84
Dist Valve	6606															
Q (gpm)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00
H (ft) from Orenco	0.00	2.29	3.97	5.38	6.72	8.11	9.64	11.34	13.24	15.36	17.71	20.30	23.13	26.19	29.50	33.06
Static Head (ft)	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47
Q (gpm)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00
TDH (ft)	11.47	14.07	16.54	19.18	22.16	25.59	29.52	34.00	39.04	44.65	50.83	57.59	64.93	72.84	81.31	90.37
Residual Head	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
TDH with Residual head (ft)	13.47	16.07	18.54	21.18	24.16	27.59	31.52	36.00	41.04	46.65	52.83	59.59	66.93	74.84	83.31	92.37
Gould 2ed-c	76	64	60	56.5	53.5	50	47.5	45	42	40	38	35.5	33.5	31	28	26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40.00
60.00
80.00
System Curve
Pump Curve

Operation point =	40 gpm		41 ft TDH			
Reqd Dose Volume/Zone =	156.86 Gal					
Pipe Dia from Tank to Valve	2.00 In					
Drainback Volume=	61.16 Gal					
Pump Off Elev=	967.09 El					
Tank id Width =	88 In	Tank ID Length	218 in	Tank Gal/ir	83.04 Gal/in	
Min Pump On Elev=	967.50 El					

Size Dosing Tank
- Expected inflow for 16 hour period, Dosing to be over 24 hour perid

Inflow over 16 hrs =	11294.00 gal			
Outflow over 16 hours =	7529.33 gal			
Reqd Reserve Capacity =	3764.67 gal			
Available Reserve Capacity	588.00 gal	El of inlet invert=	969.09	Hold max depth to 12" below inlet
Difference	3176.67 gal			
Total Number of doses in 24 hours	72.00			
Addfitional dose/cycle req	44.12 gal			
Total Dose per Cycle	254.81 gal			
New min elev pump on	967.35 el			
Use Total Dose per cycle	255.00 Gal			
Rev Outflow over 16 hours =	12240.00 gal			
Required reserve capacity	-946.00 gal			

CycleTime /Pump Dispersal Field #1 =	20.00 min			
Pump Time On =	6.38 min	6 min	23 sec	Pump Run Time
Pump Time Off=	13.63 min	13 min	38 sec	Pump Off time
CycleTime /Pump Dispersal Field #2 =	20.00 min			
Pump Time On =	6.30 min	6 min	18 sec	Pump Run Time
Pump Time Off=	13.70 min	13 min	42 sec	Pump Off time

System #1 (South) Dosing Tank

Tank is 240"x144"x113"

Use Time Dose

System Curve Dispersal Field #2

Static Head

CL of pipe exit	978.56 ft	
Estimated Pumps Off	967.09 ft	
Total Static Head	11.47 ft	

Dynamic Head

Length of 1.5" Pipe	100 in	
Length of 2" Pipe	330 ft	

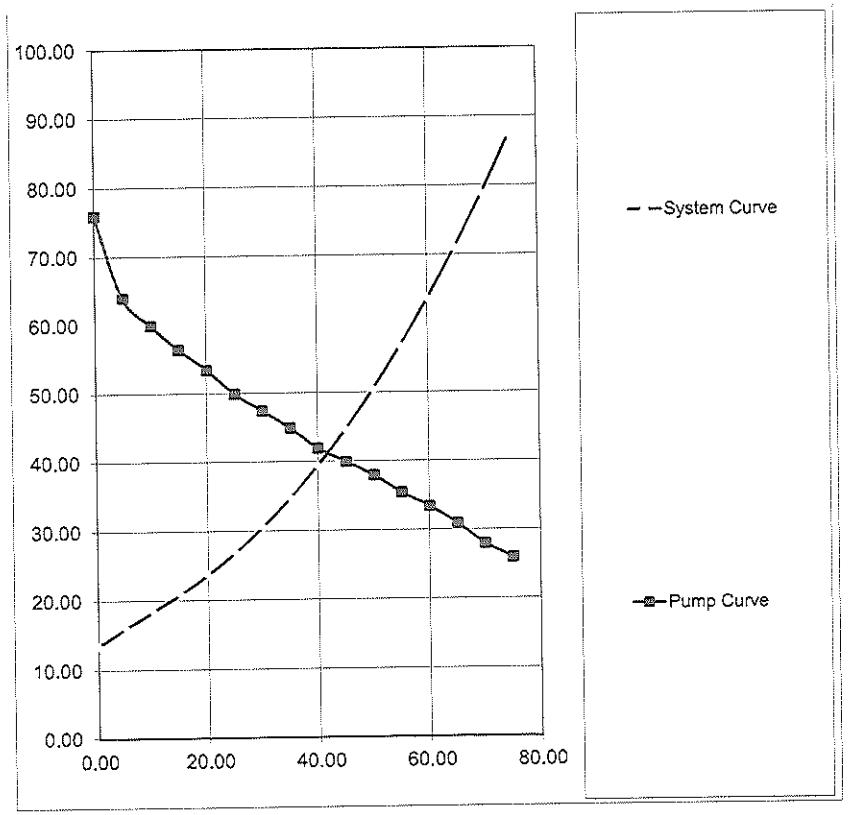
Desc of fitting	No of fittings	K Factor	Eq length/fitting (feet)		
2" 45 deg Elbows	6	0.5	7	43 ft	L=k*d/f
2" 90 deg Elbows	3	0.9	13	38 ft	

Flowrate 2" pipe	43.56 gpm		
Flowrate 1.5"	7.26 gpm		
Distribution Valve Loss	14.73 ft	From Orenco model 6606	h=0.0049*q^2+5.5*(1-e^(-0.1*q))
Dynamic Head Laterals	0.54		
Dynamic Head Main line	14.93	$H_L=10.44*L*(Q^{1.85})/(C^{1.85}*D^{4.87})$	
TDH	26.94		
Pipe C	150		

System Curve At end of Manifold

2 " Pipe																
Q (gpm)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00
H (ft)	0.00	0.27	0.98	2.08	3.54	5.35	7.49	9.96	12.75	15.86	19.27	22.99	27.00	31.31	35.91	40.80
Dist Valve	6606															
Q (gpm)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00
H (ft) from Orenco	0.00	2.29	3.97	5.38	6.72	8.11	9.64	11.34	13.24	15.36	17.71	20.30	23.13	26.19	29.50	33.06
Static Head (ft)	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47
Q (gpm)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00
TDH (ft)	11.47	14.03	16.42	18.93	21.73	24.93	28.60	32.77	37.46	42.69	48.45	54.76	61.60	68.97	76.88	85.33
Residual Head	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
TDH with Residual head (ft)	13.47	16.03	18.42	20.93	23.73	26.93	30.60	34.77	39.46	44.69	50.45	56.76	63.60	70.97	78.88	87.33

Gould 2ed-c	76	64	60	56.5	53.5	50	47.5	45	42	40	38	35.5	33.5	31	28	26



Operation point =	40.5 gpm	41.5 ft TDH
Reqd Dose Volume/Zone =	156.86 Gal	
Pipe Dia from Tank to Valve	2.00 In	
Drainback Volume=	53.82 Gal	

System Curve Dispersal Field #1

Static Head

CL of pipe exit	978.56 ft
Estimated Pumps Off	967.09 ft
Total Static Head	11.47 ft

Dynamic Head

Length of 1.5" Pipe	100 in
Length of 2" Pipe	375 ft

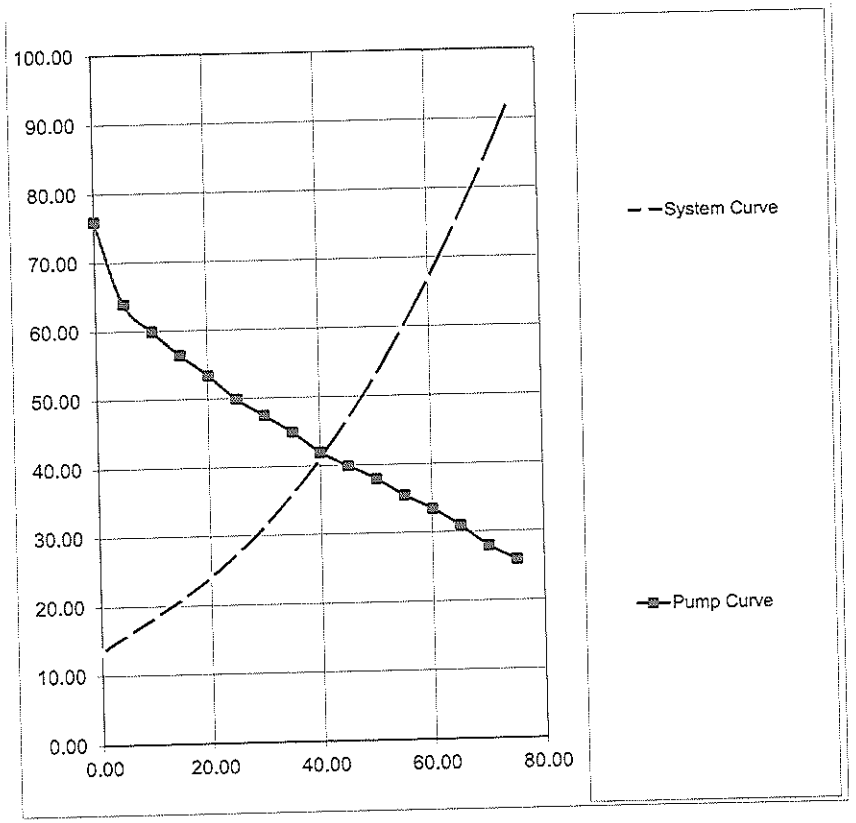
Desc of fitting	No of fittings	K Factor	Eq length/fitting (feet)		
2" 45 deg Elbows	5	0.5	7	35 ft	L=k*d/f
2" 90 deg Elbows	4	0.9	13	51 ft	

Flowrate 2" pipe	43.56 gpm	
Flowrate 1.5"	7.26 gpm	
Distribution Valve Loss	14.73 ft	From Orenco model 6606 h=0.0049*q^2+5.5*(1-e^(-0.1*q))
Dynamic Head Laterals	0.54	$H_L=10.44*L*(Q^{1.85})/(C^{1.85}*D^{4.87})$
Dynamic Head Main line	16.78	
TDH	28.79	
Pipe C	150	

System Curve At end of Manifold

2 " Pipe															
Q (gpm)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00
H (ft)	0.00	0.31	1.10	2.33	3.97	6.01	8.41	11.19	14.33	17.82	21.65	25.82	30.33	35.18	40.34	45.84

Dist Valve	6606															
Q (gpm)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00
H (ft) from Orenco	0.00	2.29	3.97	5.38	6.72	8.11	9.64	11.34	13.24	15.36	17.71	20.30	23.13	26.19	29.50	33.06
Static Head (ft)	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47	11.47
Q (gpm)	0.00	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00
TDH (ft)	11.47	14.07	16.54	19.18	22.16	25.59	29.52	34.00	39.04	44.65	50.83	57.59	64.93	72.84	81.31	90.37
Residual Head	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
TDH with Residual head (ft)	13.47	16.07	18.54	21.18	24.16	27.59	31.52	36.00	41.04	46.65	52.83	59.59	66.93	74.84	83.31	92.37
Gould 2ed-c	76	64	60	56.5	53.5	50	47.5	45	42	40	38	35.5	33.5	31	28	26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80.00
System Curve
Pump Curve

Operation point =	40 gpm		41 ft TDH			
Reqd Dose Volume/Zone =	156.86 Gal					
Pipe Dia from Tank to Valve	2.00 In					
Drainback Volume=	61.16 Gal					
Pump Off Elev=	967.09 El					
Tank id Width =	88 In	Tank ID Length	218 in	Tank Gal/ir	83.04 Gal/in	
Min Pump On Elev=	967.50 El					

Size Dosing Tank
- Expected inflow for 16 hour period, Dosing to be over 24 hour perid

Inflow over 16 hrs =	11294.00 gal			
Outflow over 16 hours =	7529.33 gal			
Reqd Reserve Capacity =	3764.67 gal			
Available Reserve Capacity	588.00 gal	El of inlet invert=	969.09	Hold max depth to 12" below inlet
Difference	3176.67 gal			
Total Number of doses in 24 hours	72.00			
Addfitional dose/cycle req	44.12 gal			
Total Dose per Cycle	254.81 gal			
New min elev pump on	967.35 el			
Use Total Dose per cycle	255.00 Gal			
Rev Outflow over 16 hours =	12240.00 gal			
Required reserve capacity	-946.00 gal			

CycleTime /Pump Dispersal Field #1 =	20.00 min			
Pump Time On =	6.38 min	6 min	23 sec	Pump Run Time
Pump Time Off=	13.63 min	13 min	38 sec	Pump Off time
CycleTime /Pump Dispersal Field #2 =	20.00 min			
Pump Time On =	6.30 min	6 min	18 sec	Pump Run Time
Pump Time Off=	13.70 min	13 min	42 sec	Pump Off time

Attachment 3

Preliminary site evaluation

The preliminary site evaluation is a desktop assessment of the selected LSTS site. The designer shall collect readily available published information from various documents and sources that describe the soils, geology, hydrology, etc. of the region in which the proposed LSTS is located. From this and other information, the designer can estimate, or make assumptions, regarding the following parameters:

A. Location information: *See attached plans.*

B. Treated wastewater characteristics:

- CBOD: *Expected <20 mg/L*
- TSS: *<10 mg/L*
- Total nitrogen: *< 10mg/L*
- Total phosphorus: *<20mg/l*

C. Design AWW flow to LSTS:*11,294 gpd*

D. Soil Type: Fine Sands, Infiltrative Loading rate=*1 gpd/ft*^{2}

E. Minimum soil absorption area = *11,294 sf. To be divided into 4 fields of 2824 sf for each field.*

F. Field length *of 105 feet each field*

G. Field width = *26.9~27ft each field*

H. Total area of soil absorption site = *4*27*105=11340 sf;*

I. Average site recharge rate = *AWW/7.48/Soil absorption area = 11294gpd/7.48g/cf/11340sf = 0.13ft/day*

J. Have the soils been disturbed at the soil absorption site: *No*

K. Soil permeability at drainfield/soil interface:

Three perc tests were taken on the site. See Plan set.

Perc #1=2.0 Mpi

Perc #2=6.1 Mpi

Perc #3=4.7 Mpi

Perc test locations #1 and #3 are either in the locations of the proposed drainfields or immediately adjacent to them. Use Perc #2 for design @ 6.1 Mpi = 9.84 in/hr

L. Soil permeability of most restrictive layer: *Soil borings #1 and #2 are in the general area of the drainfields. See plans. Coarse sand lies beneath the loamy fine sand at the surface. The loamy fine sand is approximately 4 feet thick. The surficial water table exists at ~ 56" on 4/9/15*

M. Depth to seasonal saturation (redoximorphic features):

Test	*Pit Surface Elev*	*Mottling Elev*
1	*975.9*	*974.9*
1.1	*976.4*	*974.2*
2	*976.6*	*974.1*
3	*976.7*	*974.3*
4	*977.0*	*973.5*
5	*976.2*	*972.5*

N. Depth to groundwater: *Use mottling*

O.

Location	*Depth to Mottle*	*Elevation of mottle*
Soil Pit #1	*12" Disturbed*	
Soil Pit #1.1	*27"*	
Soil Pit #2	*30"*	
Soil Pit #3	*29"*	
Soil Pit #4	*42"*	
Soil Pit #5	*44"*	

See Wenck Soils Report

P. Direction of groundwater flow: *Southerly*

Q. Hydraulic conductivity of saturated zone: *~20ft/day*

R. Ground water gradient = *(972.3-971.3)/596.91=0.001675 ft/ft*

S. Thickness of saturated zone: *~30ft See well logs*

T. Specific yield of saturated zone: *~33% (dimensionless) Morris & Johnson 1967 for fine sand*

U. Distance from soil absorption site to downgradient property boundary: *~560ft*

V. Width of soil absorption site perpendicular to the direction of groundwater flow: *215ft*

W. Ambient nitrogen concentration of groundwater upgradient of soil absorption site: *12mg/L*

X. Average daily groundwater recharge from precipitation: *7in/year or 0.0016 ft/year*

Y. Distance to nearest surface water that receives groundwater discharge: *~170ft*

Z. For platted subdivisions, will the development be provided with a community water system or will each residential lot have its own private well?

____ Community water __*x*__ Private wells

Z. Distance to nearest water-supply well: *~160 ft. A variance for this well is being applied for with the Department of Health.*

AA. Indicators of high phosphorus attenuation potential:

- Soil with high levels of iron and aluminum oxides: ____ Yes ____ No
- Soil with high levels of calcium and magnesium carbonates: ____ Yes __*x*__ No
- Soil with high levels of clay minerals: ____ Yes __*x*__ No
- Soil with medium to fine texture: __*x*__ Yes ____ No
- Soil with high or low pH: ____ Yes __*x*__ No
- Large volume of unsaturated soil below soil absorption site: ____ Yes __*x*__ No
- Will portions of the soil absorption site be routinely rested for long periods of time (months): ____ Yes __*x*__ No

Using the information obtained from the desktop review of available information, please address the following preliminary evaluations:

1. Soil suitability assessment

A. Estimate a soil sizing factor for the soil absorption site based on soil information and effluent characteristics. *Use soil sizing factor = 1*

B. Select an effluent distribution method *Pressurized Bed*

C. Provide your preliminary assessment regarding the soil's long-term hydraulic acceptance rate for the chosen treatment and distribution method. *Hydraulic long term acceptance should be adequate. Material is fine sand.*

D. Will further detailed investigation be necessary to assess the suitability of on-site soils to accept wastewater at the proposed acceptance rate? *No. There should be no biomat or other factors that develop over time to deter hydraulic acceptance as would in a gravity trench system.*

1 Minnesota R. 4725.4450, adopted on August 4, 2008, requires a minimum separation distance of 300 feet from the soil adsorption area of a LSTS to water-supply wells. This separation distance increases to 600 feet for sensitive water-supply wells. A sensitive water-supply well is a water supply well with less than 50 feet of watertight casing where the casing does not penetrate a confining layer or multiple layers of confining materials with an aggregate thickness of ten feet or more.

2. Unsaturated treatment zone assessment

A. Estimate the height of ground-water mounding above the saturated zone. *5.1" See gmound model The model predicts a mounding of 5.1 inches for long term operation of the system. The assumed ground water elevation in the model was the highest mottled soil elevation.*

B. Evaluate the potential for vadose zone mounding above a restrictive soil layer. *The restrictive layer in this case would be the surficial aquifer which varies over time. Mottling provides the best source of repeated wetting and drying of the soil and thus of the highest groundwater elevation or elevation of the most restrictive layer. From modeling we can estimate a high of 5.1" of mounding under the drain/dispersal field.*

C. Provide your preliminary assessment regarding the long-term maintenance of an unsaturated treatment zone of adequate thickness. *Due to the low expected BOD and TSS of the effluent (<30 BOD and <30 TSS) there should be little need for long term maintenance of the drainfield. No biomat or FOG impediments to infiltration in the soil should develop.*

D. Will further detailed investigation be necessary to assess whether an unsaturated treatment zone of adequate thickness will be maintained after full operation of the LSTS? *A shallow monitoring well or peizometer will be constructed in the bed as part of the construction of the pressure beds.*

3. Nitrogen impact assessment (for those selecting Option #2 only) Not used
This option cannot be used where the nitrogen dilution cannot be modeled, such as karst *geology.*

4. Phosphorus impact assessment *(for systems within 500 feet of a surface waterbody)*

The drain/dispersal field is not located within 500 feet of an open surface waterbody.

A. Estimate whether groundwater flow direction is toward a surface water body.

No. The groundwater flow is parallel to the swale which is adjacent to the drain/dispersal fields.

B. Evaluate if surficial groundwater discharges to the surface water.

A dry swale exists fifty to seventy-five to the west of the proposed drain/dispersal field.

C. Determine whether soil characteristics and other information suggest a high potential for longterm phosphorus attenuation. *I do not believe the potential exists for longterm phosphorus attenuation leaving the site. Mitigating any transfer of phosphorus leaving the site is a multi acre wetland lying downstream of both the swale and the surficial groundwater. Any transfer of wetland would likely be taken up in this wetland.*

D. Provide your preliminary assessment regarding the impact of phosphorus to nearby surface water. *None*

E. Will further detailed investigation be necessary to assess potential phosphorus impacts to surface waters? Explain why or why not. *There are not any open water surface wetlands close to the site.*

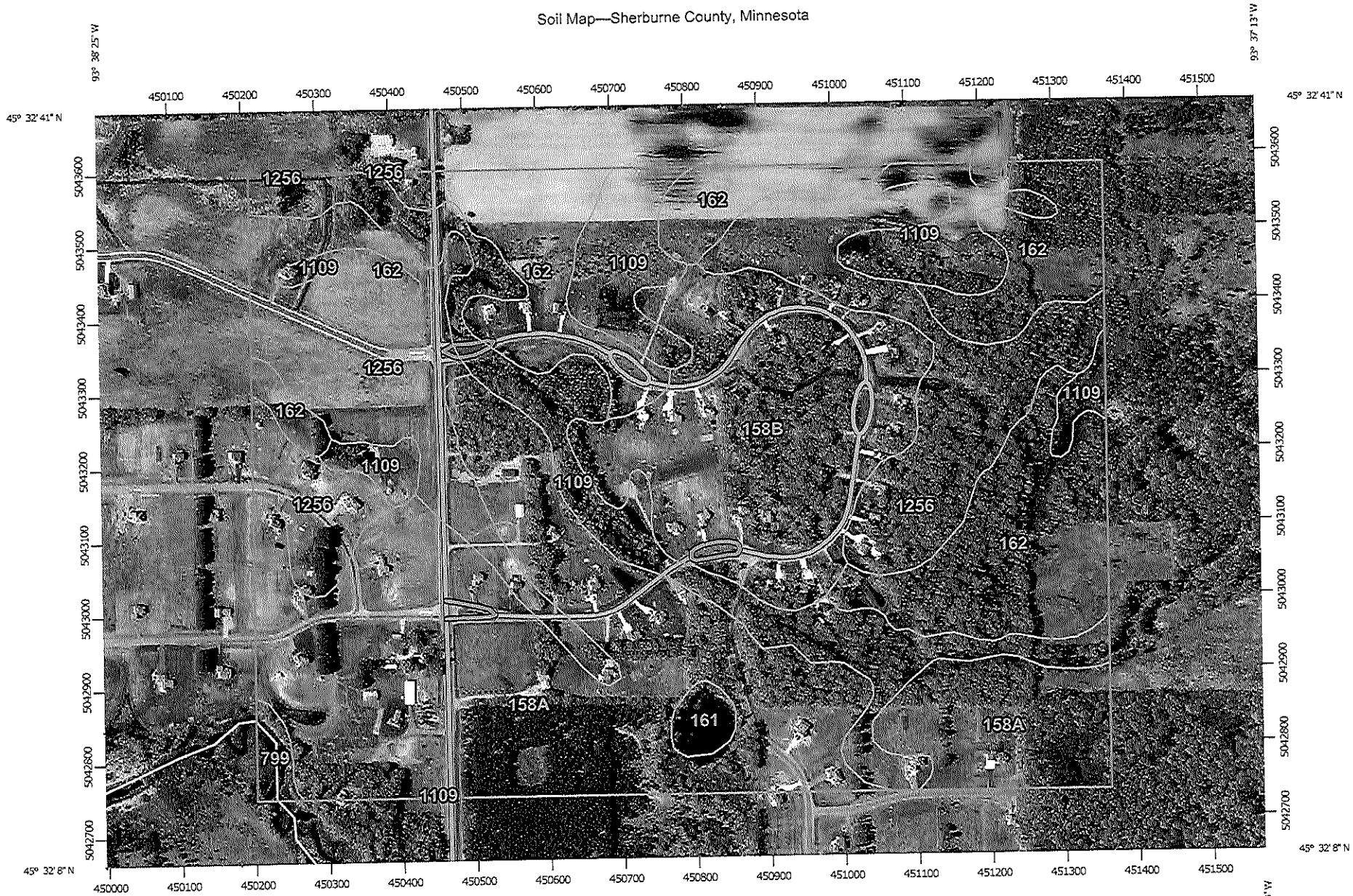
Attachment 4A

Soils evaluation form

All information requested on this boring log must be submitted to properly design the soil treatment and dispersal system. The method to observe and describe the soil is found in the USDA Field Book for Describing and Sampling Soils.

See Wenck Soils Report

Soil Map—Sherburne County, Minnesota



Map Scale: 1:7,190 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 100, 200, 400, 600

Feet: 0, 300, 600, 1200, 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

USDA Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

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: http://websoilsurvey.nrcs.usda.gov
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: Sherburne County, Minnesota
Survey Area Data: Version 11, Sep 16, 2014

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

Date(s) aerial images were photographed: Data not available.

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

Sherburne County, Minnesota (MN141)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
158A	Zimmerman fine sand, 0 to 3 percent slopes	74.7	30.5%
158B	Zimmerman fine sand, 1 to 6 percent slopes	34.1	14.0%
161	Isanti fine sandy loam, depressional, 0 to 1 percent slopes	1.7	0.7%
162	Lino loamy fine sand, 0 to 2 percent slopes	44.5	18.2%
799	Seelyeville and Bowstring soils, 0 to 1 percent slopes, frequently flooded	1.4	0.6%
1109	Isanti loamy fine sand, 0 to 2 percent slopes	39.3	16.1%
1256	Cantlin loamy fine sand, 0 to 3 percent slopes	48.8	19.9%
Totals for Area of Interest		**244.5**	**100.0%**

WENCK
ASSOCIATES

Responsive partner.
Exceptional outcomes.

March 18, 2016

Jon Bogart
Bogart Pederson
13076 1st Street
Becker, MN 55308

RE: Frontier Trails LSTS Soil Investigation

Mr. Bogart:

On March 11, 2016, Wenck Associates, Inc. (Wenck) conducted a soil investigation for the proposed Large Sewage Treatment System (LSTS) soil dispersal system to serve the Frontier Trail housing development in Baldwin Township. The site is a flat plain, and the Sherburne County Soil Survey shows the site dominated by the Zimmerman fine sand soil map unit.

Wenck observed soil conditions at 6 test pits to determine soil texture, structure, and depth to any limiting condition in the proposed LSTS soil dispersal area. The investigation shows that the site features loamy sand topsoil underlain predominantly by fine sands (some medium sand layers were also observed). Depth to seasonal saturated soils ranged from 27 inches to 44 inches in Soil Pits 1.1 through 5. Other features observed in these test pits (deep root penetration and illuviation of topsoil deep into the subsoil) indicate these soils provide for relatively unimpeded vertical water movement above the seasonally saturated soil layers. Soil observation logs are attached.

Indicators of compaction (platy structure and root limiting conditions) and seasonal water table within 12 inches of the surface were observed in Soil Pit 1. A second test pit (Soil Pit 1.1) was excavated approximately 15 feet northwest. The compaction and shallow seasonally saturated soils were not observed in this test pit or any subsequent test pits. The compaction observed in Soil Pit 1 is likely related to this pit's close proximity to the existing LSTS treatment system tank field. The soils at Soil Pit 1 may have been compacted during the installation of the wastewater treatment system in the early 2000s.

Sincerely,

Wenck Associates, Inc.

Peter Miller, Professional Soil Scientist #42636

Soil Profile Description

Date Completed: 3/11/2016
Completed By: Matthew Summers

Project Baldwin Township - Frontier Trail
Landscape Position Plain
Mapped Soil Type 158B Zimmerman fine sands

Test Pit # SP 1
Equipment: Backhoe Pit
Depth to Seasonal Saturation or other Limiting Condition 12"
Vegetation Woody shrubs and grasses
Mapped Parent Material Outwash

Horizon Bottom Depth (inches)	Matrix Color	Texture	Structure/Consistence	Redoximorphic Features	Notes
12	10YR 2/2	loamy sand	weak, medium and fine, granular, v. friable		
19	10YR 3/2	loamy sand	strong, medium, platy, friable	5% 7.5YR 4/6 fine and medium redox concentrations	Platy structure. Root limiting layer, roots horizontal, none extend deeper than the platy horizon
24	10YR 4/3	sand	single grain, loose (compacted)	5% 7.5YR 4/6 fine and medium redox concentrations	compacted, no roots
40	10YR 5/3	sand	single grain, loose	15% 7.5YR 5/6 and 5/8 medium redox concentrations	no roots

This soil investigation was conducted under my supervision and I am a licensed Minnesota Professional Soil Scientist.

Peter Miller, PSS #42636

Soil Profile Description

Date Completed: 3/11/2016
Completed By: Matthew Summers

Project: Baldwin Township - Frontier Trail
Landscape Position: Plain
Mapped Soil Type: 158B Zimmerman fine sands

Test Pit #: SP 1.1
Equipment: Backhoe Pit
Depth to Seasonal Saturation or other Limiting Condition: 27"
Vegetation: Woody shrubs and grasses
Mapped Parent Material: Outwash

Horizon Bottom Depth (inches)	Matrix Color	Texture	Structure/Consistence	Redoximorphic Features	Notes
17	10YR 3/2	loamy sand	weak, medium and fine, granular, v. friable		
27	10YR 4/3	fine sand	single grain, loose		Virtical fingers of illuviated topsoil extending into subsoil
38	10YR 5/3	fine sand	single grain, loose	10% 7.5YR 4/6 fine and medium redox concentrations, 5% 2.5Y 6/1 fine depletions	deep root penetration

This soil investigation was conducted under my supervision and I am a licensed Minnesota Professional Soil Scientist.

Peter Miller, PSS #42636

Soil Profile Description

Date Completed: 3/11/2016
Completed By: Matthew Summers

Project: Baldwin Township - Frontier Trail
Landscape Position: Plain
Mapped Soil Type: 158B Zimmerman fine sands

Test Pit #: SP 2
Equipment: Backhoe Pit
Depth to Seasonal Saturation or other Limiting Condition: 30"
Vegetation: Woody shrubs and grasses
Mapped Parent Material: Outwash

Horizon Bottom Depth (inches)	Matrix Color	Texture	Structure/Consistence	Redoximorphic Features	Notes
12	10YR 3/2	loamy sand	weak, medium and fine, granular, v. friable		
30	10YR 4/3	fine sand	single grain, loose		Virtical fingers of illuviated topsoil extending into subsoil
42	10YR 6/3	sand	single grain, loose	25% 7.5YR 4/6 fine and medium redox concentrations, 10% 2.5Y 5/1 fine depletions	deep root penetration

This soil investigation was conducted under my supervision and I am a licensed Minnesota Professional Soil Scientist.

Peter Miller, PSS #42636

Soil Profile Description

Date Completed: 3/11/2016
Completed By: Matthew Summers

Project: Baldwin Township - Frontier Trail
Landscape Position: Plain
Mapped Soil Type: 158B Zimmerman fine sands

Test Pit #: SP 3
Equipment: Backhoe Pit
Depth to Seasonal Saturation or other Limiting Condition: 29"
Vegetation: Woody shrubs and grasses
Mapped Parent Material: Outwash

Horizon Bottom Depth (inches)	Matrix Color	Texture	Structure/Consistence	Redoximorphic Features	Notes
13	10YR 3/2	sand	weak, medium and fine, granular, v. friable		
29	10YR 4/4	fine sand	single grain, loose		Virtical fingers of illuviated topsoil extending into subsoil
42	10YR 5/3	fine sand	single grain, loose	25% 7.5YR 4/6 fine and medium redox concentrations, 10% 2.5Y 5/1 fine depletions	deep root penetration

This soil investigation was conducted under my supervision and I am a licensed Minnesota Professional Soil Scientist.

Peter Miller, PSS #42636

Soil Profile Description

Date Completed: 3/11/2016
Completed By: Matthew Summers

Project: Baldwin Township - Frontier Trail
Landscape Position: Plain
Mapped Soil Type: 158B Zimmerman fine sands

Test Pit #: SP 4
Equipment: Backhoe Pit
Depth to Seasonal Saturation or other Limiting Condition: 42"
Vegetation: Woody shrubs and grasses
Mapped Parent Material: Outwash

Horizon Bottom Depth (inches)	Matrix Color	Texture	Structure/Consistence	Redoximorphic Features	Notes
18	10YR 3/2	loamy sand	weak, medium and fine, granular, v. friable		
26	10YR 4/3	fine sand	single grain, loose		Virtical fingers of illuviated topsoil extending into subsoil
42	10YR 4/4	fine sand	single grain, loose		
50	10YR 6/3	fine sand	single grain, loose	25% 7.5YR 4/6 fine and medium redox concentrations, 10% 2.5Y 6/1 fine depletions	deep root penetration

This soil investigation was conducted under my supervision and I am a licensed Minnesota Professional Soil Scientist.

Peter Miller, PSS #42636

Soil Profile Description

Date Completed: 3/11/2016
Completed By: Matthew Summers

Project: Baldwin Township - Frontier Trail
Landscape Position: Plain
Mapped Soil Type: 158B Zimmerman fine sands

Test Pit #: SP 5
Equipment: Backhoe Pit
Depth to Seasonal Saturation or other Limiting Condition: 44"
Vegetation: Woody shrubs and grasses
Mapped Parent Material: Outwash

Horizon Bottom Depth (inches)	Matrix Color	Texture	Structure/Consistence	Redoximorphic Features	Notes
22	10YR 3/2	loamy sand	weak, medium and fine, granular, v. friable		
29	10YR 4/3	fine sand	single grain, loose		Virtical fingers of illuviated topsoil extending into subsoil
44	10YR 4/4	fine sand	single grain, loose		
60	10YR 6/3	fine sand	single grain, loose	20% 7.5YR 4/6 fine and medium redox concentrations, 10% 2.5Y 6/1 fine depletions	deep root penetration, bottom of pit saturated (app. 62")

This soil investigation was conducted under my supervision and I am a licensed Minnesota Professional Soil Scientist.

Peter Miller, PSS #42636

Attachment 4B

Loading rate table

This chart determines a soil dispersal system loading rate based on infiltration /absorption capabilities of the soil. The final loading rate may be less if another design constraint (e.g., groundwater mounding) is excessive at the loading rates provided in this table.

The soil condition at the proposed depth of the soil dispersal system is used for determining the loading rate. If more restrictive layers are present below the system, those values may also be used for sizing (but are not required). However the more restrictive layer may result in unacceptable groundwater mounding at the lower loading rate.

Soil classification	Soil texture (USDA)	Soil structure (USDA)	BOD 30 to 220 mg/L and TSS 30 to 150 mg/L (gpd/ft^2)	BOD < 30 mg/L and TSS < 30 mg/L (gpd/ft^2)
1	Coarse sand	Single grain	1.2	1.6
2	Medium sand, loamy sand	Single grain	1.2	1.6
3	Fine sand, loamy fine sand	Single grain	0.6	1.0
4	Sandy loam	Weak to strong	0.8	1.0
5	Sandy loam	Massive or platy	0.6	0.7
6	Loam	Moderate to strong	0.6	0.8
7	Loam	Weak or platy	0.5	0.6
8	Loam	Massive	0.4	0.5
9	Silt loam	Moderate to strong	0.5	0.8
10	Silt loam	Weak or platy	0.4	0.6
11	Silt loam	Massive	---	0.24
12	Sandy clay loam, clay loam, silty clay loam	Moderate to strong	0.45	0.6
13	Sandy clay loam, clay loam, silty clay loam	Weak or platy	0.3	0.3
14	Sandy clay loam, clay loam, silty clay loam	Massive	---	---
15	Sandy clay, clay, silty clay	Strong	0.24	0.24
16	Sandy clay, clay, silty clay	Weak to moderate, massive, or platy	---	---

* The soil structure must have a moist consistency of loose, very friable, friable, or firm as determined by the *Field Book for Describing and Sampling Soils* (NRCS, USDA).

Attachment 5

Pathogen treatment

The pathogen-reduction methods that can be manipulated in system design are:

- Pathogen reduction treatment units
- Loading rates to the soil dispersal system
- Dosing frequency to the soil dispersal system
- Thickness of unsaturated soil treatment zone
- Disinfection units

Step 1 List the design loading rate based on the soils infiltration capacity in Attachment 4B.
1.0 gpd/ft^2 (1)

Step 2 Determine the fecal organism concentration that can be achieved from the pathogen- reduction treatment device. *13500cfu/100 ml* (2)

Step 3 Convert concentration in Step 2 into a log value: *4.13* (3)

Step 4 Determine the soil texture of unsaturated zone:

Soil classification of unsaturated treatment zone from Attachment 4B	**Soil textural terms used in log reduction table**
Classification 1-3	Sandy Soil Treatment Area
Classification 4-11	Loamy Soil Treatment Area
Classification 12-16	Clayey Soil Treatment Area

Textural Class is sandy soil

Step 5 Determine the estimated height of the capillary fringe from the table below

Soil Texture	**Adverse effect of the capillary fringe**
Sandy	1.5
Loamy	6
Clayey	12

Height of Capillary Fringe = *1.5"*

Step 6 Choose dosing frequency: *12 doses/day (6)*

Step 7 Reduction of fecal organisms by a clogging mat

Mat	Log *reduction*
No clogging mat	0
With clogging mat	2.0

Reduction =0 (7)

Step 8 Determine the fecal organism reduction (in logs) from the charts on the following chart (use information from Steps 1, 4, and 6)

Log reduction/inch = *0.140 (8)*

Step 9 Calculate the minimum necessary unsaturated thickness needed for pathogen treatment:

	-	/	+	=	inches
4.13 (3)	*0* (7)	*0.140* (8)	*1.5* (5)	*31*	

Some of the variables can be adjusted if the calculated unsaturated thickness is undesirable.

Since the calculated thickness is needed during system operation for pathogen treatment, the anticipated groundwater mound as determined by the Hydrogeologic Evaluation (Section 9), must not infringe on this thickness. Therefore, the designed system depth/height of the bottom of the distribution medium can be calculated as shown below:

Depth to limiting layer (in.)	- Needed unsaturated thickness (in.)	- Groundwater mounding (in.)	=	Depth/height of system (A negative number is an elevated system.)
24	31	0		-7

Use 36" unsaturated soil, elevate system by 12"

Sandy Soil

Loading Rate (gal/ft.2/day)

Dosing frequency doses/day	0.24	0.48	0.72	0.96	1.2	1.4	1.9	2.4	2.9	3.4	3.8
1											
2	0.152	0.141	0.13								
4	0.163	0.15	0.137	0.117							
6	0.173	0.159	0.144	0.123	0.113	0.171					
8	0.184	0.168	0.152	0.13	0.118	0.107	0.084				
10	0.194	0.177	0.159	0.136	0.124	0.112	0.088	0.07			
12	0.205	0.186	0.166	0.142	0.13	0.117	0.092	0.074	0.056		
14	0.215	0.194	0.173	0.149	0.136	0.123	0.096	0.078	0.06	0.043	
16	0.226	0.203	0.181	0.155	0.142	0.128	0.1	0.082	0.065	0.047	0.031
18	0.236	0.212	0.188	0.161	0.148	0.133	0.104	0.086	0.069	0.052	0.036
20	0.247	0.221	0.195	0.168	0.153	0.138	0.108	0.09	0.073	0.056	0.04
22	0.257	0.23	0.203	0.174	0.159	0.143	0.112	0.095	0.078	0.061	0.044
24	0.278	0.248	0.217	0.187	0.171	0.154	0.119	0.103	0.086	0.07	0.053

Loamy Soil

Loading Rate (gal/ft2/day)

Dosing frequency doses/day	0.24	0.48	0.72	0.96	1.2	1.4	1.9	2.4	2.9
1									
2	0.183								
4	0.195	0.18							
6	0.208	0.191	0.173						
8	0.221	0.201	0.182	0.156					
10	0.233	0.212	0.191	0.163	0.149				
12	0.246	0.223	0.199	0.171	0.156	0.141			
14	0.258	0.233	0.208	0.178	0.163	0.147			
16	0.271	0.244	0.217	0.186	0.17	0.153	1.2		
18	0.284	0.255	0.226	0.194	0.177	0.160	0.124	0.124	
20	0.296	0.265	0.235	0.201	0.184	0.166	0.129	0.109	
22	0.309	0.276	0.243	0.209	0.191	0.172	0.134	0.114	
24	0.334	0.297	0.261	0.224	0.205	0.184	0.143	0.123	0.104

Clayey Soil

Loading Rate (gal/ft2/day)

Dosing frequency doses/day	0.24	0.48	0.72	0.96	1.2	1.4
1						
2						
4	0.212					
6	0.225					
8	0.239	0.218				
10	0.253	0.23				
12	0.266	0.241	0.216			
14	0.28	0.253	0.226			
16	0.294	0.264	0.235	0.202		
18	0.307	0.276	0.245	0.21		
20	0.321	0.288	0.254	0.218	0.199	
22	0.335	0.299	0.264	0.226	0.207	0.199
24	0.362	0.322	0.283	0.243	0.222	0.2

Attachment 6

Nitrogen treatment

Use permitting option #1

Permitting option #1:

This option requires the design of a nitrogen pretreatment system to achieve 10 mg/L total nitrogen as N *prior to* discharge to the soil dispersion portion of the facility. **An end-of-pipe (EOP) limit of 10 mg/L total nitrogen as N will be applied as a calendar month average.**

Permitting option #2:

This option allows any combination of nitrogen pretreatment devices, soil and groundwater nitrogen reductions and dilution by down-gradient green space (precipitation recharge) to comply with the 10mg/L nitrate plus nitrite nitrogen (as N) groundwater limit. An up-front, detailed hydrogeologic assessment and dilution/dispersion modeling are required as part of the design process. Based on the results of the assessment, **the MPCA will assign an EOP limit (above 10 mg/L total nitrogen as N) and groundwater monitoring to validate the modeling results.**

BIOWATER TECHNOLOGY

Process Design
Data Entry

Client Name:	EHS	**Proposed System Type:**	CMFF® - Pre DN-AE-Post DN
Location:	Frontier Trails	**Type of Wastewater:**	Municipal
Project Name:	Frontier Trails	**Treatment Type:**	Total Nitrogen Removal
Representative:	EHS	**Primary Treatment Type:**	Client Specified

US

1) Select US or METRIC design basis
2) Enter Values in Yellow Cells
3) Select Primary Treatment Type, even if NO PE
4) Enter Primary Efficiency Cell Calculation

METRIC	Average flow:		or	0.00 MGD
	Wet weather:		or	0.00 MGD
	Design DWF:		or	0.00 MGD

US	Average flow:	0.01104 MGD	or	42 m3/d
	Wet weather:	0.01104 MGD	or	2 m3/h
	Design DWF:	0.01104 MGD	or	2 m3/h

Population Equivalent	100

CHARACTERISTICS

Parameter	Concentrations mg/L		Loads at average flow kg/d		Loads at average flow lb/d	
	Influent	Primary treated	Influent	Primary treated	Influent	Primary treated
Total BOD5	5	5	0	0	0	0
Filtered BOD5		0	0	0	0	0
Total COD		0	0	0	0	0
Filtered COD		0	0	0	0	0
Total N	35.00	35	1	1	3	3
NH4-N	2.00	2	0	0	0	0
TKN	3.00	3.00	0	0	0	0
Nitrate & Nitrite	32.00	32.00	1	1	3	3
Total P		0	0	0	0	0
PO4-P		0	0	0	0	0
TSS	10	10	0	0	1	1
VSS		0	0	0	0	0
Alkalinity, mmol/L & kmol/d		0	0	0	0	0

EFFLUENT REQUIREMENTS

Parameter	Concentrations, mg/L mg/L Effluent	Loads at average flow kg/d Effluent	Loads at average flow lb/d Effluent
Total BOD5	30	1	3
Filtered BOD5		0	0
Total COD		0	0
Filtered COD		0	0
Total N	10	0	1
NH4-N		0	0
TKN		0	0
Nitrate & Nitrite		0	0
Total P		0	0
PO4-P		0	0
TSS	30	1	3
VSS		0	0

Biological Process Design Temperature	10 C 50.00 F

Max Temp for Aeration	21 C 69.80 F	**Elevation** 500.00 FT AMSL

BIOWATER TECHNOLOGY

CMFF®
PROCESS DESIGN CALCULATIONS

Client Name:	EHS	**Proposed System Type:**	CMFF® - Pre DN-AE-Post DN
Location:	Frontier Trails	**Type of Wastewater:**	Municipal
Project Name:	Frontier Trails	**Treatment Type:**	Total Nitrogen Removal
Representative:	EHS	**Primary Treatment Type:**	Client Specified

DN CMFF® REACTOR DESIGN

DN CMFF® Surface Area Loading Rate (SALR) Determination

Type of Wastewater: Municipal — Provided from Entry Page
DN CMFF® SALR = 0.54 g NOx/m2/ day
DN CMFF® SALR = ____ Override only if pilot data or verifiable information is known

SALR Temperature Correction

$$\text{DN CMFF® } SALR = r_{SALR,d} \times \theta^{(Td\,-Ts)}$$

DN CMFF® SALR = g NOx/m2/ day, valid between 5C and 25C
$r_{SALR,d}$ = Standard SALR at Standard Temperature g NOx/m2/ day
θ = Temperature Coefficient Theta
Td = Biological Process Design Temperature (°C)
Ts = Standard Temperature (°C)

$r_{SALR,d}$ = 0.54 g NOx/m2/ day
θ = 1.07
Td = 10 (°C)
Ts = 10 (°C)

DN CMFF® SALR = 0.54 g NOx/m2/ day

TN Removal Required Calculation

$$TN\ Removal\ Required = NOx\ out\ of\ Pre-DN + (0.35 \times DO \times MLR) \times \left(\frac{Kg}{1000\ g}\right)$$

TN Removal Required = Amount of Nitrogen to remove (Kg TN/day)
NOx = Influent NO_x load (Kg TKN/day)
Assimilation = Amount of Nitrogen used for BOD destruction (kg/day)
TN_{eff} = Effluent Total Nitrogen (Kg TN/day)
DO = DO in Anoxic Influent

NOx out of DN = 1.46 Kg NOX/day
DO = 3 mg/L (Based on KN feedback given EQ tank)
Forward Flow = 41.82 m3/day

TN Removal Required = 1.51 Kg TN/day

BIOWATER TECHNOLOGY

CMFF®
PROCESS DESIGN CALCULATIONS

Client Name:	EHS	**Proposed System Type:**	CMFF® - Pre DN-AE-Post DN
Location:	Frontier Trails	**Type of Wastewater:**	Municipal
Project Name:	Frontier Trails	**Treatment Type:**	Total Nitrogen Removal
Representative:	EHS	**Primary Treatment Type:**	Client Specified

DN CMFF® Required Fixed Film Surface Area

$$Post-DN\ CMFF®\ FF\ SA = \frac{Load\ to\ CMFF® \frac{1000\ g}{Kg}}{SALR}$$

DN CMFF® FF SA = CMFF® Surface Area Fixed Film required for load reduction (m2)
Load to DN CMFF® = Load to the DN CMFF® (Kg NOx/d)
DN CMFF® SALR = Temperature adjusted CMFF® SALR g NOx/m2/day

Load to DN CMFF® =	1.51	Total NOx in kg/d (TKNin - TN out)
DN CMFF® SALR =	0.54	g NOx/m2/day

DN CMFF® FF SA = 2,792 m^2

Required Carrier Volume for DN CMFF® Reactor

$$Post-DN\ CMFF®\ Carrier\ Volume = \frac{FF\ SA}{Protected\ Surface\ Area}$$

DN CMFF® Carrier Volume = Required volume of Carriers for specific treatment need (m3)
DN CMFF® FF SA = Surface Area Fixed Film required for load reduction (m2)
Protected Surface Area = Specific surface area per volume of carrier (m2/m3)

DN CMFF® FF SA =	2,792	m^2
Protected Surface Area =	650	m^2/m^3

DN CMFF® Carrier Volume = 4.30 m^3

BIOWATER TECHNOLOGY

CMFF®
PROCESS DESIGN CALCULATIONS

Client Name:	EHS	**Proposed System Type:**	CMFF® - Pre DN-AE-Post DN
Location:	Frontier Trails	**Type of Wastewater:**	Municipal
Project Name:	Frontier Trails	**Treatment Type:**	Total Nitrogen Removal
Representative:	EHS	**Primary Treatment Type:**	Client Specified

DN CMFF® Reactor Sizing

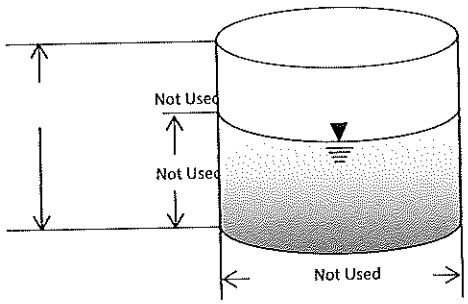
Rectangular	
1	Pick number of CMFF® Trains
1	Pick number of DN CMFF® Reactor(s)

Only Enter Dimensions for the type of reactor chosen and type of unit measurement used

Circular Reactor			
	Metric		US
Diameter		or	0.00 ft
SWD		or	0.00 ft
Free Board		or	0.00 ft
Total Height	0.000 m	or	0.00 ft

	US		Metric
Diameter		or	0.00 m
SWD		or	0.00 m
Free Board		or	0.00 m
Total Height	0.000 ft	or	0.00 m

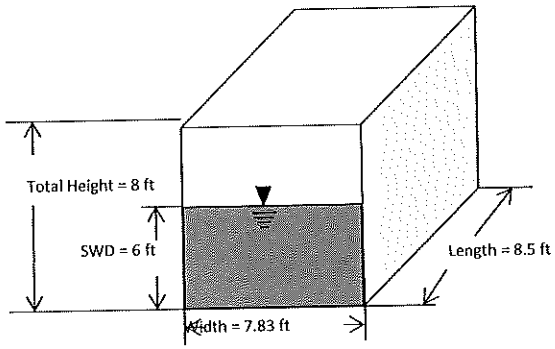
Circular Reactor



Rectangular Reactor			
	Metric		US
Length		or	0.00 ft
Width		or	0.00 ft
SWD		or	0.00 ft
Free Board		or	0.00 ft
Total Height	0.000 m	or	0.00 ft

	US		Metric
Length	8.500 ft	or	2.59 m
Width	7.833 ft	or	2.39 m
SWD	6.000 ft	or	1.83 m
Free Board	2.000 ft	or	0.61 m
Total Height	8.000 ft	or	2.44 m

Rectangular Reactor



BIOWATER TECHNOLOGY

CMFF®
PROCESS DESIGN CALCULATIONS

Client Name:	EHS	**Proposed System Type:**	CMFF® - Pre DN-AE-Post DN
Location:	Frontier Trails	**Type of Wastewater:**	Municipal
Project Name:	Frontier Trails	**Treatment Type:**	Total Nitrogen Removal
Representative:	EHS	**Primary Treatment Type:**	Client Specified

DN CMFF® Opt. Vol.	Metric	US
One Reactor	11 m3	400 ft3
All Trains and Reactors	11 m3	400 ft3
One Reactor	11,313 L	2,988 gal
All Trains and Reactors	11,313 L	2,988 gal
Fill Fraction	✓ 37.97%	

DN CMFF® Floor Area	Metric	US
One Reactor	6 m2	67 ft2
All Trains and Reactors	6 m2	67 ft2

$$Operating\ Volume = \pi \times \left(\frac{Dia.}{2}\right)^2\ (Circular)$$

$$Operating\ Volume = Length \times Width \times SWD\ (Rectangular)$$

$$Fill\ Fraction = \frac{Carrier\ Volume}{Operating\ Volum\ (All\ Trains\ and\ Tanks)}$$

Post AE tank: 15 min HRT at Peak Hrly Flow,	0.435606061
9.062589 m3 tank volume	Dimensions
1472.671 m2 BWTX	6.808511 ft
	Long

Attachment 7

Infiltrative surface sizing

Calculating the minimum drainfield size based on hydraulics (note that evaluations for fecal and/or nitrogen may alter this hydraulic sizing value):

Step 1 Design AWW Flow **(from Attachment 2, Step 7):** *11294 gpd*

Step 2 Loading rate (allowable hydraulic loading rate based on organic strength of effluent) **(from Attachment 4B)** 1.0 gpd/ft^2

Step 3 Minimum drainfield Size = Step 1 / Step 2: 11294 ft^2

Step 4 Multiply Step 3 by 1.5 to the drainfield size 16941 ft^2

Step 5 Divide Step 4 by the number of cells the drainfield will be divided into:

Use 4 zones 4235 ft^2/cell, Each cell is 104 ft long, so width is 4235/104=40.72 ft use 41' width

Be prepared to alter the overall drainfield size, number of zones, length-to-width ratio of drainfield, and location of the drainfield on the property to accommodate the further evaluations

Attachment 8 — Phosphorus treatment

Is the proposed LSTS located within 500 feet of a surface water with a phosphorus limit or a TMDL for phosphorus?

__x__ No *(If no, there are no further requirements for phosphorus.)*

_____ Yes *(If yes, please submit a phosphorus workplan/assessment.)*

The assessment is based on the following factors:

1) The soil's ability to attenuate phosphorus, which is dependent on:

a. The phosphorus retention capacity of the soil.

b. The loading and resting cycles of the soil treatment and dispersal system.

2) The amount of phosphorus discharged to the soil over the life of the system, which is dependent on:

a. The daily loading rate of phosphorus to the soil.

b. The anticipated life of the soil treatment and dispersal system before hydraulic failure (i.e., clogging). The anticipated design life for a soil treatment and dispersal system receiving septic tank effluent is approximately 30 years. The anticipated design life for a soil treatment and dispersal system receiving secondary treated effluent is approximately 100 years.

A narrative report must be developed which includes a detailed discussion of the why or why not a phosphorus study was undertaken, and if undertaken, the following:

- Method used to determine phosphorus retention capacity
- Whether the method reflected long-term phosphorus retention (precipitation reactions)
- Method results and supporting documentation
- An estimation of expected phosphorus breakthrough to the receiving water
- Any phosphorus-treatment options or waste-reduction methods to be employed

Note: Designers should work with agency staff to determine whether a phosphorus study is needed and a suitable evaluation method.

Suggested references that provide methodologies for estimating phosphorus impacts include:

High Rate Soil Absorption (HRSA) Task Force Final Report. Minnesota Pollution Control Agency. (Found atwww.pca.state.mn.us/index.php/view-document.html?gid=5180)

Soil and Water Assessment Tool (SWAT). U.S. Department of Agriculture. SWAT is a river basin scale model developed to quantify the impact of land management practices in large, complex watersheds. (Information at swat.tamu.edu/)

MT3D. U.S. Environmental Protection Agency. MT3D is a 3D solute transport model for simulation of advection, dispersion and chemical reactions of dissolved constituents in groundwater systems. (Information at www.epa.gov/ada/csmos/models/mt3d.html)

CHEMFLO-2000. U.S. Environmental Protection Agency. CHEMFLO-2000 enables users to simulate water movement and chemical fate and transport in vadose zones. (Information at www.epa.gov/ada/csmos/models/chemflo2000.html)

PHAST. U.S. Geological Service. PHAST--A Computer Program for Simulating Ground-Water Flow, Solute Transport, and Multi-component Geochemical Reactions. (See

Attachment 9 — Nitrogen dilution mass balance equation (Not Applicable)

Nitrogen dilution modeling is used to predict operational compliance with the Nitrate-Nitrogen drinking water standard at the property boundary or nearest drinking water well. If compliance is met at the boundary, then the drainfield site chosen and the preliminary design sizing demonstrates an acceptable LSTS drainfield site. If compliance is not met, then re-evaluate the location of the drainfield and the need for pretreatment of the effluent for nitrogen. Compliance with the nitrogen standard for these LSTSs is an iterative process based on land-use planning and technology choices. If no combination of choices exists that satisfies the nitrogen modeling standards, then the site is not a viable LSTS drainfield/dispersal site.

The equation below, or another MPCA-accepted model, can be used to predict the nitrogen concentrations at the property boundary. The analysis shall be made to determine whether the groundwater impacted from the system, as measured at the down-gradient property boundary or nearest receptor (whichever is closer), will theoretically meet a 10 mg/L Nitrate plus nitrite Nitrogen (as N) concentration in monitoring wells for Permitting Option 2. This determination shall be made by a combination of nitrogen-reducing technologies, soil treatment of nitrogen (denitrification), and dilution by precipitation and up-gradient groundwater.

Calculation –

$$CO = (QB * CB) + (QS * CS) + (QI * CI) / QB + QS + QI$$

Where CO = output concentration of nitrate

QB = flow entering the system across the upgradient (background) area

CB = upgradient nitrate concentration

QS = flow entering the system from the septic system drainfield

CS = concentration of total nitrogen in the septic effluent

QI = flow entering the system from infiltration of precipitation

CI = concentration of nitrates in the infiltrate

Please complete Attachment 11 with the values used in your determination of nitrogen dilution.

Note: The permittee is only required to address the fate and transport of nitrogen contributed to the groundwater by its LSTS. In other words, one permittee will not be required to treat wastewater nitrogen to a lesser concentration than another permittee just because the ambient/upgradient groundwater concentration may be greater in that location. Therefore, if the ambient/upgradient groundwater has nitrate concentrations greater than the drinking water standard of 10 mg/L, the permittee is allowed to model a CB value of 10 mg/L. In situations where upgradient nitrate concentrations are greater than 10 mg/L, the MPCA expects that the concentration of nitrate downgradient of the LSTS will not exceed the upgradient concentration.

It should also be noted that it is prudent to always use a CB value of 10 mg/L even where upgradient (or ambient) groundwater nitrate concentrations are currently low. Upgradient groundwater nitrate concentrations can fluctuate over time. The model may yield an acceptable result for CO by using a

relatively low value for CB. However, if upgradient groundwater nitrate concentrations were to increase in the future, the permittee may find the facility not in compliance with the permit due to the fact that the nitrogen discharged by the LSTS is no longer receiving the expected dilution from upgradient groundwater.

Attachment 10 — Inputs used in the mass balance nitrogen calculation

CS _____ mg/L — concentration of total nitrogen discharged to soil dispersal system[1]

CB _____ mg/L — concentration of nitrate-nitrogen in ambient/upgradient groundwater[2]

CI _____ mg/L — concentration of nitrate-nitrogen in precipitation percolating to groundwater

L1 _____ ft — dimension of soil dispersal system perpendicular to groundwater flow direction

L2 _____ ft — distance from upgradient edge of LSTS to downgradient property boundary or drinking water well, whichever is closest

K _____ ft/day — saturated hydraulic conductivity

i _____ ft/ft — hydraulic gradient

W1 _____ ft — saturated thickness of saturated zone[3]

A _____ ft^2 — cross-sectional area of saturated zone upgradient of the LSTS A = L1 * W1

P _____ in/yr - net precipitation that ultimately percolates to the saturated zone

QS _____ gpd — quantity of effluent discharged to the soil dispersal system

QB _____ gpd — QB = KiA * 7.48 gallons/ft^3

QI _____ gpd — QI = L1 * L2 * (P/12 in/ft) * 7.48 gallons/ft^3 / 365 day/yr

[1]This value will become your permit limit (calendar month average).
[2]It is suggested that 10 mg/L be used for this value as upgradient nitrate concentrations could potentially increase
in the future.
[3]It is suggested that no more than 10 feet be used for this dimension as this is generally the length of a typical

Attachment 11 —Septic tank sizing for community tanks Minimum

septic tank sizing (Not Applicable)

Step 1 Determine the design AWW flow **(from Attachment 2)**_____ gpd

Step 2 Determine peaking factor _____
Use 3.0 unless system has low-pressure sewers and grinder pumps, then use 4.0.

Step 3 Calculate minimum required septic tank volume _____gallons
Volume = Step 1 x Step 2

Additional considerations

- Effluent screens/filters shall be provided at the outlet of the last septic tank.
- Baffles shall be installed at each inlet and outlet of the tank and each compartment.
- Where more than one tank is used to obtain the required liquid volume, tanks are typically connected in series. However parallel flow arrangements can be considered in the design, if justified. Accurate methods of splitting flows and maintaining accurate flow splitting in the future need to be accounted for. Please see Minn. R. 7080.0130, Subp 1, (A-P) for further information.
- The peaking factor of 3.0 is used to ensure that the same total septic tank volume will be provided in community septic tanks as would be provided if individual septic tanks, sized according to Minn. R. 7080.0130, subp. 3, were used. The septic volume calculated at three times the AWW flow will be equivalent to the total volume if individual tanks are installed at each home (assuming a typical three-bedroom home uses a minimum tank volume of 1,000

APPENDIX G

DEPARTMENT OF HEALTH VARIANCE PERMIT

Minnesota
Department
of Health

PROTECTING, MAINTAINING & IMPROVING THE HEALTH OF ALL MINNESOTANS

August 3, 2016

Refer to: TN 5380

Mr. Brad Schumacher
Baldwin Township Board Chair
P.O. Box 25
30239 128th Street,
Princeton, Minnesota 55371

Mr. Brett Cloutier
14247 316th Avenue Northwest
Princeton, Minnesota 55371

Mr. Jon Bogart, PE
Bogart Pederson & Associates
13076 First Street
Becker, Minnesota 55308

Dear Mr. Schumacher, Mr. Bogart, and Mr. Cloutier:

Subject: Variance from Minnesota Rules, Chapter 4725, for Construction of a Water-Supply Well at 14247 316th Avenue Northwest, Princeton, and Modification of an Existing Subsurface Sewage Treatment System (SSTS) Located in the NW ¼ of Section 7, Township 35 North , Range 26 West , Baldwin Township, Sherburne County, Minnesota

This letter is in response to your request to the Minnesota Department of Health (MDH), for a variance from Minnesota Rules, chapter 4725, to construct a water-supply well on the subject property, located less than 300 feet from the site of an existing Subsurface Sewage Treatment System (SSTS) drainfield with an average design flow greater than 10,000 gallons per day. Subsequent to the well installation, modifications to the SSTS drainfield are planned.

Minnesota Rules, part 4725.4450, subpart 1, item A (1) requires that a well must be located at least 300 feet from the absorption area of a soil dispersal system with an average design flow greater than 10,000 gallons per day, including an SSTS drainfield. In addition, Minnesota Statutes, section 103I.205, subdivision 6 requires that a person may not place, construct, or install an actual or potential source of contamination any closer to a well than the isolation distances prescribed by the commissioner of health by rule unless a variance has been prescribed by rule.

Mr. Curtis Wunderlich, MDH St. Cloud district hydrologist, inspected the subject site on May 3, 2016. Mr. Wunderlich reported that there are no locations for a well and SSTS drainfield on the subject properties that meets all of the isolation distance requirements of Minnesota Rules, chapter 4725.

The well on the neighboring property at 14233 316th Avenue Northwest, Minnesota Unique Well Number 658527, will be sealed and replaced prior to beginning modifications on the SSTS drainfield.

Based on Mr. Wunderlich's inspection, information provided by you, and in accordance with Minnesota Rules, chapter 4725, **your request for a variance is granted** to construct a water-supply well at 14247 316th Avenue, Princeton, 260 feet north of the SSTS drainfield and to modify the SSTS drainfield at a distance of 260 feet from the subject water-supply well.

The variance is granted because there are no accessible locations for a well and drainfield that meet all required isolation distances, and because the proposed locations for the well and drainfield provide the greatest isolation distances between the well and known contamination sources.

Because the isolation distances between the proposed well location and observed and proposed contamination sources are less than required in rule, additional construction methods and precautions are required in order to reduce the potential for contamination of the well and groundwater. Adherence to the following list of additional conditions and requirements should provide the necessary additional protection for the well and groundwater.

The variance is granted with the following conditions:

1. The licensed well contractor that is selected for well construction must sign one copy of the variance agreement (Page 4) and return the signed variance agreement to the MDH before beginning well construction. Return the signed variance agreement to: Mr. Alex Martell, Minnesota Department of Health, Well Management Section, 625 North Robert Street, P.O. Box 64975, St. Paul, Minnesota 55164-0975.

2. The licensed SSTS contractor that is selected for the SSTS drainfield modifications must sign one copy of the variance agreement (Page 5) and return the signed variance agreement to the MDH before beginning construction. Return the signed variance agreement to: Mr. Alex Martell, Minnesota Department of Health, Well Management Section, 625 North Robert Street, P.O. Box 64975, St. Paul, Minnesota 55164-0975.

3. You must contact Mr. Wunderlich at 320-223-7329, Mr. Keith Donabauer at 320-223-7316, or Mr. Ronald Thompson at 651-201-3658 at least 24 hours prior to beginning construction of the well so that an inspector may be present during well construction.

4. The well casing for the proposed well must extend to a depth of at least **75 feet.**

5. The drilled bore hole must be at least 3.0 inches larger than the outside diameter of the casing or couplings, whichever is larger.

6. The annular space between the casing and the bore hole wall in unconsolidated materials must be filled with neat-cement grout, cement-sand grout, or bentonite grout as defined in Minnesota Rules, part 4725.0100. Bentonite grout must be NSF approved and marketed as a well sealant. Bentonite grout must be mixed to the manufacturer's specifications or must meet the minimum requirements of 15 percent by weight bentonite as specified in Minnesota Rules, chapter 4725, whichever is heavier. Grout must be inserted through a tremie pipe from within **10 feet** of the lower termination of the casing up to the ground surface or the base of the pitless connection. Bentonite grout must not be used in bedrock.

7. The existing well on the subject property, Minnesota Unique Well Number 658511, must be sealed by a licensed well contractor or licensed well sealing contractor within 30 days of the completion of the proposed new well.

8. The existing well on the neighboring property, Minnesota Unique Well Number 658527, must be sealed by a licensed well contractor or licensed well sealing contractor prior to beginning modifications on the SSTS drainfield.

9. All other provisions of Minnesota Rules, chapter 4725, are in effect.

This variance is conditioned upon the applicable acceptance of and compliance with the conditions of the variance. Failure by the applicant to comply with the conditions prescribed in the variance will result in the immediate expiration of the variance.

If you have any questions regarding this matter, please contact Mr. Wunderlich at 320-223-7329 or Mr. Alex Martell at 651-201-4595.

Sincerely,

Christopher D. Elvrum, P.G., Manager
Well Management Section
Environmental Health Division
P.O. Box 64975
St. Paul, Minnesota 55164-0975

CDE:CW:dg

I hereby agree to abide by the above stated conditions of the variance.

_____ _____

Well Contractor Signature Date

Well Contractor Information:

Contractor Name (please print) _____
Company Name _____
Company Address _____
_____
_____
Company Phone Number _____
MN Unique Well Number for proposed well _____

NOTE: Signature of well contractor must be obtained and a copy of the form returned to Mr. Alex Martell, Minnesota Department of Health, Well Management Section, 625 North Robert Street, P.O. Box 64975, St. Paul, Minnesota 55164-0975 before well construction may begin.

I hereby agree to abide by the above stated conditions of the variance.

_____ _____

SSTS Contractor Signature Date

SSTS Contractor Information:

Contractor Name (please print) _____
Company Name _____
Company Address _____
_____
_____
Company Phone Number _____

NOTE: Signature of the SSTS contractor must be obtained and a copy of the form returned to Mr. Alex Martell, Minnesota Department of Health, Well Management Section, 625 North Robert Street, P.O. Box 64975, St. Paul, Minnesota 55164-0975 before well construction may begin.

APPENDIX H

WEISER TANK WARRANTY

WIESER CONCRETE
W3716 U.S. HWY 10 • MAIDEN ROCK, WI 54750
(715) 647-2311 800-325-8456 Fax: (715) 647-5181
Website: www.wieserconcrete.com

AUG 16 2017

August 14, 2017

Baldwin Township
Jay Swanson
30239 128th Street
Princeton, MN 55371

RE: Frontier Trails- Sherburne County

This letter acknowledges that there was a minor leak in the W2500-FDL that was installed on July 5th 2017. The tank was inspected and repaired by Wieser Concrete on July 12th 2017 using a commercial grade, industry proven product called Avanti Mutigrout. The onsite contractor, Septic Check then poured concrete inside the tank for the treatment system. This concrete is also protecting the repair and may be considered a secondary repair. Since this time, the tank has been submerged in ground water under a tremendous amount of pressure yet remains watertight. An additional waterproofing and concrete protection material called Xypex will be applied to the interior walls and floor. These repairs was/will be done in a manner that conforms to ASTM C1227 and also follows Minnesota Rules of Subsurface Sewage Treatment Systems 7080 published by the Minnesota Pollution Control Agency.

Due to this original leak, Wieser Concrete Products, Inc. will extend the one year warranty until July 5, 2037 and will cover labor and materials necessary to repair or replace the tank if a structural failure was to happen. The tank will need to remain free of vehicle traffic or any surcharge loads on or within 15' of the tanks.

If there are any questions or if you need any further information, please contact us @ 800-325-8456.

Sincerely

Andy Winkler
General Manager

Cc: Brian Koski

XYPEX® CONCENTRATE

071616 | CEMENTITIOUS CRYSTALLINE

Concrete Waterproofing

Description

Xypex is a unique chemical treatment for the waterproofing, protection and repair of concrete. XYPEX CONCENTRATE consists of Portland cement, finely graded sand and active proprietary chemicals; it is applied as a cementitious slurry to the pre-saturated surface of existing above and below-grade structures. The active chemicals diffuse into the substrate and react with moisture and the constituents of hardened concrete to cause a catalytic reaction. This reaction generates a non-soluble crystalline formation throughout the pores and capillary tracts of the concrete, as well as cracks, permanently sealing the concrete and preventing the penetration of water and other liquids from any direction, even under high hydrostatic pressure. Xypex Concentrate is also mixed in a Dry-Pac form for sealing strips at construction joints, or for the repairing of leaking cracks, faulty construction joints and other defects.

Recommended for:

- Reservoirs
- Sewage and Water Treatment Plants
- Underground Vaults
- Secondary Containment Structures
- Foundations
- Tunnels and Subway Systems
- Swimming Pools
- Parking Structures

Advantages

- Resists extreme hydrostatic pressure
- Becomes an integral part of the substrate
- Can seal hairline cracks up to 0.4 mm
- Can be applied to the positive or the negative side of the concrete surface
- Allows concrete to breathe
- Highly resistant to aggressive chemicals
- Non-toxic
- Does not require a dry surface
- Cannot puncture, tear or come apart at the seams
- No costly surface priming or leveling prior to application
- Does not require sealing, lapping and finishing of seams at corners, edges or between membranes
- Does not require protection during backfilling or during placement of steel, wire mesh or other materials
- Less costly to apply than most other methods
- Not subject to deterioration
- Permanent
- Available in white for enhanced illumination

Packaging

Xypex Concentrate is available in 20 lb. (9.1 kg) pails, 60 lb. (27.2 kg) pails and 50 lb. (22.7 kg) bags.

Storage

Xypex products must be stored dry at a minimum temperature of 45°F (7°C). Shelf life is one year when stored under proper conditions.

Coverage

For normal surface conditions, the coverage rate for each Xypex coat is 6 to 7.2 sq. ft./lb. (1.25 - 1.5 lb./sq. yd. or 0.65 - 0.8 kg/m²).

Test Data

PERMEABILITY

U.S. Army Corps of Engineers (USACE) CRD C48, "Permeability of Concrete", Pacific Testing Labs, Seattle, USA

Two in. (51 mm) thick, 2000 psi (13.8 MPa) Xypex-treated concrete samples were pressure tested up to a 405 ft. (124 m) water head (175 psi/1.2 MPa), the limit of the testing apparatus. While untreated samples showed marked leakage, the Xypex-treated samples (as a result of the crystallization process) became totally sealed and exhibited no measurable leakage.

DIN 1048 (equivalent to EN 12390-8), "Water Impermeability of Concrete", Bautest – Corporation for Research & Testing of Building Materials, Augsburg, Germany

Twenty cm thick Xypex-treated concrete samples were pressure tested up to 7 bars (230 ft./70 m water head) for 24 hours to determine water impermeability. While the reference specimens measured water penetration up to a depth of 92 mm, Xypex-treated samples measured water penetration of zero to an average of 4 mm.

EN 12390-8, "Depth of Water Penetration on Samples Treated with Concentrate Coating", OL-123, Czech Technical University, Prague, Czech Republic

Three replicate 150 mm concrete cubes from four different mix designs (strength classes) were coated with Xypex Concentrate at a thickness of 0.8 mm to 1 mm. Controls for each of the different mix designs were also cast for comparison purposes. All samples were exposed to 0.5 MPa (73 psi) of water pressure for 72 hours from the opposite side of the treated surface. Specimens from each set

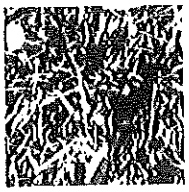
were split transversely from the treated surface at 28 days and 91 day to measure depth of water penetration from the exposed surface. After 28 days, the Xypex coating reduced the depth of water penetration by 90 to 94% compared to the control mixes for the four mix types. At 91 days all Xypex-treated samples measured <1 mm of water penetration.

DEPTH OF PENETRATION

"Measurement of Mass Concrete Humidity", Czech Technical University, (CVUT) Faculty of Civil Engineering, Prague, Czech Republic

A coating of Xypex Concentrate was applied to one face of a 300 mm x 300 mm x 220 mm set of concrete blocks; two replicate sets of blocks were left untreated. Water filled containers were tightly sealed onto the opposite face of the treated blocks and one set of the untreated blocks while the third untreated block set was kept in the laboratory as a control. Humidity probes were installed in 6 mm diameter holes that were drilled to within 30 - 40 mm of the water exposed surface. Mass humidity was recorded at intervals of 28, 45, 90, 125 and 132 days. Final results showed that the Xypex-treated specimens had an average humidity reading of 4.6%, the untreated sample measured 7.9% and the control block with no water exposure was 4.4%, essentially equivalent to the Xypex specimens' results. The Xypex reactive chemicals had diffused at least 190 mm in 132 days.

"An Enhancement in the Nature of Concrete with a Multiplicative Cement Crystal-Type Concrete Material", Central Research Laboratory of Nikki Shoji in association with Hosei University, Japan



A 60 cm x 70 cm x 40 cm concrete block was cast and a Concentrate coating was applied to the surface and cured. The block was left outdoors for approximately 1 year. Subsequently, a 40 cm (15.75 in.) long cylinder was then cored perpendicular to the Xypex treatment and cut into 18 slices of equal length. SEM photographs utilizing a 1000x magnification were taken of slices from various depths from the treated surface to determine the extent of crystalline growth. While the crystalline structure was most dense in specimens located closest to the treated surface, there was evidence of the crystalline structure at 30 cm (12 inches) from the treated surface.

CRACK SEALING

ASTM C856 "Standard Practice for Petrographic Examination of Hardened Concrete", Setsco Services Pte, Ltd., Singapore

A coat of Xypex Concentrate was applied to a slab that had developed numerous hairline cracks. To determine the crack sealing ability of the Xypex treatment, cores were extracted from a slab at 3, 10, 14 and 20 days following application. Thin sections were taken from each core in order to examine hairline cracks utilizing a polarizing and fluorescent microscope (PFM). In each case, there was evidence of the Xypex crystalline structure in the cracks to a depth of about 20 mm. Photographs taken this depth at 100x magnification showed the Xypex crystalline structure had reduced the width of the cracks dramatically.

TENSILE BOND STRENGTH

EN 1542 "Products and Systems for the Protection and Repair of Concrete Structures – Test Methods – Measurement by Pull-off", Trow Associates Inc., Burnaby, B.C., Canada

Two coats of Xypex Concentrate were applied at 0.8 kg per m^2 with a total cured thickness of 0.9 mm to a standard concrete substrate meeting EN 1766 MC (0,40) (meeting ICRI CSP-4). The coating was applied and cured to the manufacturer's technical specifications and tested at 30 days age for bond strength. The average tensile bond strength of five replicates was 1.23 MPa.

CHEMICAL RESISTANCE

ASTM C 267, "Chemical Resistance to Mortars", Pacific Testing Labs, Seattle, USA

Xypex-treated cylinders and untreated cylinders were exposed to hydrochloric acid, caustic soda, toluene, mineral oil, ethelyne glycol, pool chlorine, brake fluid and other chemicals. Results indicated that chemical exposure did not have any detrimental effects on the Xypex coating. Tests following chemical exposure measured an average 17% higher compressive strength in the Xypex-treated specimens over the untreated control samples.

IWATE University Technical Report, "Resistance to Acid Attack", Tokyo, Japan

Before Immersion *After 5 Weeks* *After 10 Weeks*

Xypex-treated mortar and untreated mortar were measured for acid resistance after exposure to a 5% H_2SO_4 solution for 100 days. Xypex suppressed concrete erosion to 1/8 of the reference samples.

ASTM C876 "Influence of Xypex Coating System on Residual Service Life of Concrete Structures" Durability Assessment Section, Xypex Australia

A bridge pier in a tidal splash zone was starting to experience reinforcing steel corrosion after 40 plus years of service. An investigation was conducted to examine the effectiveness of the Xypex coating system on the durability performance of the structure. Three corrosion prediction test methods were conducted before and after application of a) one coat and b) two coats of Xypex Concentrate. Test methods

included corrosion current (galvanostatic pulse transient), corrosion potential (Cu/CuSO4 half-cell) and electrical resistance. After 6 months of surface treatment corrosion rates were reduced by an average of 36 to 51%. Half-cell potentials were less negative and concrete resistance was increased. Corrosion activity level in the structure was reduced considerably.

RILEM CPC-18 "Carbonation Resistance of Samples Treated with a Xypex Concentrate Coating", Construction and Maintenance Technology Research Center (CONTEC), Sirindhorn International Institute of Technology (SIIT) – Thammasat University, Bangkok, Thailand

Control and Xypex Concentrate coated samples were carbonated in an accelerated carbonation chamber. The average depths of carbonation were measured at 28, 56, 77 and 91 days. The depth of carbonation of these Xypex Concentrate coated samples was reduced by 35 - 40% compared to the controls. Following initial carbonation, one set of samples was coated with Xypex Concentrate to model old concrete already damaged by carbonation. For these specimens, testing indicated that carbonation was arrested and in one specimen reduced.

FREEZE/THAW DURABILITY

ASTM C 672, "Standard Test Method for Scaling Resistance of Concrete Surfaces Exposed to De-Icing Chemicals", Twin City Testing Lab, St. Paul, USA

Xypex-treated samples restricted chloride ion concentration to below the level necessary to promote electrolytic corrosion of reinforcing steel. Visual examination of untreated panels after 50 freeze/thaw cycles showed a marked increase in surface deterioration compared to Xypex-treated samples.

POTABLE WATER EXPOSURE

NSF 61, "Drinking Water System Component-Health Effects", NSF International, Ann Arbor, USA

Exposure testing of potable water in contact with Xypex-treated samples indicated no harmful effects.

RADIATION RESISTANCE

U.S.A. Standard No. N69, "Protective Coatings for the Nuclear Industry", Pacific Testing Labs, Seattle, USA

After exposure to 5.76 x 10^4 rads of gamma radiation, the Xypex treatment revealed no ill effects or damages.

Application Procedures

1. **SURFACE PREPARATION** Concrete surfaces to be treated must be clean and free of laitance, dirt, film, paint, coating or other foreign matter. Surfaces must also have an open capillary system to provide "tooth and suction" for the Xypex treatment. A CSP-3 per the International Concrete Repair Institute Guidelines and Surface Profile Chips is recommended. If surface is too smooth (e.g. where steel forms are used) or covered with excess form oil or other foreign matter, the concrete should be lightly sandblasted, waterblasted, or etched with muriatic (HCL) acid.

2. **STRUCTURAL REPAIRS – PRIOR TO COATING APPLICATION** For cracks larger than 1/64" (0.4 mm) or for actively leaking cracks the following repair procedures are recommended. Chip out cracks, faulty construction joints and other structural defects to a depth of 1.5 inches (37 mm) and a width of 1 inch (25 mm). A "V" shaped slot is not acceptable. The slot may be saw cut instead of chipped but ensure that the slot is dovetailed or otherwise shaped such that there will be mechanical interlock of materials placed into the slot at a later stage. Clean and wet the slot and apply a brush coat of Xypex Concentrate as described in steps 5 & 6 and allow to dry for 10 minutes. Fill cavity by tightly compressing Dry-Pac into the groove with pneumatic packing tool or with hammer and wood block.

NOTE:

i. Areas of poor concrete consolidation that show evidence of leakage should also be repaired.

ii. Against a direct flow of water (leakage) or where there is excess moisture due to seepage, use Xypex Patch'n Plug, then Xypex Dry-Pac followed by a brush coat of Xypex Concentrate.

iii. For expansion joints or chronic moving cracks, flexible materials such as expansion joint sealants should be used.

3. **WETTING CONCRETE** Xypex requires a saturated surface dry (SDS) condition. Concrete surfaces must be thoroughly saturated with clean water prior to the application so as to aid the diffusion of the Xypex chemistry and to ensure growth of the crystalline formation deep within the pores of the concrete. Remove excess water before the application such that there is no glistening water on the surface. If concrete dries out before application, it must be re-wetted.

4. **MIXING FOR SLURRY COAT** Mix Xypex powder with clean water to a creamy consistency in the following proportions:

For Brush Application
1.25 - 1.5 lb./sq. yd. (0.65 - 0.8 kg/m²)
5 parts powder to 2 parts water

2.0 lb./sq. yd. (1.0 kg/m²)
3 parts powder to 1 part water

For Spray Application
1.25 - 1.5 lb./sq. yd. (0.65 - 0.8 kg/m²)
5 parts powder to 3 parts water
(ratio may vary with equipment type)

Do not mix more Xypex material than can be applied in 20 minutes. As the mixture thickens, stir briefly to ensure mixture remains fluid; but do not add water.

Mixing Dry-Pac
Using a trowel, mix 6 parts Xypex Concentrate powder by volume to 1 part clean water for 10 to 15 seconds. Lumps should be present in this mixture. Do not mix more than can be applied in 20 minutes.

5. **APPLYING XYPEX** Apply Xypex with a semi-stiff nylon bristle brush, push broom (for large horizontal surfaces) or specialized spray equipment. The coating must be uniformly applied and should be just under 1/16 in. (1.25 mm). When a second coat (Xypex Concentrate or Xypex Modified) is required, it should be applied after the first coat has reached an initial set but while it is still "green" (less than 48 hours). Curing by misting the coating with water should be done between coats. Ensure first coat is in SSD condition before application of the second coat. The Xypex treatment must not be applied under rainy conditions or when ambient temperature is below 40°F (4°C). Avoid application of the Xypex coating in hot and windy conditions as the coating may dry out prematurely. For recommended equipment, contact Xypex's Technical Services Department or your local Xypex Technical Services Representative.

6. **CURING** Generally a misty fog spray of clean water is used for curing the Xypex treatment. Curing should begin as soon as the Xypex has set to the point where it will not be damaged by a fine spray of water. Under normal conditions, it is sufficient to spray Xypex-treated surfaces three times per day for two to three days. In hot or arid climates, spraying may be required more frequently. Wet burlap and some specialty curing blankets are also effective for curing. During the curing period, the coating must be protected from rainfall, frost, wind, the puddling of water and temperatures below 36°F (2°C) for a period of not less than 48 hours after application. If plastic sheeting is used as protection, it must be raised off the Xypex to allow the coating to breathe. Xypex Gamma Cure may be used in lieu of water curing for certain applications (consult with Xypex's Technical Services Department or your local Xypex Technical Services Representative.

NOTE:
i. For concrete structures that hold liquids (e.g. reservoirs, swimming pools, tanks, etc.), Xypex should be cured for three days and allowed to set for 12 days (18 days for waste water or corrosive solutions) before filling the structure with liquid.

ii. For Xypex coated slabs that will be a wearing surface, an application of Xypex Quickset after the coating has been cured and dried is recommended. Contact your local Xypex Technical Services Representative for assistance.

iii. If any other cementitious system is applied over the Xypex coating, it should be after the coating has completely set but while it is still green (12 to 48 hours); the 12 to 24 hour window is considered ideal. For installations onto a Xypex coating older than 48 hours contact your Xypex Technical Service Representative regarding surface preparation and application recommendations. Xypex Chemical Corporation makes no representations or warranties regarding the compatibility of Xypex products with plasters, stuccos, tiles and other surface-applied materials. Prior to the installation, it is recommended that a test section be completed under anticipated ambient and project conditions to demonstrate acceptable bond.

Technical Services

For more instructions, alternative application methods, or information concerning the compatibility of the Xypex treatment with other products or technologies, contact the Technical Services Department of Xypex Chemical Corporation or your local Xypex Technical Services Representative.

Safe Handling Information

Xypex is alkaline. As a cementitious powder or mixture, Xypex may cause significant skin and eye irritation. Directions for treating these problems are clearly detailed on all Xypex pails and packaging. The Manufacturer also maintains comprehensive and up-to-date Safety Data Sheets on all its products. Each sheet contains health and safety information for the protection of workers and customers. The Manufacturer recommends you contact Xypex Chemical Corporation or your local Xypex Technical Services Representative to obtain copies of Safety Data Sheets prior to product storage or use.

Warranty

The Manufacturer warrants that the products manufactured by it shall be free from material defects and will be consistent with its normal high quality. Should any of the products be proven defective, the liability to the Manufacturer shall be limited to replacement of the product ex factory. The Manufacturer makes no warranty as to merchantability or fitness for a particular purpose and this warranty is in lieu of all other warranties expressed or implied. The user shall determine the suitability of the product for his intended use and assume all risks and liability in connection therewith.

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GAMMA CURE

CEMENTITIOUS CRYSTALLINE - CURING

Concrete Waterproofing

Description

XYPEX GAMMA CURE is a curing agent designed specifically for Xypex crystalline waterproofing products. Gamma Cure may be used as an alternative to water curing for certain Xypex applications. It is also used to accelerate the Xypex crystallization process. Xypex Gamma Cure acts as an evaporation retardant by retaining the maximum amount of moisture in the Xypex coating. It also provides a catalyst for the reaction with the Xypex crystalline waterproofing treatment. It is a self-dissipating (2 - 3 days) non-film forming product.

Recommended for:

- Applications where water-curing is not possible
- Hot, dry, windy conditions
- Vertical surfaces

Packaging

Xypex Gamma Cure is available in 1 U.S. gallon (3.79 litre) bottles and 5 U.S. gallon (18.95 litre) pails.

Storage

Xypex products must be stored dry at a minimum temperature of 45°F (7°C). Shelf life is one year when stored under proper conditions.

Coverage

One U.S. gallon (3.79 litres) of Gamma Cure when diluted with water will cover approximately 800 sq. ft. (75 m^2).

Application Procedures

1. **CURING OF XYPEX COATING** Dilute one part Gamma Cure with 3 parts clean water. Apply by spraying onto the crystalline waterproofing coating after the coating has reached an initial set, but before it dries (approx. 1 - 2 hours).

2. **PREPARATION OF CONCRETE SUBSTRATE IN HOT, DRY OR WINDY CONDITIONS** Dilute one part Gamma Cure with 3 parts clean water and apply to concrete surface before application of the Xypex crystalline coating. Gamma Cure should be applied while the concrete is still damp from pre-watering.

Technical Services

For more instructions, alternative application methods, or information concerning the compatibility of the Xypex treatment with other products or technologies, contact the Technical Services Department of Xypex Chemical Corporation or your local Xypex Technical Services Representative.

Safe Handling Information

Gamma Cure is an acidic solution. This product may be a mild to moderate skin and eye irritant. In addition, many of the components of the cementitious products that are used in conjunction with the Gamma Cure may also possess significant skin and eye irritation potential. Directions for treating these problems are clearly detailed on all Xypex pails and packaging. The Manufacturer also maintains comprehensive and up-to-date Safety Data Sheets on all its products. Each sheet contains health and safety information for the protection of workers and customers. The Manufacturer recommends you contact Xypex Chemical Corporation or your local Xypex Technical Services Representative to obtain copies of Safety Data Sheets prior to product storage or use.

Warranty

The Manufacturer warrants that the products manufactured by it shall be free from material defects and will be consistent with its normal high quality. Should any of the products be proven defective, the liability to the Manufacturer shall be limited to replacement of the product ex factory. The Manufacturer makes no warranty as to merchantability or fitness for a particular purpose and this warranty is in lieu of all other warranties expressed or implied. The user shall determine the suitability of the product for his intended use and assume all risks and liability in connection therewith.

BALDWIN TOWNSHIP REGULAR MEETING

August 21, 2017

Present – Supervisors Brad Schumacher, Larry Handshoe, Bryan Lawrence and Tom Rush. Supervisor Jay Swanson absent.

Call to Order – The August 21, 2017 Baldwin Township regular meeting was called to order by Chairman Brad Schumacher at 7:00 p.m.

Pledge of Allegiance – All present recited the Pledge of Allegiance.

Additions/Corrections to Agenda

- Add "Discuss/Approve/Disapprove Duncan Johnson" to Old Business under the County Planning & Zoning Report
- Add "Discuss Union Times Interview" to under New Business
- Add "Discuss/Approve/Disapprove Quote for Fence for Outfield" under Park Committee Report
- Add "Renew Chair Dave Patten for Park Committee for 3-year Term" under Park Committee Report
- Add "Discuss/Approve/Disapprove Letter of Thanks to Dr. Jeremy Peterson" to under Park Committee Report

Approval of Regular Meeting Agenda With/Without Additions/Corrections - Handshoe/Lawrence unanimous to approve the regular meeting agenda as amended.

Treasurer's Report:
August 2017 Preliminary Treasurer's Report – The clerk reported she had deposited the proceeds of the bond check in the amount of $2.235 million. She reported receipts of $15,603.22 and disbursements of $115,875.58, check numbers 21350 through 21407 and 6 EFT payments leaving an unaudited balance of $825,527.24.

Sheriff's Report – Deputy Wilson reported that there were 237 calls for service in the month of July. He also reported there are several storage sheds being broken into throughout the county.

Fire Department Report – Schumacher reported that he had personally thanked the fire chief of Zimmerman for the monetary donation towards the camera. Lawrence/Handshoe motioned to send a thank you letter to their relief association. Schumacher also reported that they are working on a potential new fire hall that would be closer to Orrock Township. The Baldwin Fire Department Relief Association Dance is August 26, 2017 at Ridgewood Bay from 5:00 p.m. to midnight.

Road Report – Zac Good reported that maintenance is working on building the shed at Young Park. The kit for the shed that was initially purchased was returned for a full refund. The board agreed that the shed should match the brown building at the park.

It was agreed that maintenance should look into a 72-inch deck lawn mower with the funds to purchase equally taken from the park, maintenance and cemetery funds. A quote will be brought back to the next regular meeting.

The ditch mower rented from Ziegler sustained damage with a damaged wheel and a broken window. The equipment was received with the driver's side wheel put on backwards. Ziegler is charging the township $1,000 for the damage but they are willing to give the township free delivery on the next rental which usually costs $700. Lawrence questioned why the township would be liable when the equipment was received with the wheel on wrong. Good stated that they said we had accepted the equipment when it was delivered. Rush stated that the window was our fault. Good stated that Ziegler is on the only people we can rent from in the area and they had delivered it with the wheel backwards. Lawrence/Handshoe unanimous to turn it into our insurance company. Lawrence also suggested getting a letter from Ziegler saying there is a $700 credit.

After the shed is finished, maintenance is to start blacktop patching. In September the trees at Goose Lake should be cut down with the anticipation that the access will be put in sometime in September or October.

Discuss Frontier Trails Septic Tank – Brian Koski, Septic Check, was present to discuss the Wieser Concrete letter regarding the crack in the septic tank. The proposal is for a 20 year warranty and install an epoxy liner to the repairs already done to add a third layer of protection.

Jon Bogart, township engineer, stated that he knows of a tank in Elk River with similar issues. Epoxy was put in the tank in 2003 or 2004 and that tank has not leaded. His opinion is that it is a good solution. However, on the other side, all things have a lifetime and it is a matter of how long does a company last. Wieser has been around a long time. What happens if they get bought out? In about 17 years all of us will have been replaced. Will any one remember? As an engineer, he does think it is a good solution. He has discussed this with Supervisor Swanson and he cannot dispute his view and Swanson has not changed his viewpoint. Lawrence stated that Bogart is not speaking on behalf of Swanson tonight.

Schumacher stated that the majority of folks will pay for 10 years in Frontier Trails and it would provide a warranty for them and us. He would like to talk to Supervisor Swanson as it is crucial we have his insight on this. Does the remainder of the board want to wait for Supervisor Swanson to attend the next meeting? Bogart stated that the contract has a certain length for him to complete the work and, in fairness to Brian Koski, give him more time as the town board is holding him up. He can hold off the MPCA for a little bit.

Lawrence stated that he has an issue with the terminology. When you said "hairline crack" and we saw the picture, he is not sure that is a hairline crack as it is bigger. He appreciates the 20 year warranty and liner and would be in favor of that.

Lawrence/Rush unanimous to accept the tank with a 20 year warranty and epoxy liner and accepts the letter from Wieser also.

Brian Koski stated that a different set of permit limits will have to be complied with. The board needs to discuss a long term plan. The next phase should be tank pumping and maintenance. Lawrence questioned if the epoxy is an approved process with the MPCA with Bogart responding that he talked with the MPCA and the tank is dry.

Recess Regular Meeting – Rush/Handshoe unanimous to recess the Baldwin Township regular meeting at 7:39 p.m.

Open Public Hearing, Consideration of Vacating a Portion of 142nd Street, Fourth Elk Lake Estates – Handshoe/Rush unanimous to open the public hearing for consideration of vacating a portion of 142nd Street, Fourth Elk Lake Estates at 7:39 p.m.

It is noted that a response was never received from DNR although Sherburne County Soil and Water addressed the issue in a letter dated August 21, 2017. The letter states:

Dear Mr. Schumacher and Members of the Board:

The purpose of this letter is to address a Little Elk Lake area resident concern over the current and future state of a Baldwin Township owned parcel at the terminus of 142nd St. NW. Sherburne SWCD staff visited the site on August 17, 2017 for observation.

Through a previous project, a saffle baffle had been installed by Baldwin Township to capture stormwater runoff from 142nd St. NW to minimize sediment runoff into the lake. For further details of the saffle baffle installation, please see the attached Project Summary.

This device appears to be operating as expected. For example during the evening of August 16, 2017 roughly 1 inch of rain fell in the area and fresh sediment cover was observed within the manhole of the saffle babble and along the rocks of the outfall structure. Currently, a small portion of the property in question is in turfgrass and mowed by neighboring property owners. The remaining area of the property consists of a rock chute outfall from the saffle baffle, and then an approximately 30 ft wide lake shore buffer consisting of untouched dense vegetation anywhere from 4-6 ft high, with the exception of several larger trees. The lake shore buffer is of ample size to filter and slow down any runoff.

Overall, the property in question is currently in good structure and ecological condition with effective stormwater treatment occurring, no signs of erosion, and minimal runoff from the existing turfgrass. Some non-native plant species exist on the property (reed canary grass.) The presence of these species is not expected to contribute towards poorer lake health or condition, however replacing the invasives with a native alternative would be a preferable action as it would provide deeper root structures aiding in infiltration and stabilization. Additional protection and wildlife habitat could be crested through replacing the current turfgrass with a native pollinator friendly seed mix. This planting would enhance the ecological condition of the parcel, but is to

be viewed as a –a step taken "above-and-beyond" what is needed. From a water quality perspective, there are no concerns with the existing parcel condition.

If you have any questions or concerns please feel free to contact me directly.

Sincerely,
Francine Larson
District Manager
Sherburne SWCD

Bogart stated that 142nd Street from the top of the hill to the end of the cul-de-sac was a gravel road and was experiencing a fair amount of erosion going down to the lake. The town board addressed the problem and had us build a saffle baffle to collect the sediment. It appears to be working fairly well and it sounds like the SCSWD agrees. The township checks on it about once a year.

Christi Miller, 14235 285th Avenue – Ms. Miller questioned if, in vacating this, does that mean that the township doesn't own it? When the plat was established inner lots were sold with 3 accesses to the lake. That is one of the accesses. By vacating it, it is taking away Elk Lake Estates right to do that. Her second concern is what happens when there is erosion or runoff? The township would no longer own the property and would need the owner's permission. Jon Bogart replied that the township would be retaining a drainage and utility easement. Ms. Miller stated that there a lot of different accesses to the lake. What happens to that? Everybody gets to vacate then there will be no accesses to the lake. The board would be setting a precedent and it is not a good thing to do. There has been time and effort and money put into this already.

Dawn Othoudt, Owns Property at 28510 142nd Street – Mrs. Othoudt distributed photos to the town board along with a written statement:

08/21/2017 Statement to the Baldwin town board members regarding vacating a portion of 142nd St.

We have several concerns that we request the board take the time to thoroughly research and resolve prior to any further discussion to approve vacating a portion of 142nd St ROW.

1st Concern is the Environmental Impact. The install of an irrigation system and sod has been done over a large portion of the ROW in question. Other landscaping has been done including a retaining wall. Each time the soil is disturbed it further erodes causing runoff after rainfalls. Sod is not native grasses or vegetation and including the other landscaping, has done more harm than good in our opinion. Dan Cibulka; a water resource specialist at the office of soil and water conservation agrees. We're asking the board to have an environmental study done to determine the impact of the current situation so that a determination of what should be done to avoid any continued or further damage to the lake.

2nd Concern is Encroachments. We know lies shown in the photos are not 100% accurate but we believe as is shown by the photos there is definitely sufficient reason to

question how much of the retaining walls, other forms of landscaping as well as structures are in the ROW. We believe that the survey will show encroachment. We also believe the pavement is encroaching onto our property along the northwest corner. Since the pavement was installed we can no longer find our two property stakes. In preparation for paving, we thought the road should have been centered so that there was room for utilities, etc. within the ROW. We saw stakes along the roadside prior to the pavement being installed but the road is severely off center in spots. The west side is potentially on our property of if not, inches from it with the east side having more than 20' of unpaved ROW. A proper survey would have clearly identified the correct boundaries vs the current traveled path yet I cannot find any meeting minutes addressing the issue or even making mention of it. Why would something as permanent as paving a road be done knowing it's out of center? If in fact the tar is on our property it will have to be removed. We're asking the board to have 142nd St surveyed and corrective action be taken to resolve all the encroachments. We're also asking the board to consider the survey be conducted by an independent licensed surveyor as we are not confident in the previous work done by Bogart/Peterson.

3rd Concern is Safety and Violations of Ordinance 100 Town Board Rights of Way; As stated in section 1.00 number 1. Purpose. To protect public safety, reduce interference with public travel and the public's interest in its rights-of-way. The entire width of the road needs to remain clear for emergency, service vehicles and the public. Since moving onto 142nd St. the Lees and Bumgarners have regularly parked their cars, trucks, boats, trailers and pontoons on the ROA. As recently as w/in the last 45 days my husband Richard witnessed the Ace Waste truck attempting to turn around at the north end of the road. There were 3 vehicles parked on the road. Once vehicle (belonging to the Bumgarners) had a boat trailer attached. The driver hit the boat trailer breaking a light. Deborah Lee came out of her home and chewed out the driver who told her that if they didn't keep the road clear they would not continue to pick up their waste. This is the kind of issue that have been going on for a very long time. Everyone should be expected to abide by the same rules. Just because it's a dead end is not an excuse to violate the ordinance and turn the end of the road into a personal parking lot. Perhaps there needs to be no parking signs put in place as was done on 4 undeveloped Cul-de-sacs within the town in October 2012.

Sincerely,
Richard and Dawn Othoudt-28510 142nd St. Town of Baldwin. Minnesota

Jim Lee, 28559 142nd Street – Mr. Lee stated he lives across the street from the Bumgarner's and is the other people involved with the end of the road. The rip rap part was put on as a band aid before the tar went on. Now it is completey full with weeds growing in it. He believes it has been cleaned once. The rock was is totally on his property. Before the road was tarred the dirt did not have a place to go. To this day, after a big rain, anything that goes past that goes onto the bottom of his property. That shouldn't be happening anymore. The people that were complaining about having access live two houses from where there is an access. The other people that are complaining don't live there as they rent it out weekends and weeks with cars and parties. The people that aren't even there are complaining. We do not have a

driveway. We park on the side of the home. The one incident with the garbage truck consisted of harsh words and a call to the company and, by the end, there was laughter. We take care of the land down there and has not seen one other person offer to clean up. It is nice to have a nice looking property. Lastly, we have neighbors next to us that are on the lake association and set up for the run/walk. They are involved in the community and to have someone that doesn't live there totally disagree with them. It would help us and it would be nice to have the property we are taking care of be our property.

Debbie Lee, 28559 142nd Street – Mrs. Lee stated that when the road was staked out for tar Mr. Othoudt was standing out there and never said anything. Jon Bogart told her that most of the rip rap is on the Lee's property. Mrs. Lee stated that people stand on their property and use their chairs. If there was a fire, nobody even knows it is there because it has been vacated. Schumacher stated that it is not vacated yet. Mrs. Lee stated there were drainage issue before the road was tarred and had to put dirt in the wall so it would not come down. We are trying our best. Ran rip rap on her property and a number of things. We have given up our property to keep the lake clean. They have put band aids on it. We take care of all the property down there and would like the opportunity to pay taxes on it and keep it up.

Rush questioned how much the township had invested in the project. Bogart stated he remembers about $17,000-$25,000. Mr. Lee stated that it was more than that but didn't the township receive a grant for the baffle? Bogart stated that he does not remember the total dollar amount.

Dave Looney, 14235 285th Avenue – Mr. Looney stated that he wants it on the record that this road has been an issue for over 30 years. Between me and Othoudt he doesn't think there is anybody in this room that have been there longer than us. His family has been there for 60 years. Somebody finally got hurt on his driveway because of this road problem. There is a potential lawsuit coming up and I'm not going to mention any names so I would give some serious thought because he is a taxpayer before I would want to do anything right now because I'm sure this is all going to be investigated before this is said and done. Schumacher stated that the town would sure like an easement across his property to fix that water drainage at the bottom of the hill. Mr. Looney responded, "you know what, I will give you one right here, right now tonight. Let's do it. Be there tomorrow at 9:00 o'clock and get started on it."

Brian Bumgarner, 28560 142nd Street – Mr. Bumgarner stated that he does not disagree with the Othoudt's regarding the encroachments on the road. As far as parking on the street, we don't personally park on the street. The Ace truck – the trailer that was hit wasn't attached to a vehicle and was in a driveway. He has an agreement in place for Ace to turn around in his driveway. Ace has taken responsibility and liability for that accident. He has a good understanding where the right-of-way is with utility boxes. This is a public road not being accessed or utilized. The road being vacated is all dirt with no work done on it with the asphalt project. It was platted in 1950 as a road and never used as a road. He presented a visual of what they are looking for and

accomplish. They are trying to address the Soil and Water commentary about canary weed. He presented a photo of the start of the rip rap at the road which shows it is taken over by weeds. He presented a photo of the discharge chute of the saffle baffle stating it is doing a good job of controlling runoff. He presented a photo of their shoreline along with a photo of a portion of a tree down in the road right-of-way. A benefit of vacating a portion of this land would be the township would no longer have to worry about accessing. There is a 16 foot drop to the lake level and, if used by snowmobiles and ATV's, then there would be erosion problems. Mr. Othoudt's comment about speaking with Dan at the SWCD, that individual came and out reviewed the parcel of land before this was written and came out at Mr. Othoudt's demand. That is what generated the response from the district manager of the SWCD.

Richard Othoudt, 28510 142nd Street – Mr. Othoudt stated he has owned the property approximately 40 years. Prior to the Bumgarner's and Lee's moving in there was no issue with runoff. The township has done everything in their power to solve their issues. Clearly the photos say otherwise about retaining walls and what not. There was never a permit pulled for that retaining wall. The DNR said that there should have been a permit pulled for the amount of dirt moved. When the rip rap was installed he told West Branch Construction to stop as he did not think it was on the right-of-way. He tried his best to get it moved over. Rip rap can't do its job when a retaining wall is on top of it. There was never a problem prior to these homeowners. Dan (from Soil and Water) agreed with him. It is best to leave it natural. He knows Bumgarner's home is 2.95 feet onto the road right-of-way, according to the county. He used the area all the time when the kids were young. Mrs. Lee verbally attacked him when he went down there with his grandkid. They bought knowing there was a 40 foot access to the lake. Why would you reward them with a very valuable piece of property? It doesn't sound right at all. Vacate this because they are maintaining it. No one asked them to. 90% of this was created by them. Enough is enough. Leave it alone.

Lisa Herman, 144th Street – Ms. Herman stated she was here to speak on behalf of the Bumgarner's and Lee's. No one takes more care of the lake than Andie (Bumgarner). The comment made that they are the ones causing the problems on the road – no one can do that but nature. Andie has chaired the lake association and raised about $2,000, which takes a ton of time and effort and it is all volunteer. The integrity of these people and the words from people that don't live on the lake. She sees that these people care and it is not a malicious thing. It is safer for the lake and the people.

Jim Lee (address above) – Mr. Lee stated that both the Lee's and Bumgarner's bought their houses the way they are. The rock wall was part of what was there when we bought the house. It was inspected and approved. Dirt is coming from the road and not coming from our side. It is on our property and was okayed. If the guy who built the wall did not cut a permit – it was there when we bought it. Guaranteed if not maintained you would not be able to walk down there. You can't expect us to continue. We want this to look nice and we will take care of it.

Dawn Othoudt (address above) – Mrs. Othoudt stated that they do not live out there currently. She does not want to apply that anybody is deliberately not taking care of the lake. We raised our kids out there. We use that access to cut across to Ridgewood Bay in the winter. The road has taken some significant changes because of the construction. When Bumgarner's house was built it was bigger than the lot. The road started being altered. Prior to that there was not runoff going down to the lake. Their garage is potentially 4 feet onto the road right-of-way. Two primary structures were there originally. Landscaping has pushed out onto the road right-of-way. Before anything else is done these other things need to be addressed along with the parking issues.

Andre Bumgarner, 28560 142nd Street – Mrs. Bumgarner stated that we all live on this lake and love the lake. There is a lot of public accesses to this lake. These were plotted out back in the 1950's when they did not think about environmental issues like erosion. Keep our lakes safe. She wants the public to use it but be controlled and have an area. All these points of access is not in the best interest of the lake.

Richard Othoudt (address above) – Mr. Othoudt stated that it was nice that soil and water wrote a letter. Andrea (Bumgarner) works at soil and water. If he did not go down there and ask that they send a letter and the DNR said they knew nothing about it. Comments were made – keep it clean and nice looking. If vacated, what are the odds that would say welcome, come use it. About the other accesses they were the loudest voice about a swimming beach. Unusable. He swam there as a child. It is a public beach and it says it on the plat books. There is a lot of bad information that shut it down. It is great that there is a garden there. All the people can't use it. This won't be useable if vacated. True, they do have a 2 car garage which was approved so they would not park on the road. All has to be addressed and taken care of.

Brian Bumgarner (address above) – Mr. Bumgarner stated that important fact are being overlooked. He presented a map of Elk Lake which showed all known public accesses marked in yellow. There are a lot of issues with Elk Lake Estates and he does not know if it pertains to this. Rick brought up the rain garden – the slab is above the high water mark. It can't be utilized because nobody maintains it. It could be a beautiful garden but nobody maintains it. Vacating this road won't solve any of the parking problems. He had asked Mr. Bogart what the parcel could be used for in the future. The vote was 21 to 0 of lake association members who were opposed to rebuilding the boat launch there. Protect the lake and keep invasive species out. The intent was not to block access.

Christi Miller (address above) – Ms. Miller questioned what happens when these two sell their homes to someone else. It creates more issues because they own it and the township would need to have permission to fix it.

Close Public Comment - Rush/Handshoe unanimous to close public comment at 8:37 p.m.

Reopen Regular Meeting - Rush/Handshoe unanimous to reopen the regular meeting at 8:37 p.m.

Discuss Frontier Trails Septic Tank – Schumacher asked when the project will be done. Bogart stated there is a little electrical work that needs to be done with the pumps with about a week of work left. He is getting the final numbers to Bridget Chard.

Review/Approve/Disapprove Lawn Mower Quote – Lawrence/Handshoe unanimous to table the lawn mower quote to the September 5, 2017 regular meeting of Baldwin Township.

Approval of Consent Agenda – Rush/Lawrence unanimous to approve the Town Board Meeting Minutes of August 7, 2017; to approve the County Handling 2020 Census; to approve Adding Zachary Good as an Authorized Signer on Township Accounts; and to approve Resolution #17-12; Resolution Accepting Donations.

Lawrence/Schumacher unanimous to approve the Letter of Support for County Road 45 Intersection Improvements.

Recess Regular Meeting - Handshoe/Rush unanimous to recess the regular meeting at 8:46 p.m. for a five (5) minute break.

Reopen Regular Meeting - Lawrence/Handshoe unanimous to reopen the regular meeting at 8:49 p.m.

CONDITIONAL & INTERIM USE PERMITS: None.

PLATS: None.

VARIANCES: None.

OLD BUSINESS:

County Planning & Zoning Report – Lawrence reported that the County Planning and Zoning recommended approval of the Allen Jackson Acres. An IUP in Livonia Township was approved, and a lot split in Palmer Township.

Discuss/Approve/Disapprove Duncan Johnson – It was suggested the best alternative was to change the holding pond to a rain garden since it is technically in the road right of way. Lawrence/Handshoe unanimous to approve subject to Bogart's review.

Park Committee Report – Rush reported that shed is being built. The sod did come back. 90 foot bases have been installed. Princeton/Zimmerman team using the field two times a week and will, hopefully, host a tournament. He is waiting for the poles. The Park Committee suggested a "no horse" sign at the entrance to the park. Dogs

have been running on the field along with golf cars. The committee does not suggest an entrance into left field and suggests going more towards the building. Rush asked Bogart to send Dave Patten the driveway approach drawing for Goose Lake. The Park Committee will meet at Goose Lake at their next meeting. First meet at town hall then go onto Goose Lake.

Review/Approve/Disapprove Pursuing Grant Opportunities for Young Park - Rush/Handshoe unanimous to table pursuing grant opportunities for Young Park until the September 5, 2017 regular meeting of Baldwin Township.

Discuss/Approve/Disapprove Quote for Fence for Outfield – Two quotes were received: Century Fence for $9,525.00 and Bemboom's Fence, Inc. for $9,000.00. Rush/Handshoe unanimous to award the quote for the fence for the outfield at Young Park to Bemboom's Fence, Inc. for $9,000.00.

Renew Chair Dave Patten for Park Committee for 3-Year Term – Lawrence / Handshoe unanimous to renew Dave Patten as chair of the Park Committee for a 3-year term.

Discuss/Approve/Disapprove Letter of Thanks to Dr. Jeremy Peterson - Rush/Handshoe unanimous to approve a letter of thanks to Peterson. He's been on the Park Committee Board since 2010. There are now two (2) openings for three (3) year terms.

Baldwin Volunteer Corps Update – The next meeting for the Baldwin Volunteer Corps is August 28, 2017.

Approve/Disapprove Resolution # 17-09; Resolution Vacating A Portion of 142nd Street, Fourth Elk Lake Estates – Rush/Handshoe unanimous to table Resolution #17-09 until the September 5, 2017 regular meeting of Baldwin Township in order to have the township attorney determine the legality of vacating a dedicated access.

TABLED ITEMS:

Review/Approve/Disapprove Changing iPad Email Accounts – Lawrence/Handshoe unanimous to table changing the iPad email accounts.

NEW BUSINESS:

Schedule Special Meeting to Discuss Additional Deputy Clerk Position - Lawrence/Handshoe unanimous to table discussing an additional deputy clerk position until the September 18, 2017 regular meeting of Baldwin Township.

Discuss Changes to Employee Handbook – The board is to review the Employee Handbook, and make changes at the next meeting.

Discuss Princeton Union-Times Interview – Schumacher said he shared his opinion about the Bell Annexation with the Princeton Union-Times.

Announcements:

- Rum River Drive/125th Street Public Information Meeting, Wednesday, August 23rd, Princeton City Hall, 4:00 p.m.-5:30 p.m.
- District 7 Meeting & Election, Wednesday, August 30th, Anoka Ramsey Community College, Cambridge, 7:00 p.m.
- Town Offices Closed, Monday, September 4th, Labor Day
- Town Board Regular Meeting, Tuesday, September 5th
- Sherburne SWCD Conservation Tour, Thursday, September 7th, Begins at The Friendly Buffalo, Big Lake, 8:30 a.m., Registration Deadline Monday, August 28th

Any Other Business:
Rush/Lawrence unanimous to send a thank you letter to Mike and Damon Rademacher for helping the maintenance department.

Rush/Handshoe unanimous to add to the September 5, 2017 agenda "Discuss/Approve/ Disapprove Sick Time for Terry Carlile".

Lawrence/Rush unanimous to approve the clerk taking Wednesday, August 23, 2017 as a personal day.

Motion to Approve Bills for Payment – Handshoe/Rush unanimous to approve for payment check numbers 21374 through 21407 and 6 EFT payments totaling $108,987.99.

Adjournment – Rush/Handshoe unanimous to adjourn at 9:31 p.m.

Cathy Stevens

Submitted By: (s/) Cathy Stevens
Clerk/Treasurer
Baldwin Township

Approved By: (s/) Brad Schumacher
Chairman, Board of Supervisors
Baldwin Township

9-5-17
Date

Attendees: Lester Kriesel, Brian Bumgarner, Brian Koski, Andrea Bumgarner, Dawn Othoudt, Christi Miller, David Looney, Jim Lee, Deb Lee, Lisa Herman, Linda Thunstrom, Rick Othoudt, Dean McDevitt, Zac Good, Jon Bogart

APPENDIX I

MPCA PERMIT

Minnesota Pollution Control Agency

State Disposal System

MN0064459

Permittee: Baldwin Township

Facility name: Frontier Trails Homeowners Association

Township: Baldwin Township, **County:** Sherburne

Issuance date: February 1, 2016

Expiration date: January 31, 2027

The state of Minnesota, on behalf of its citizens through the Minnesota Pollution Control Agency (MPCA), authorizes the Permittee to operate a disposal system at the facility named above in accordance with the requirements of this permit.

The goal of this permit is to reduce pollutant levels in point source discharges and protect water quality in accordance with the U.S. Clean Water Act, Minnesota statutes and rules, and federal laws and regulations.

This permit is effective on the issuance date identified above. This permit expires at midnight on the expiration date identified above.

Signature: Nicole Blasing

This document has been electronically signed.

for the Minnesota Pollution Control Agency

Nicole Blasing
Supervisor, North Central Regional Unit
Brainerd Office
Municipal Division

Submit eDMRs
Submit via the MPCA Online Services Portal at
https://netweb.pca.state.mn.us/private/

Submit other WQ reports to:
Attention: WQ Submittals Center
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

Questions on this permit?
For eDMR and other permit reporting issues, contact:
Sheri Woitalewicz, 507-476-4271

For specific permit requirements please refer to:
Jeremy Sanoski, 218-316-3888

Wastewater Permit Program general questions, contact:
MPCA, 651-282-6143 or 1-800-657-3938.

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1. Permitted facility description

The Frontier Trails Homeowners Association facility (facility) is located at 950 feet east of County Road 1, north of 314th Street and south of 316th Street on out lot C, Baldwin Township, Minnesota 55371, Sherburne County.

Major components of the facility include:
- Anaerobic Contactor
- Collection system (pumped septic tank effluent)
- Effluent Disposal - Subsurface Trench/Bed
- Individual or Community SSTS
- Primary treatment - septic tank
- Recirculating Media Filter (sand/gravel)
- Recirculating Media Filter (textile media)

The application and plans indicate that the facility consists of a 112.23-acre single family residential unit cluster development located in Baldwin Township, Sherburne County. The development consists of 41 single family lots. The treatment system for this development is divided into two treatment systems. System 1 provides treatment for 21 homes and system 2 provides treatment for 20 homes.

Both systems consist of individual home septic tanks each with a 600-gallon dosing tank, a septic tank effluent pressure (STEP) collection system, one 4,200-gallon flow equalization tank, one 7,500-gallon recirculating sand filter/Advantex AX100 dosing tank with multiple pumps, one 864 square foot recirculating sand filter and one Advantex AX100 filter, one 7,500-gallon and one 4,200-gallon dosing tank.

All existing components will be utilized for the upgraded system. The existing drain fields for system 1 and 2 will be abandoned and two new drain fields will be built. Effluent from system 2 will be pumped to system 1 and into a new MBBR (Moving bed biofilm reactor) with carbon addition for denitrification followed by polishing aeration and solids removal prior to dosing one of the two new drain fields. Each new drain field has two cells for a total disposal area of 11,232 square feet.

Stations WS001 and WS004 are influent stations for each of the separate systems, these two stations will be used during Phase 1 and Phase 2. Phase 2 monitoring will be effective 90 days after initiation of operation of the upgraded facility. WS002 and WS005 are sludge and scum monitoring in the existing tanks, this monitoring is only required during Phase 1 and not required during Phase 2. WS003 and WS006 are the effluent to drainfield monitoring stations for the two existing drain fields. Both existing drainfields will be abandoned during construction, this monitoring is required during Phase 1 of the Permit. WS007 is a new monitoring station which will be located after the final distribution tank and prior to the new drain fields. This monitoring station will include the new total nitrogen end of pipe limit.

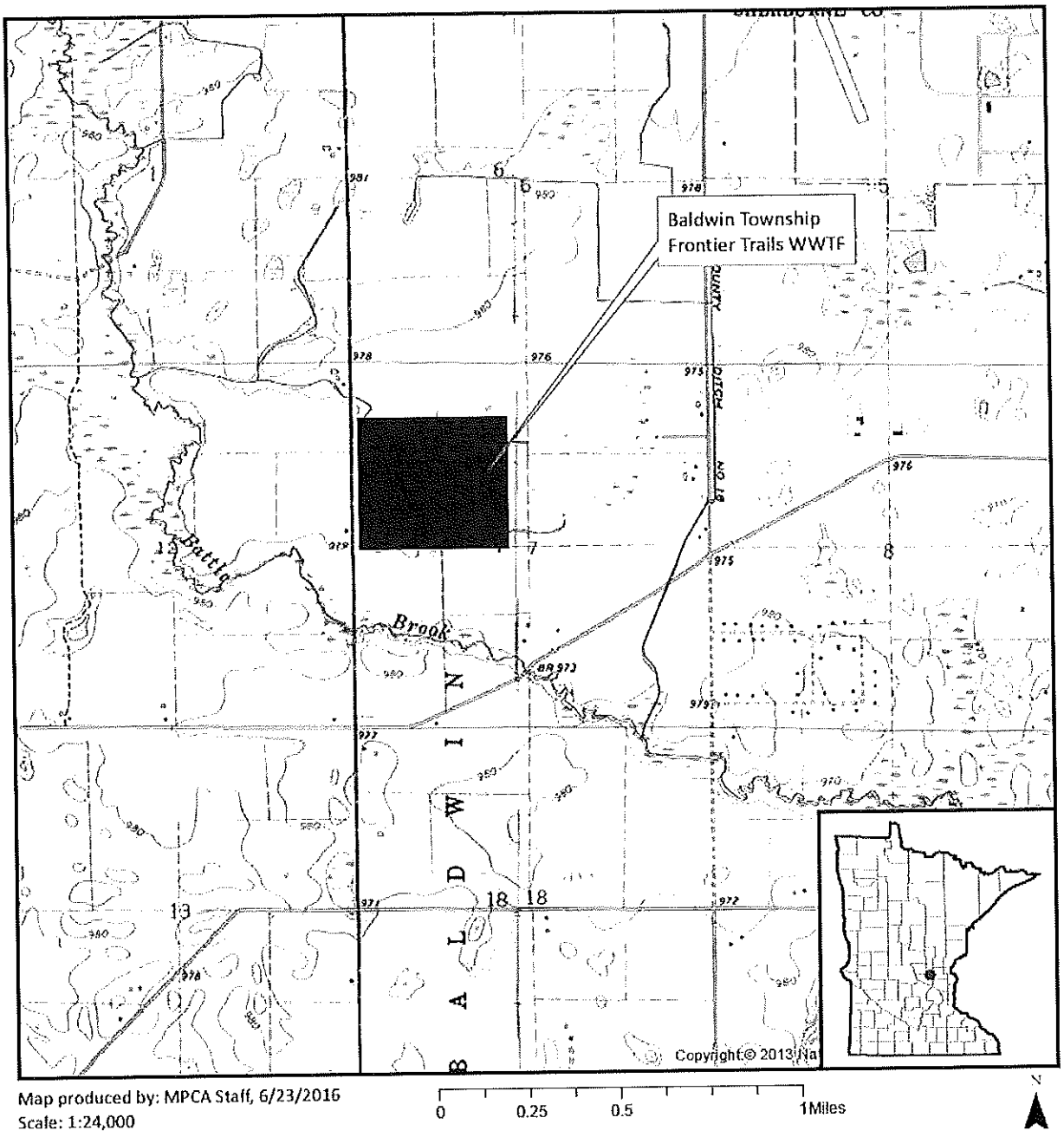
The total system has an average wet weather design flow of 13,640 gallons per day. The total system is designed to treat an average influent Five Day Carbonaceous Biochemical Oxygen Demand concentration of 265 milligrams per Liter (mg/L) and a Total Suspended Solids concentration of 300 mg/L.

The system is further described in plans and specifications on file with the MPCA in an engineering report prepared by Bogart, Pederson & Associates, Inc.

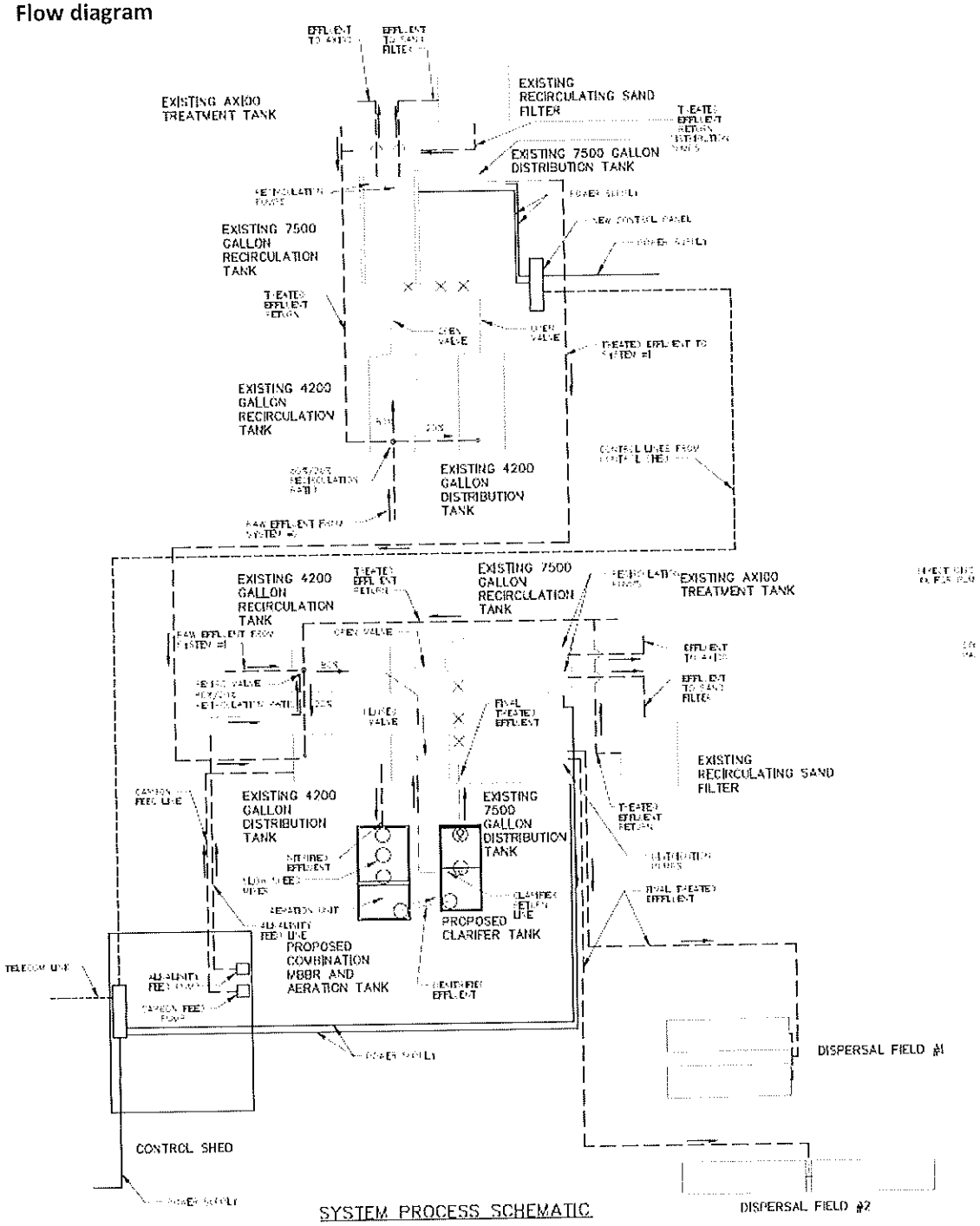
2. Location map of permitted facility

Topographic Map of Permitted Facility

MN0064459: Baldwin Township Frontier Trails WWTF
T35N, R26W, Section 7
BaldwinTownship, Sherburne County, Minnesota



3. Flow diagram



SYSTEM PROCESS SCHEMATIC

4. Summary of stations and station locations

Station	Type of station	Local name	PLS location
GW 001	Well, Upgradient	200 ft. West of System #2	T35N, R26W, S7, SE Quarter of the NW Quarter
GW 002	Well, Downgradient	500 ft. S of System #2	T35N, R26W, S7, SE Quarter of the NW Quarter
GW 003	Well, Downgradient	500 ft. S of System #1	T35N, R26W, S7, SE Quarter of the NW Quarter
GW 004	Piezometer, Other	200 ft W of System #1	T35N, R26W, S7, SE Quarter of the NW Quarter
WS 001	Influent Waste	Influent Waste System #1	T35N, R26W, S7, NE Quarter of the NW Quarter
WS 002	Internal Waste Stream	EQ Tank - System #1	T35N, R26W, S7, NE Quarter of the NW Quarter
WS 003	Intermediate: WW to Land	Dosing Tank - System #1	T35N, R26W, S7, NE Quarter of the NW Quarter
WS 004	Influent Waste	Influent Waste System #2	T35N, R26W, S7, NE Quarter of the NW Quarter
WS 005	Internal Waste Stream	EQ Tanks - System #2	T35N, R26W, S7, NE Quarter of the NW Quarter
WS 006	Intermediate: WW to Land	Dosing Tanks - System #2	T35N, R26W, S7, NE Quarter of the NW Quarter
WS 007	Intermediate: WW to Land	End of Pipe New Drainfield	T35N, R26W, S7, NE Quarter of the NW Quarter
WS007	Intermediate: WW to Land	End of Pipe New Drainfield	T35N, R26W, S7, NE Quarter of the NW Quarter

5. Permit requirements

GW 001	**Well, Upgradient**	
		Groundwater Well: Large Subsurface Sewage Treatment System Well Monitoring Requirements
	5.1.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)], Phases: Phase 1
	5.1.2	Sampling Location. [Minn. R. 7001.0150, Subp. 2(B)]
	5.1.3	Samples for Station GW001 shall be taken at the groundwater monitoring well located 200 feet west of system #2. [Minn. R. 7001.0150, Subp. 2(B)]
	5.1.4	The Permittee shall submit monitoring results in accordance with the limits and monitoring requirements for this station. If conditions are such that no sample can be acquired, the Permittee shall report "No Flow" or "No Discharge" on Discharge Monitoring Report (DMR) and shall add a Comments attachment to the DMR detailing why the sample was not collected. [Minn. R. 7001.0150, Subp. 2(B)]
		Facility Specific Requirements
	5.2.5	Monitoring for Station GW001 is required only during Phase 1 of the permit. [Minn. R. 7001]
GW 002	**Well, Downgradient**	
		Groundwater Well: Large Subsurface Sewage Treatment System Well Monitoring Requirements
	5.3.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)], Phases: Phase 1
	5.3.2	Sampling Location. [Minn. R. 7001.0150, Subp. 2(B)]
	5.3.3	Samples for Station GW002 shall be taken at the groundwater monitoring well located 500 feet south of system #2. [Minn. R. 7001.0150, Subp. 2(B)]
	5.3.4	The Permittee shall submit monitoring results in accordance with the limits and monitoring requirements for this station. If conditions are such that no sample can be acquired, the Permittee shall report "No Flow" or "No Discharge" on Discharge Monitoring Report (DMR) and shall add a Comments attachment to the DMR detailing why the sample was not collected. [Minn. R. 7001.0150, Subp. 2(B)]
		Facility Specific Requirements
	5.4.5	Monitoring for Station GW002 is required during Phase 1 of the permit. [Minn. R. 7001]
GW 003	**Well, Downgradient**	
		Groundwater Well: Large Subsurface Sewage Treatment System Well Monitoring Requirements
	5.5.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)], Phases: Phase 1
	5.5.2	Sampling Location. [Minn. R. 7001.0150, Subp. 2(B)]
	5.5.3	Samples for Station GW003 shall be taken at the groundwater monitoring well located 500 feet south of system #2. [Minn. R. 7001.0150, Subp. 2(B)]
	5.5.4	The Permittee shall submit monitoring results in accordance with the limits and monitoring requirements for this station. If conditions are such that no sample can be acquired, the Permittee shall report "No Flow" or "No Discharge" on Discharge Monitoring Report (DMR) and shall add a Comments attachment to the DMR detailing

		why the sample was not collected. [Minn. R. 7001.0150, Subp. 2(B)]
		Facility Specific Requirements
	5.6.5	Monitoring for Station GW003 is required during Phase 1 of the permit. [Minn. R. 7001]
GW 004	**Piezometer, Other**	
		Groundwater Well: Large Subsurface Sewage Treatment System Piezometer Monitoring Requirements
	5.7.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)], Phases: Phase 1
	5.7.2	Sampling Location. [Minn. R. 7001.0150, Subp. 2(B)]
	5.7.3	Samples for Station GW004 shall be taken at the piezometer located 200 feet west of system #1. [Minn. R. 7001.0150, Subp. 2(B)]
	5.7.4	The Permittee shall submit monitoring results in accordance with the limits and monitoring requirements for this station. If conditions are such that no sample can be acquired, the Permittee shall report "No Flow" or "No Discharge" on Discharge Monitoring Report (DMR) and shall add a Comments attachment to the DMR detailing why the sample was not collected. [Minn. R. 7001.0150, Subp. 2(B)]
		Facility Specific Requirements
	5.8.5	Monitoring for Station GW004 is required during Phase 1 of the permit. [Minn. R. 7001]
WS 001	**Influent Waste**	
		Waste Stream: Large Subsurface Sewage Treatment System Influent Monitoring Requirements
	5.9.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)]
	5.9.2	Sampling Location. [Minn. R. 7001.0150, Subp. 2(B)]
	5.9.3	Samples for Station WS001 shall be taken at a point representative of the influent flow to treatment system #1. [Minn. R. 7001.0150, Subp. 2(B)]
	5.9.4	The Permittee shall submit monitoring results in accordance with the limits and monitoring requirements for this station. If conditions are such that no sample can be acquired, the Permittee shall report "No Flow" or "No Discharge" on Discharge Monitoring Report (DMR) and shall add a Comments attachment to the DMR detailing why the sample was not collected. [Minn. R. 7001.0150, Subp. 2(B)]
		Facility Specific Requirements
	5.10.5	Monitoring for Station WS001 is required during Phase 1 and Phase 2 of the permit. Monitoring for phase 2 will start 90 days after initiation of operation of the upgraded facility. The monitoring point for both Phase 1 and Phase 2 will be the same point. [Minn. R. 7001]
WS 002	**Internal Waste Stream**	
		Waste Stream: Drainfield Septic Tank Requirements
	5.11.1	The Permittee shall submit a quarterly DMR : Due by 21 days after the end of each calendar quarter following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)], Phases: Phase 1
	5.11.2	Sampling Location. [Minn. R. 7001.0150, Subp. 2(B)]
	5.11.3	Samples for Station WS002 shall be taken at the EQ tanks connected to treatment

		system #1. [Minn. R. 7001.0150, Subp. 2(B)]
	5.11.4	The Permittee shall submit monitoring results in accordance with the limits and monitoring requirements for this station. If conditions are such that no sample can be acquired, the Permittee shall report "No Flow" or "No Discharge" on Discharge Monitoring Report (DMR) and shall add a Comments attachment to the DMR detailing why the sample was not collected. [Minn. R. 7001.0150, Subp. 2(B)]
		Facility Specific Requirements
	5.12.5	Monitoring for Station WS002 is required during Phase 1 of the permit. [Minn. R. 7001]
WS 003	**Intermediate: WW to Land**	
		Waste Stream: Large Subsurface Sewage Treatment System Pretreatment Effluent Requirements
	5.13.1	The Permittee shall submit a quarterly DMR : Due by 21 days after the end of each calendar quarter following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)], Phases: Phase 1
	5.13.2	Sampling Location. [Minn. R. 7001.0150, Subp. 2(B)]
	5.13.3	Samples for Station WS003 shall be taken at the dosing tank and prior to the drip irrigation zone connected to system #1. [Minn. R. 7001.0150, Subp. 2(B)]
	5.13.4	The Permittee shall submit monitoring results in accordance with the limits and monitoring requirements for this station. If conditions are such that no sample can be acquired, the Permittee shall report "No Flow" or "No Discharge" on Discharge Monitoring Report (DMR) and shall add a Comments attachment to the DMR detailing why the sample was not collected. [Minn. R. 7001.0150, Subp. 2(B)]
		Facility Specific Requirements
	5.14.5	Monitoring for Station WS003 is required during Phase 1 of the permit. [Minn. R. 7001]
WS 004	**Influent Waste**	
		Waste Stream: Large Subsurface Sewage Treatment System Influent Monitoring Requirements
	5.15.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)]
	5.15.2	Sampling Location. [Minn. R. 7001.0150, Subp. 2(B)]
	5.15.3	Samples for Station WS004 shall be taken at a point representative of the influent flow to treatment system #2. The monitoring is required during both Phase 1 and Phase 2. [Minn. R. 7001.0150, Subp. 2(B)]
	5.15.4	The Permittee shall submit monitoring results in accordance with the limits and monitoring requirements for this station. If conditions are such that no sample can be acquired, the Permittee shall report "No Flow" or "No Discharge" on Discharge Monitoring Report (DMR) and shall add a Comments attachment to the DMR detailing why the sample was not collected. [Minn. R. 7001.0150, Subp. 2(B)]
		Facility Specific Requirements
	5.16.5	Monitoring for Station WS004 is required during Phase 1 and Phase 2 of the permit. Phase 2 will start 90 days after initiation of operation of the upgraded facility. The monitoring point will remain at the same point for both Phase 1 and Phase 2. [Minn. R. 7001]
WS 005	**Internal Waste**	

	Stream	
		Waste Stream: Drainfield Septic Tank Requirements
	5.17.1	The Permittee shall submit a quarterly DMR : Due by 21 days after the end of each calendar quarter following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)], Phases: Phase 1
	5.17.2	Sampling Location. [Minn. R. 7001.0150, Subp. 2(B)]
	5.17.3	Samples for Station WS005 shall be taken at the EQ tanks for treatment system #2. [Minn. R. 7001.0150, Subp. 2(B)]
	5.17.4	The Permittee shall submit monitoring results in accordance with the limits and monitoring requirements for this station. If conditions are such that no sample can be acquired, the Permittee shall report "No Flow" or "No Discharge" on Discharge Monitoring Report (DMR) and shall add a Comments attachment to the DMR detailing why the sample was not collected. [Minn. R. 7001.0150, Subp. 2(B)]
		Facility Specific Requirements
	5.18.5	Monitoring for Station WS005 is required during Phase 1 of the permit. [Minn. R. 7001]
WS 006	**Intermediate: WW to Land**	
		Waste Stream: Large Subsurface Sewage Treatment System Pretreatment Effluent Requirements
	5.19.1	The Permittee shall submit a quarterly DMR : Due by 21 days after the end of each calendar quarter following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)], Phases: Phase 1
	5.19.2	Sampling Location. [Minn. R. 7001.0150, Subp. 2(B)]
	5.19.3	Samples for Station WS006 shall be taken at the dosing tank prior to the discharge in the drip irrigation zone of system #2. [Minn. R. 7001.0150, Subp. 2(B)]
	5.19.4	The Permittee shall submit monitoring results in accordance with the limits and monitoring requirements for this station. If conditions are such that no sample can be acquired, the Permittee shall report "No Flow" or "No Discharge" on Discharge Monitoring Report (DMR) and shall add a Comments attachment to the DMR detailing why the sample was not collected. [Minn. R. 7001.0150, Subp. 2(B)]
		Facility Specific Requirements
	5.20.5	Monitoring for Station WS006 is required during Phase 1 of the permit. [Minn. R. 7001]
WS007	**Intermediate: WW to Land**	
		Waste Stream: Large Subsurface Sewage Treatment System End-of-Pipe Requirements
	5.21.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)], Phases: Phase 2
	5.21.2	Sampling Location. [Minn. R. 7001.0150, Subp. 2(B)]
	5.21.3	Samples for Station WS007 shall be taken at the existing dosing tank of system #1. This station will be monitored during Phase 2. Phase 2 monitoring will begin 90 days after initiation of operations of the upgraded facility. [Minn. R. 7001.0150, Subp. 2(B)]
	5.21.4	The Permittee shall submit monitoring results in accordance with the limits and monitoring requirements for this station. If conditions are such that no sample can be acquired, the Permittee shall report "No Flow" or "No Discharge" on Discharge Monitoring Report (DMR) and shall add a Comments attachment to the DMR detailing

		why the sample was not collected. [Minn. R. 7001.0150, Subp. 2(B)]
		Facility Specific Requirements
	5.22.5	Monitoring for Station WS007 is required during Phase 2 of the permit. This station will be monitored 90 days after initiation of operation of the upgraded facility. [Minn. R. 7001]
MN0064459	**Frontier Trails Homeowners Association**	
		Groundwater Station General Requirements
	5.23.1	Analysis Requirements. [Minn. R. 7001]
	5.23.2	pH analyses shall be conducted within 15 minutes of Sample collection. [Minn. R. 7001]
	5.23.3	Monitoring Wells. [Minn. R. 7001]
	5.23.4	The Permittee shall install, maintain and abandon groundwater monitoring wells according to the Minnesota Water Well Construction Code, Minnesota Rules, ch. 4725. Damaged or improperly constructed monitoring wells shall be repaired or properly abandoned and replaced. Information on licensed water well contractors is available from the Minnesota Department of Health. [Minn. R. 4725]
	5.23.5	The Permittee shall submit a detailed monitoring well log for each monitoring well at the facility and a detailed US Geological Survey topographical map identifying the location of each well. [Minn. R. 7001]
	5.23.6	Each monitoring well shall be clearly numbered on the outside of the well with either indelible paint or an inscribed number. [Minn. R. 7001]
	5.23.7	The monitoring wells shall be sampled in accordance with "Minnesota Pollution Control Agency, Water Quality Division: Sampling Procedures for Ground Water Monitoring Wells, July 1997, Reviewed and re-approved September 2006" or any updates to this document. A copy of this publication is available on the MPCA website at: http://www.pca.state.mn.us. [Minn. R. 7001]
	5.23.8	Grab samples shall be collected at all ground water monitoring points (lysimeters or wells) after stabilization tests are conducted. [Minn. R. 7001]
	5.23.9	Prior to well purging and sampling, depths to groundwater shall be measured to the nearest 0.01 foot below the top of the well casing, and groundwater elevations shall be reported to the nearest 0.01 foot above mean sea level. [Minn. R. 7001]
	5.23.10	Temperature, specific conductance and pH shall be reported as the final field measurements from well stabilization. [Minn. R. 7001]
	5.23.11	The Permittee shall begin sampling as required in the limits and monitoring section of this permit at least two weeks prior to wastewater or waste application to this site, during periods of application, and continuing for two weeks after the waste application ends. [Minn. R. 7001]
		Waste Stream Station General Requirements
	5.24.12	Analysis Requirements. [Minn. R. 7001]
	5.24.13	pH analyses shall be conducted within 15 minutes of Sample collection. [Minn. R. 7001]
	5.24.14	Representative Samples. [Minn. R. 7001]
	5.24.15	Samples shall be collected at a point representative of the total influent flow to both systems 1 and 2. [Minn. R. 7001]
	5.24.16	Nitrogen Limits and Monitoring Requirements. [Minn. R. 7001]
	5.24.17	"Total Nitrogen" is to be reported as the summation of the Total Kjeldahl Nitrogen and Total Nitrite plus Nitrate Nitrogen values. [Minn. R. 7001]

		Compliance Construction Schedule
	5.25.18	Definitions. [Minn. R. 7001]
	5.25.19	"Initiation of operation" means the date that MPCA determines all components of the wastewater treatment system are complete and functioning and the project begins operating for the purposes for which it was planned, designed, and built. [State Definitions]
	5.25.20	"Completion of construction" means all the construction is complete except for minor weather-related components and conforms to the approved plans and specifications and change orders. [State Definitions]
	5.25.21	"Notice to proceed" means a written notice given by the Permittee to the contractor that affixes the contract effective date and the date that the contractor begins performing the work specified in the contract documents. [State Definitions]
	5.25.22	Schedule. [Minn. R. 7001]
	5.25.23	Submit Notice to Proceed. The Permittee must submit a copy of the Notice to Proceed to the MPCA within 14 days of its execution. [Minn. R. 7001]
	5.25.24	Submit Verification of Certified Operator and O&M Manual. The Permittee must notify the MPCA in writing at least 60 days before the planned initiation of operation of the new or upgraded facility that it has employed a wastewater treatment facility operator, certified for the classification of the treatment system (according to Minn. R. Chapter 9400), that is directly responsible for the operation of the system. The Permittee must also submit an operation and maintenance (O&M) manual or a maintenance plan; or a certificate of completion of operation and maintenance manual. [Minn. R. 7001]
	5.25.25	Submit Notice of Intent to Initiate Operation. The Permittee must notify the MPCA in writing at least 14 days before the planned initiation of operation date. Following MPCA staff concurrence that the facility is adequately prepared, MPCA staff will notify the Permittee that it may initiate operation of the new or upgraded facility. [Minn. R. 7001]
	5.25.26	Submit Initiation of Operation Date. The Permittee must notify the MPCA in writing within 14 days after the actual initiation of operation date. The Permittee must comply with all permit requirements and attain final limits within 90 days of the Initiation of Operation date. [Minn. R. 7001]
	5.25.27	Submit Notice to Complete Construction. The Permittee must notify the MPCA in writing at least 14 days before the planned completion of construction date. The MPCA may complete a final inspection. [Minn. R. 7001]
	5.25.28	Submit Final Technical Documents. The Permittee must submit the following to the MPCA within one year after the initiation of operation date: a. An MPCA-approved certification form that is signed by a professional engineer registered in the state of Minnesota stating that the project meets the performance standards. b. A revised operation and maintenance manual or a maintenance plan; or a certificate of completion of an operation and maintenance manual on a form prescribed by the MPCA. At a minimum, this plan must include a detailed discussion of operation and controls, maintenance, sampling and analysis, problem mitigation, VOC management, personnel records and reporting, and safety. This plan must be maintained and updated regularly and made available to the MPCA staff upon request. c. A system effectiveness evaluation that summarizes the effectiveness of the treatment facility (including any applicable ground water monitoring system) as detailed in the plan and specification approval letter or through communication with the MPCA staff.

		d. One copy of "as-built" plans and specifications, also known as record drawings, must be submitted in a format approved by the MPCA. The factsheet titled "Wastewater Treatment Facility Construction Record Documents, As-Built Submittal Requirements" contains specific information regarding the required format of the submittal. The document is located on the MPCA web page at: http://www.pca.state.mn.us/index.php/view-document.html?gid=15492. [Minn. R. 7001]
		Large Subsurface Treatment System (LSTS)
	5.26.29	Unauthorized Discharge. [Minn. R. 7001]
	5.26.30	There shall be no unauthorized discharge to the ground surface or surface water from these facilities. [Minn. R. 7001.0030]
	5.26.31	Prohibitions. [Minn. R. 7001]
	5.26.32	The Permittee shall prevent the discharge of any wastes other than sewage into any component of the facility, including septic tanks, advanced treatment systems, and soil treatment systems that could result in damage to the treatment facility or inhibit treatment unless the discharge of such other substances is specifically approved in writing by the MPCA. [Minn. R. 7001]
	5.26.33	Sanitary Sewer Extension Permit. [Minn. R. 7001]
	5.26.34	The Permittee may be required to obtain a Sanitary Sewer Extension Permit from the MPCA for any addition, extension or replacement to the sanitary sewer. If a sewer extension permit is required, construction may not begin until plans and specifications have been submitted and a written permit is granted except as allowed in Minn. Stat. 115.07, Subd. 3(b). [Minn. R. 7001.0020, D]
	5.26.35	Operator Certification. [Minn. R. 7001]
	5.26.36	The Permittee shall provide a Class C state certified operator who is in direct responsible charge of the operation, maintenance and testing functions required to ensure compliance with the terms and conditions of this permit. In addition, the certified operator shall maintain a current Service Provider Certification. [Minn. R. 9400]
	5.26.37	The Permittee shall provide the appropriate number of operators with a Type IV certification to be responsible for the land application of biosolids or semisolids from commercial or industrial operations. [Minn. R. 7041]
	5.26.38	If the Permittee chooses to meet operator certification requirements through a contractual agreement, the Permittee shall provide a copy of the contract to the MPCA, WQ Submittals Center. The contract shall include the certified operator's name, certificate number, service provider certification number, company name if appropriate, the period covered by the contract and provisions for renewal; the duties and responsibilities of the certified operator; the duties and responsibilities of the permittee; and provisions for notifying the MPCA 30 days in advance of termination if the contract is terminated prior to the expiration date. [Minn. R. 9400]
	5.26.39	The Permittee shall notify the MPCA within 30 days of a change in operator certification or contract status. [Minn. R. 9400]
	5.26.40	Special Requirements. [Minn. R. 7001]
	5.26.41	Special Condition - Update O & M Manual. [Minn. R. 7001]
	5.26.42	The Permittee is required to have on-site and available an updated Operation and Maintenance manual. This manual shall be available to MPCA staff upon request. [Minn. R. 7001.0150, Subp. 3(F)]
	5.26.43	Facility Maintenance. [Minn. R. 7001]
	5.26.44	The facility shall be adequately protected to prevent damage. [Minn. R. 7001.0150, Subp. 3(F)]
	5.26.45	Collection System. [Minn. R. 7001]
	5.26.46	The collection system shall be properly maintained to minimize inflow, infiltration,

		exfiltration, and obstructions. A record of all inspections and maintenance operations shall be kept by the Permittee for a minimum of three years. [Minn. R. 7001.0150, Subp. 3(F)]
	5.26.47	Tank Maintenance. [Minn. R. 7001]
	5.26.48	All tanks (primary, secondary, holding, dosing, individual, etc.) associated with this system shall be operated, pumped and maintained to ensure proper system operation and solids management. After every pumping event, all tanks shall be inspected for potential failure (such as cracks, roots, damaged baffles, etc.). Identified problems shall be corrected immediately. [Minn. R. 7001.0150, Subp. 3(F)]
	5.26.49	The owner of a septic tank or tanks or the owner's agent shall arrange for the removal and proper disposal of septage from all tanks or compartments in which the top of the sludge layer is less than 12 inches below the bottom of the outlet baffle or whenever the bottom of the scum layer is less than three inches above the outlet baffle. All accumulations of sludge, scum, and liquids shall be removed through the maintenance hole. [Minn. R. 7001.0150, Subp. 3(F)]
	5.26.50	The Permittee shall properly clean the effluent screens as often as needed to maintain an adequate flow rate from the septic tank(s). The Permittee shall keep a record at the facility that indicates the dates that the effluent screens are inspected, removed and cleaned. [Minn. R. 7001.0150, Subp. 3(F)]
	5.26.51	Tanks that are not specifically covered under the Limits & Monitoring section of this permit shall be inspected at least every three years and pumped as necessary unless more restrictive local requirements have been established. [Minn. R. 7001.0150, Subp. 3(F)]
	5.26.52	Soil Treatment System Maintenance. [Minn. R. 7001]
	5.26.53	The soil treatment system(s) shall be adequately fenced. [Minn. R. 7001.0150, Subp. 3(F)]
	5.26.54	A dense vegetative cover shall be maintained over the soil treatment system(s) at all times during the growing season to prevent the growth of unwanted vegetation such as trees, deep rooted nuisance plants, aquatic vegetation and to prevent erosion. [Minn. R. 7001.0150, Subp. 3(F)]
	5.26.55	Routine maintenance shall be conducted to discourage the presence of rodents and other burrowing animals and deer on the soil treatment system and to allow inspection of observation ports installed in the soil treatment system(s) inspection pipes. [Minn. R. 7001.0150, Subp. 3(F)]
	5.26.56	Soil Treatment System Inspection. [Minn. R. 7001]
	5.26.57	Ponding depth inspections to determine the condition of each soil treatment system (trench, bed, at-grade, mound, or drip dispersal) /drainfield standpipe shall be conducted every other month during the time the soil treatment system is in use. The inspection of each soil treatment system shall include the identification of wet or saturated areas, depth of effluent ponding in the soil treatment observation ports, evidence of effluent at the surface, frozen components, and measurements in piezometers (if installed). Visual observations shall be recorded and inspection records shall be maintained by the owner for a minimum of three years following each inspection. The results of the inspection are not required to be submitted to the MPCA but shall be made available upon request by MPCA staff. [Minn. R. 7001.0150, Subp. 3(F)]
	5.26.58	Indications of excessive hydraulic and organic loading to the wastewater treatment facility flow rate include ineffective septic tanks or advanced treatment systems, prolonged saturated soil conditions, vegetative drowning or excessive ground water mounding (observed from piezometers) and exceeding daily permitted flow rates as indicated by flow meters, event counters and running time clocks. [Minn. R. 7001.0150, Subp. 3(F)]
	5.26.59	Reserve Soil Treatment System. [Minn. R. 7001]
	5.26.60	The reserve area for the soil treatment system/drainfield shall be properly protected

		to prevent the use of, and damage to, the area. The reserve area shall be posted and identified for the public with at least one sign designating its future purpose and the boundaries shall be visibly staked at all corners. In no case may this area be disturbed for any purpose, including vehicle traffic, storage, bike, hiking or ATV trails, playing fields, etc. [Minn. R. 7001.0150, Subp. 3(F)]
		Biosolids: Domestic Septage (No Analysis Required)
	5.27.61	Authorization. [Minn. R. 7041]
	5.27.62	This permit authorizes the Permittee to store and land apply domestic wastewater treatment septage that is defined as biosolids in accordance with the provisions in this chapter and Minn. R. ch. 7041. The conditions for septage treatment and application described in this chapter apply only to septage from domestic residences as described in the permit application. For the purpose of this permit chapter, solids collected in septic tanks are referred to as biosolids. If any commercial or industrial user is added to this permitted facility, the MPCA shall be notified before adding that user to the facility so that appropriate monitoring, treatment and disposal of the septage can be determined. Based on that determination, the Permittee may be required to apply and pay for a permit modification. [Minn. R. 7041]
	5.27.63	Permittees who prepare bulk biosolids shall obtain approval of the sites on which bulk biosolids are applied before they are applied unless they are Exceptional Quality Biosolids. Site application procedures are set forth in Minn. R. ch. 7041.0800. [Minn. R. 7041.800]
	5.27.64	Compliance Responsibility. [Minn. R. 7041]
	5.27.65	The Permittee is responsible for ensuring that the applicable requirements in this chapter and Minn. R. ch. 7041 are met when biosolids are prepared, distributed, or applied to the land. [Minn. R. 7041]
	5.27.66	Notification Requirements. [Minn. R. 7041]
	5.27.67	The Permittee shall provide information needed to comply with the biosolids requirements of Minn. R. ch. 7041 to others who prepare or use the biosolids. [Minn. R. 7041]
	5.27.68	Pathogen and Vector Attraction Reduction. [Minn. R. 7041]
	5.27.69	Biosolids shall be processed, treated, or be incorporated or injected into the soil to meet pathogen and vector attraction reduction requirements in Minn. R. ch. 7041.1800, subp. 3, items a, b, or c as follows: a. the pH of the septage shall be raised to 12 or higher for 30 minutes by alkali addition and, without the addition of more alkali, shall remain at 12 or higher for 30 minutes; b. the septage is injected and no significant amount of the septage is present on the land surface within one hour after it is injected, or c. the septage is incorporated below the surface of the land within six hours after surface application. [Minn. R. 7041.1800, subp. 3]
	5.27.70	The minimum duration between application and harvest, grazing or public access to areas where biosolids have been applied to the land is as follows: a. 14 months for food crops whose harvested parts may touch the soil/biosolids mixture (such as melons, squash, tomatoes, etc.), when biosolids are surface applied, incorporated or injected. b. 20 months or 38 months depending on the application method for food crops whose harvested parts grow in the soil (such as potatoes, carrots, onions, etc.). The 20 month time period is required when biosolids are surface applied or surface applied and incorporated after they have been on the soil surface for at least four (4) months.

		The 38 month time period is required when the biosolids are injected or surface applied and incorporated within four (4) months of application. c. 30 days for feed crops, other food crops (such as field corn, sweet corn, etc.), hay or fiber crops when biosolids are surface applied, incorporated or injected. d. 30 days for grazing of animals when biosolids are surface applied, incorporated or injected. e. One year where there is a high potential for public contact with the site, (such as a reclamation site located in populated areas, a construction site located in a city, turf farms, plant nurseries, etc.) and 30 days where there is low potential for public contact (such as agricultural land, forest, a reclamation site located in an unpopulated area, etc.) when biosolids are surface applied, incorporated, or injected. [Minn. R. 7041]
	5.27.71	Management Practices. [Minn. R. 7041]
	5.27.72	The management practices for the land application of biosolids are described in detail in Minn. R. ch. 7041.1200 and shall be followed unless specified otherwise in a site approval letter or a permit issued by the MPCA. [Minn. R. 7041.1200]
	5.27.73	Overall management requirements: a. Biosolids shall not be applied to the land if it is likely to adversely affect a threatened or endangered species listed under Section 4 of the Endangered Species Act or its designated critical habitat. b. Biosolids shall not be applied to flooded, frozen or snow covered ground so that the biosolids enter wetlands or other waters of the state. c. Biosolids shall be applied at an agronomic rate. The Agronomic application rate for septage applied to agricultural land, forest, or a reclamation site for a cropping year shall be calculated using the following equation unless determined otherwise by the MPCA. AR = N / 0.0026 Where: AR = Application rate in gallons per acre for the cropping year. N = The maximum available nitrogen application rate in pounds per acre per cropping year required by the crop based on realistic yield goals or nitrogen uptake by vegetation grown on the land minus the amount supplied by other sources such as manure or fertilizer. d. Biosolids shall not be applied within 33 feet of a wetland or waters of the state unless specified otherwise by the MPCA in a permit. [Minn. R. 7041]
	5.27.74	Records. [Minn. R. 7041]
	5.27.75	The Permittee shall obtain and keep on record items a. through g. for five years and items h. through j. indefinitely: a. The following certification statement for all septage applied to the land: "I certify, under penalty of law, that the information that will be used to determine compliance with the pathogen and vector attraction reduction requirements in part 7041.1800, subp. 3 ____[insert either item a, b, or c], the management practices in part 7041.1200, and the site restrictions in part 7041.1300, subpart 3, item D, has been prepared under my direction and supervision according to the system designed to ensure that qualified personnel properly gather and evaluate the information used to determine that the pathogen and vector attraction reduction requirements have been met. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment."; b. a description of how the pathogen and vector attraction reduction requirements are met. If alkali addition is used, records shall indicate each container of septage applied is monitored for compliance with subp. 3, item a;

		c. a description of how management practices and site restrictions are met; d. a record of soil test data as required by part 7041.0800, site approvals, or permits; e. the maximum available nitrogen application rate based on the realistic yield goal of the crop or vegetation grown on the site during the cropping year; f. the number of acres used; g. any other analysis or information required by the MPCA; h. the legal description of the land application site; i. the amount and date of septage applied in gallons per acre and the cumulative dry tons per acre; and j. the amount of arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc applied each cropping year and cumulatively expressed in pounds per acre. [Minn. R. 7041]
	5.27.76	Reporting Requirements. [Minn. R. 7041]
	5.27.77	The Permittee shall submit a biosolids annual report : Due annually, by the 31st of December on a form provided by or approved by the MPCA. The report shall include the requirements in Minnesota Rules, part 7041.1700. [Minn. R. 7041]
	5.27.78	The permittee shall submit a Biosolids Annual Report by December 31 of each year for biosolids storage and/or transfer activities occurring during the cropping year previous to December 31. The report shall indicate whether or not biosolids were transferred and/or stored. If biosolids were transferred, the report shall describe how much was transferred, where it was transferred to, the name of the facility that accepted the transfer and the contact person at that facility. "Cropping year" means a year beginning on September 1 of the year prior to the growing season and ending August 31 the year the crop is harvested. For example, the 2012 cropping year began September 1, 2011, and ended August 31, 2012. [Minn. R. 7041]
	5.27.79	The Permittee shall submit the Biosolids Annual Report to: MPCA Submittals Center Minnesota Pollution Control Agency 520 Lafayette Road North St. Paul, Minnesota 55155-4194. [Minn. R. 7041]
		Total Facility Requirements (SDS)
	5.28.80	No Discharge. There shall be no point source discharge to surface water from the permitted activity. [Minn. R. 7001.]
	5.28.81	Definitions. Refer to the 'Permit Users Manual' found on the MPCA website (www.pca.state.mn.us) for standard definitions. [Minn. R. 7001.]
	5.28.82	Incorporation by Reference. The following applicable federal and state laws are incorporated by reference in this permit, are applicable to the Permittee, and are enforceable parts of this permit: 40 CFR pts. 122.41, 122.42, 136, 403 and 503; Minn. R. pts. 7001, 7041, 7045, 7050, 7052, 7053, 7060, and 7080; and Minn. Stat. ch. 115 and 116. [Minn. R. 7001]
	5.28.83	Permittee Responsibility. The Permittee shall perform the actions or conduct the activity authorized by the permit in compliance with the conditions of the permit and, if required, in accordance with the plans and specifications approved by the Agency. [Minn. R. 7001.0150, subp. 3(E)]
	5.28.84	Toxic Discharges Prohibited. Whether or not this permit includes effluent limitations for toxic pollutants, the Permittee shall not discharge a toxic pollutant except according to Code of Federal Regulations, Title 40, sections 400 to 460 and Minnesota Rules 7050, 7052, 7053 and any other applicable MPCA rules. [Minn. R. 7001.1090, subp. 1(A)]
	5.28.85	Nuisance Conditions Prohibited. The Permittee's discharge shall not cause any nuisance conditions including, but not limited to: floating solids, scum and visible oil film, acutely toxic conditions to aquatic life, or other adverse impact on the receiving

		water. [Minn. R. 7050.0210, subp. 2]
	5.28.86	Property Rights. This permit does not convey a property right or an exclusive privilege. [Minn. R. 7001.0150, subp. 3(C)]
	5.28.87	Liability Exemption. In issuing this permit, the state and the MPCA assume no responsibility for damage to persons, property, or the environment caused by the activities of the Permittee in the conduct of its actions, including those activities authorized, directed, or undertaken under this permit. To the extent the state and the MPCA may be liable for the activities of its employees, that liability is explicitly limited to that provided in the Tort Claims Act. [Minn. R. 7001.0150, subp. 3(O)]
	5.28.88	The MPCA's issuance of this permit does not obligate the MPCA to enforce local laws, rules, or plans beyond what is authorized by Minnesota Statutes. [Minn. R. 7001.0150, subp. 3(D)]
	5.28.89	Liabilities. The MPCA's issuance of this permit does not release the Permittee from any liability, penalty or duty imposed by Minnesota or federal statutes or rules or local ordinances, except the obligation to obtain the permit. [Minn. R. 7001.0150, subp. 3(A)]
	5.28.90	The issuance of this permit does not prevent the future adoption by the MPCA of pollution control rules, standards, or orders more stringent than those now in existence and does not prevent the enforcement of these rules, standards, or orders against the Permittee. [Minn. R. 7001.0150, subp. 3(B)]
	5.28.91	Severability. The provisions of this permit are severable and, if any provisions of this permit or the application of any provision of this permit to any circumstance are held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby. [Minn. R. 7001]
	5.28.92	Compliance with Other Rules and Statutes. The Permittee shall comply with all applicable air quality, solid waste, and hazardous waste statutes and rules in the operation and maintenance of the facility. [Minn. R. 7001]
	5.28.93	Inspection and Entry. When authorized by Minn. Stat. ch. 115.04; 115B.17, subd. 4; and 116.091, and upon presentation of proper credentials, the agency, or an authorized employee or agent of the agency, shall be allowed by the Permittee to enter at reasonable times upon the property of the Permittee to examine and copy books, papers, records, or memoranda pertaining to the construction, modification, or operation of the facility covered by the permit or pertaining to the activity covered by the permit; and to conduct surveys and investigations, including sampling or monitoring, pertaining to the construction, modification, or operation of the facility covered by the permit or pertaining to the activity covered by the permit. [Minn. R. 7001.0150, subp. 3(I)]
	5.28.94	Control Users. The Permittee shall regulate the users of its wastewater treatment facility so as to prevent the introduction of pollutants or materials that may result in the inhibition or disruption of the conveyance system, treatment facility or processes, or disposal system that would contribute to the violation of the conditions of this permit or any federal, state or local law or regulation. [Minn. R. 7001.0150, subp. 3(F)]
	5.28.95	Sampling. [Minn. R. 7001]
	5.28.96	Representative Sampling. Samples and measurements required by this permit shall be conducted as specified in this permit and shall be representative of the discharge or monitored activity. [Minn. R. 7001.0150, 2(B)]
	5.28.97	Additional Sampling. If the Permittee monitors more frequently than required, the results and the frequency of monitoring shall be reported on the Discharge Monitoring Report (DMR) or another MPCA-approved form for that reporting period. [Minn. R. 7001.1090, subp. 1(E)]
	5.28.98	Certified Laboratory. A laboratory certified by the Minnesota Department of Health and/or registered by the MPCA shall conduct analyses required by this permit. Analyses of dissolved oxygen, pH, temperature, specific conductance, and total residual oxidants (chlorine, bromine) do not need to be completed by a certified

		laboratory but shall comply with manufacturers specifications for equipment calibration and use. [Minn. R. 4740.2010, Minn. R. 4740.2050 through 2120]
	5.28.99	Sample Preservation and Procedure. Sample preservation and test procedures for the analysis of pollutants shall conform to 40 CFR Part 136 and Minn. R. 7041.3200. [Minn. R. 7001.0150, 2(B), Minn. R. 7041.3200]
	5.28.100	Equipment Calibration: Flow meters, pumps, flumes, lift stations or other flow monitoring equipment used for purposes of determining compliance with permit shall be checked and/or calibrated for accuracy at least twice annually. [Minn. R. 7001.0150, 2(B and C)]
	5.28.101	Maintain Records. The Permittee shall keep the records required by this permit for at least three years, including any calculations, original recordings from automatic monitoring instruments, and laboratory sheets. The Permittee shall extend these record retention periods upon request of the MPCA. The Permittee shall maintain records for each sample and measurement. The records shall include the following information: a. the exact place, date, and time of the sample or measurement; b. the date of analysis; c. the name of the person who performed the sample collection, measurement, analysis, or calculation; d. the analytical techniques, procedures and methods used; and e. the results of the analysis. [Minn. R. 7001.0150, 2(C)]
	5.28.102	Completing Reports. The Permittee shall submit the results of the required sampling and monitoring activities on the forms provided, specified, or approved by the MPCA. The information shall be recorded in the specified areas on those forms and in the units specified. Required forms may include DMR Supplemental/Sample Value Form Individual values for each sample and measurement shall be recorded on the DMR Supplemental/Sample Value Form which, if required, will be provided by the MPCA. DMR Supplemental/Sample Value Forms shall be submitted with the appropriate DMRs. You may design and use your own supplemental form; however it shall be approved by the MPCA. Note: Required summary information shall also be recorded on the DMR. Summary information that is submitted ONLY on the DMR Supplemental/Sample Value Form does not comply with the reporting requirements. [Minn. R. 7001.1090, 1(D), Minn. R. 7001.150, 2(B)]
	5.28.103	Submitting Reports. DMRs, DMR supplemental forms and related attachments must be electronically submitted via the MPCA Online Services Portal after authorization is approved. DMRs and DMR Supplemental Forms shall be electronically submitted by the 21st day of the month following the sampling period or as otherwise specified in this permit. Electronic DMR submittal shall be complete on or before 11:59 PM of the 21st day of the month following the sampling period or as otherwise specified in this permit. A DMR shall be submitted for each required station even if no discharge occurred during the reporting period. Other reports required by this permit shall be postmarked by the date specified in the permit to: MPCA, Attn: WQ Submittals Center, 520 Lafayette Road North, St Paul Minnesota 551554194. [Minn. R. 7001..0150, Subp. 2(B), Minn. R. 7001..0150, Subp. 3(H)]
	5.28.104	Incomplete or Incorrect Reports. The Permittee shall immediately submit an electronically amended report or DMR to the MPCA upon discovery by the Permittee or notification by the MPCA that it has submitted an incomplete or incorrect report or

		DMR. The amended report or DMR shall contain the missing or corrected data along with a cover letter explaining the circumstances of the incomplete or incorrect report. If it is impossible to electronically amend the report or DMR, the Permittee shall immediately notify the MPCA and the MPCA will provide direction for the amendment submittals. [Minn. R. 7001.0150, 3(G)]
	5.28.105	Required Signatures. All DMRs, forms, reports, and other documents submitted to the MPCA shall be signed by the Permittee or the duly authorized representative of the Permittee. Minn. R. 7001.0150, subp. 2, item D. The person or persons that sign the DMRs, forms, reports or other documents shall certify that he or she understands and complies with the certification requirements of Minn. R. 7001.0070 and 7001.0540, including the penalties for submitting false information. Technical documents, such as design drawings and specifications and engineering studies required to be submitted as part of a permit application or by permit conditions, shall be certified by a registered professional engineer. [Minn. R. 7001.0540]
	5.28.106	Detection Level. The Permittee shall report monitoring results below the reporting limit (RL) of a particular instrument as "<" the value of the RL. For example, if an instrument has a RL of 0.1 mg/L and a parameter is not detected at a value of 0.1 mg/L or greater, the concentration shall be reported as "<0.1 mg/L." "Non-detected," "undetected," "below detection limit," and "zero" are unacceptable reporting results, and are permit reporting violations. Where sample values are less than the level of detection and the permit requires reporting of an average, the Permittee shall calculate the average as follows: a. If one or more values are greater than the level of detection, substitute zero for all nondetectable values to use in the average calculation. b. If all values are below the level of detection, report the averages as "<" the corresponding level of detection. c. Where one or more sample values are less than the level of detection, and the permit requires reporting of a mass, usually expressed as kg/day, the Permittee shall substitute zero for all nondetectable values. [Minn. R. 7001.0150, 2(B)]
	5.28.107	Records. The Permittee shall, when requested by the Agency, submit within a reasonable time the information and reports that are relevant to the control of pollution regarding the construction, modification, or operation of the facility covered by the permit or regarding the conduct of the activity covered by the permit. [Minn. R. 7001.0150, 3(H)]
	5.28.108	Confidential Information. Except for data determined to be confidential according to Minn. Stat. ch. 116.075, subd. 2, all reports required by this permit shall be available for public inspection. Effluent data shall not be considered confidential. To request the Agency maintain data as confidential, the Permittee shall follow Minn. R. 7000.1300. [Minn. R. 7000.1300]
	5.28.109	Noncompliance and Enforcement. [Minn. R. 7001]
	5.28.110	Subject to Enforcement Action and Penalties. Noncompliance with a term or condition of this permit subjects the Permittee to penalties provided by federal and state law set forth in section 309 of the Clean Water Act; United States Code, title 33, section 1319, as amended; and in Minn. Stat. ch. 115.071 and 116.072, including monetary penalties, imprisonment, or both. [Minn. R. 7001.1090, 1(B)]
	5.28.111	Criminal Activity. The Permittee may not knowingly make a false statement, representation, or certification in a record or other document submitted to the Agency. A person who falsifies a report or document submitted to the Agency, or tampers with, or knowingly renders inaccurate a monitoring device or method required to be maintained under this permit is subject to criminal and civil penalties provided by federal and state law. [Minn. R. 7001.0150, 3(G), Minn. R. 7001.1090, 1(G and H), Minn. Stat. ch. 609.671, 1]

	5.28.112	Noncompliance Defense. It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. [Minn. R. 7001]
	5.28.113	Effluent Violations. If sampling by the Permittee indicates a violation of any discharge limitation specified in this permit, the Permittee shall immediately make every effort to verify the violation by collecting additional samples, if appropriate, investigate the cause of the violation, and take action to prevent future violations. If the permittee discovers that noncompliance with a condition of the permit has occurred which could endanger human health, public drinking water supplies, or the environment, the Permittee shall within 24 hours of the discovery of the noncompliance, orally notify the commissioner and submit a written description of the noncompliance within 5 days of the discovery. The written description shall include items a. through e., as listed below. If the Permittee discovers other non-compliance that does not explicitly endanger human health, public drinking water supplies, or the environment, the non-compliance shall be reported during the next reporting period to the MPCA with its Discharge Monitoring Report (DMR). If no DMR is required within 30 days, the Permittee shall submit a written report within 30 days of the discovery of the noncompliance. This description shall include the following information: a. a description of the event including volume, duration, monitoring results and receiving waters; b. the cause of the event; c. the steps taken to reduce, eliminate and prevent reoccurrence of the event; d. the exact dates and times of the event; and e. steps taken to reduce any adverse impact resulting from the event. [Minn. R. 7001.150, 3(K)]
	5.28.114	Upset Defense. In the event of temporary noncompliance by the Permittee with an applicable effluent limitation resulting from an upset at the Permittee's facility due to factors beyond the control of the Permittee, the Permittee has an affirmative defense to an enforcement action brought by the Agency as a result of the noncompliance if the Permittee demonstrates by a preponderance of competent evidence: a. the specific cause of the upset; b. that the upset was unintentional; c. that the upset resulted from factors beyond the reasonable control of the Permittee and did not result from operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or increases in production which are beyond the design capability of the treatment facilities; d. that at the time of the upset the facility was being properly operated; e. that the Permittee properly notified the Commissioner of the upset in accordance with Minn. R. 7001.1090, subp. 1, item I; and f. that the Permittee implemented the remedial measures required by Minn. R. 7001.0150, subp. 3, Item J. [Minn. R. 7001.1090]
	5.28.115	Release. [Minn. R. 7001]
	5.28.116	Unauthorized Releases of Wastewater Prohibited. Except for discharges from outfalls specifically authorized by this permit, overflows, discharges, spills, or other releases of wastewater or materials to the environment, whether intentional or not, are prohibited. However, the MPCA will consider the Permittee's compliance with permit requirements, frequency of release, quantity, type, location, and other relevant factors when determining appropriate action. [Minn. Stat. ch. 115.061]
	5.28.117	Discovery of a release. Upon discovery of a release, the Permittee shall: a. Take all reasonable steps to immediately end the release. b. Notify the Minnesota Department of Public Safety Duty Officer at 1(800)422-0798

		or (651)649-5451 (metro area) immediately upon discovery of the release. You may contact the MPCA during business hours at 1(800)657-3864 or (651)296-6300 (metro area). c. Recover as rapidly and as thoroughly as possible all substances and materials released or immediately take other action as may be reasonably possible to minimize or abate pollution to waters of the state or potential impacts to human health caused thereby. If the released materials or substances cannot be immediately or completely recovered, the Permittee shall contact the MPCA. If directed by the MPCA, the Permittee shall consult with other local, state or federal agencies (such as the Minnesota Department of Natural Resources and/or the Wetland Conservation Act authority) for implementation of additional clean-up or remediation activities in wetland or other sensitive areas. [Minn. R. 7001.1090]
	5.28.118	Sampling of a release. Upon discovery of a release, the Permittee shall: a. Collect representative samples of the release. The Permittee shall sample the release for parameters of concern immediately following discovery of the release. The Permittee may contact the MPCA during business hours to discuss the sampling parameters and protocol. In addition, Fecal Coliform Bacteria samples shall be collected where it is determined by the Permittee that the release contains or may contain sewage. If the release cannot be immediately stopped, the Permittee shall consult with MPCA regarding additional sampling requirements. Samples shall be collected at least, but not limited to, two times per week for as long as the release continues. b. Submit the sampling results on the Release Sampling Form (http://www.pca.state.mn.us/index.php/view-document.html?gid=18867). The Release Sampling Form shall be submitted to the MPCA with the next DMR or within 30 days whichever is sooner. [Minn. R. 7001.1090]
	5.28.119	Bypass. [Minn. R. 7001]
	5.28.120	Anticipated bypass. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if the bypass is for essential maintenance to assure efficient operation of the facility. The permittee shall submit prior notice, if possible at least ten days before the date of the bypass to the MPCA. The notice of the need for an anticipated bypass shall include the following information: a. the proposed date and estimated duration of the bypass; b. the alternatives to bypassing; and c. a proposal for effluent sampling during the bypass. Any bypass wastewater shall enter waters of the state from outfalls specifically authorized by this permit. Therefore, samples shall be collected at the frequency and location identified in this permit or two times per week for as long as the bypass continues, whichever is more frequent. [Minn. R. 7001.1090, 1(J)]
	5.28.121	All other bypasses are prohibited. The MPCA may take enforcement action against the Permittee for a bypass, unless the specific conditions described in Minn. R. Ch. 7001.1090 subp. 1, K and 122.41(m)(4)(i) are met. In the event of an unanticipated bypass, the permittee shall: a. Take all reasonable steps to immediately end the bypass. b. Notify the Minnesota Department of Public Safety Duty Officer at 1(800)422-0798 or (651)649-5451 (metro area) immediately upon commencement of the bypass. You may contact the MPCA during business hours at 1(800)657-3864 or (651)296-6300 (metro area).

		c. Immediately take action as may be reasonably possible to minimize or abate pollution to waters of the state or potential impacts to human health caused thereby. If directed by the MPCA, the Permittee shall consult with other local, state or federal agencies for implementation of abatement, clean-up, or remediation activities. d. Only allow bypass wastewater as specified in this section to enter waters of the state from outfalls specifically authorized by this permit. Samples shall be collected at the frequency and location identified in this permit or two times per week for as long as the bypass continues, whichever is more frequent. The permittee shall also follow the reporting requirements for effluent violations as specified in this permit. [40 CFR 122.41(m)(4)(i), Minn. R. 7001.1090, 1(K), Minn. Stat. ch. 115.061]
	5.28.122	Operation and Maintenance. [Minn. R. 7001]
	5.28.123	The Permittee shall at all times properly operate and maintain the facilities and systems of treatment and control, and the appurtenances related to them which are installed or used by the Permittee to achieve compliance with the conditions of the permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. The Permittee shall install and maintain appropriate backup or auxiliary facilities if they are necessary to achieve compliance with the conditions of the permit and, for all permits other than hazardous waste facility permits, if these backup or auxiliary facilities are technically and economically feasible Minn. R. 7001.0150. subp. 3, item F. [Minn. R. 7001.0150, 3(F)]
	5.28.124	In the event of a reduction or loss of effective treatment of wastewater at the facility, the Permittee shall control production or curtail its discharges to the extent necessary to maintain compliance with the terms and conditions of this permit. The Permittee shall continue this control or curtailment until the wastewater treatment facility has been restored or until an alternative method of treatment is provided. [Minn. R. 7001.1090, 1(C)]
	5.28.125	Solids Management. The Permittee shall properly store, transport, and dispose of biosolids, septage, sediments, residual solids, filter backwash, screenings, oil, grease, and other substances so that pollutants do not enter surface waters or ground waters of the state. Solids should be disposed of in accordance with local, state and federal requirements. [40 CFR 503, Minn. R. 7041]
	5.28.126	Scheduled Maintenance. The Permittee shall schedule maintenance of the treatment works during non-critical water quality periods to prevent degradation of water quality, except where emergency maintenance is required to prevent a condition that would be detrimental to water quality or human health. [Minn. R. 7001.0150, 3(F), Minn. R. 7001.150, 2(B)]
	5.28.127	Control Tests. In-plant control tests shall be conducted at a frequency adequate to ensure compliance with the conditions of this permit. [Minn. R. 7001.0150, 3(F), Minn. R. 7001.150, 2(B)]
	5.28.128	Changes to the Facility or Permit. [Minn. R. 7001]
	5.28.129	Permit Modifications. Except as provided under Minnesota Statutes, section 115.07, subdivisions 1 and 3, no person required by statute or rule to obtain a permit may construct, install, modify, or operate the facility to be permitted, nor shall a person commence an activity for which a permit is required by statute or rule until the agency has issued a written permit for the facility or activity. Permittees that propose to make a change to the facility or discharge that requires a permit modification shall follow Minn. R. 7001.0190. If the Permittee cannot determine whether a permit modification is needed, the Permittee shall contact the MPCA prior to any action. It is recommended that the application for permit modification be submitted to the MPCA at least 180 days prior to the planned change. [Minn. R. 7001.0030]

	5.28.130	Plans, specifications and MPCA approval are not necessary when maintenance dictates the need for installation of new equipment, provided the equipment is the same design size and has the same design intent. For instance, a broken pipe, lift station pump, aerator, or blower can be replaced with the same design-sized equipment without MPCA approval. If the proposed construction is not expressly authorized by this permit, it may require a permit modification. If the construction project requires an Environmental Assessment Worksheet under Minn. R. 4410, no construction shall begin until a negative declaration is issued and all approvals are received or implemented. [Minn. R. 7001.0030]
	5.28.131	Report Changes. The Permittee shall give advance notice as soon as possible to the MPCA of any substantial changes in operational procedures, activities that may alter the nature or frequency of the discharge, and/or material factors that may affect compliance with the conditions of this permit. [Minn. R. 7001.0150, 3(M)]
	5.28.132	Chemical Additives. The Permittee shall receive prior written approval from the MPCA before increasing the use of a chemical additive authorized by this permit, or using a chemical additive not authorized by this permit, in quantities or concentrations that have the potential to change the characteristics, nature and/or quality of the discharge. The Permittee shall request approval for an increased or new use of a chemical additive at least 60 days, or as soon as possible, before the proposed increased or new use. This written request shall include at least the following information for the proposed additive: a. The process for which the additive will be used; b. Safety Data Sheet (SDS) which shall include aquatic toxicity, human health, and environmental fate information for the proposed additive. The aquatic toxicity information shall include at minimum the results of: a) a 48-hour LC50 or EC50 acute study for a North American freshwater planktonic crustacean (either Ceriodaphnia or Daphnia sp.) and b) a 96-hour LC50 acute study for rainbow trout, bluegill or fathead minnow or another North American freshwater aquatic species other than a planktonic crustacean; c. a complete product use and instruction label; d. the commercial and chemical names and Chemical Abstract Survey (CAS) number for all ingredients in the additive (If the MSDS does not include information on chemical composition, including percentages for each ingredient totaling to 100%, the Permittee shall contact the supplier to have this information provided); and e. The proposed method of application, application frequency, concentration, and daily average and maximum rates of use. Upon review of the information submitted regarding the proposed chemical additive, the MPCA may require additional information be submitted for consideration. This permit may be modified to restrict the use or discharge of a chemical additive and include additional influent and effluent monitoring requirements. Approval for the use of an additive shall not justify the exceedance of any effluent limitation nor shall it be used as a defense against pollutant levels in the discharge causing or contributing to the violation of a water quality standard. [Minn. R. 7001.0170]
	5.28.133	MPCA Initiated Permit Modification, Suspension, or Revocation. The MPCA may modify or revoke and reissue this permit pursuant to Minn. R. 7001.0170. The MPCA may revoke without reissuance this permit pursuant to Minn. R. 7001.0180. [Minn. R. 7001.0170, Minn. R. 7001.0180]
	5.28.134	TMDL Impacts. Facilities that discharge to an impaired surface water, watershed or

		drainage basin may be required to comply with additional permits or permit requirements, including additional restriction or relaxation of limits and monitoring as authorized by the CWA 303(d)(4)(A) and 40 CFR 122.44.l.2.i., necessary to ensure consistency with the assumptions and requirements of any applicable US EPA approved wasteload allocations resulting from Total Maximum Daily Load (TMDL) studies. [Minn. R. 7001]
	5.28.135	Permit Transfer. The permit is not transferable to any person without the express written approval of the Agency after compliance with the requirements of Minn. R. 7001.0190. A person to whom the permit has been transferred shall comply with the conditions of the permit. [Minn. R. 7001.0150, 3(N)]
	5.28.136	Facility Closure. The Permittee is responsible for closure and post-closure care of the facility. The Permittee shall notify the MPCA of a significant reduction or cessation of the activities described in this permit at least 180 days before the reduction or cessation. The MPCA may require the Permittee to provide to the MPCA a facility Closure Plan for approval. Facility closure that could result in a potential long-term water quality concern, such as the ongoing discharge of wastewater to surface or ground water, may require a permit modification or reissuance. The MPCA may require the Permittee to establish and maintain financial assurance to ensure performance of certain obligations under this permit, including closure, post-closure care and remedial action at the facility. If financial assurance is required, the amount and type of financial assurance, and proposed modifications to previously MPCA-approved financial assurance, shall be approved by the MPCA. [Minn. Stat. ch. 116.07, 4]
	5.28.137	Permit Reissuance. If the Permittee desires to continue permit coverage beyond the date of permit expiration, the Permittee shall submit an application for permit reissuance : Due by 180 days prior to permit expiration. If the Permittee does not intend to continue the activities authorized by this permit after the expiration date of this permit, the Permittee shall notify the MPCA in writing at least 180 days before permit expiration. If the Permittee has submitted a timely application for permit reissuance, the Permittee may continue to conduct the activities authorized by this permit, in compliance with the requirements of this permit, until the MPCA takes final action on the application, unless the MPCA determines any of the following (Minn. R. 7001.0040 and 7001.0160): a. The Permittee is not in substantial compliance with the requirements of this permit, or with a stipulation agreement or compliance schedule designed to bring the Permittee into compliance with this permit; b. The MPCA, as a result of an action or failure to act by the Permittee, has been unable to take final action on the application on or before the expiration date of the permit; c. The Permittee has submitted an application with major deficiencies or has failed to properly supplement the application in a timely manner after being informed of deficiencies. [Minn. R. 7001.0160]

6. Submittal action summary

GW 001	Well, Upgradient	
		Groundwater Well: Large Subsurface Sewage Treatment System Well Monitoring Requirements
	6.1.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)], Phases: Phase 1
GW 002	Well, Downgradient	
		Groundwater Well: Large Subsurface Sewage Treatment System Well Monitoring Requirements
	6.2.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)], Phases: Phase 1
GW 003	Well, Downgradient	
		Groundwater Well: Large Subsurface Sewage Treatment System Well Monitoring Requirements
	6.3.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)], Phases: Phase 1
GW 004	Piezometer, Other	
		Groundwater Well: Large Subsurface Sewage Treatment System Piezometer Monitoring Requirements
	6.4.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)], Phases: Phase 1
WS 001	Influent Waste	
		Waste Stream: Large Subsurface Sewage Treatment System Influent Monitoring Requirements
	6.5.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)]
WS 002	Internal Waste Stream	
		Waste Stream: Drainfield Septic Tank Requirements
	6.6.1	The Permittee shall submit a quarterly DMR : Due by 21 days after the end of each

		calendar quarter following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)], Phases: Phase 1
WS 003	Intermediate: WW to Land	
		Waste Stream: Large Subsurface Sewage Treatment System Pretreatment Effluent Requirements
	6.7.1	The Permittee shall submit a quarterly DMR : Due by 21 days after the end of each calendar quarter following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)], Phases: Phase 1
WS 004	Influent Waste	
		Waste Stream: Large Subsurface Sewage Treatment System Influent Monitoring Requirements
	6.8.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)]
WS 005	Internal Waste Stream	
		Waste Stream: Drainfield Septic Tank Requirements
	6.9.1	The Permittee shall submit a quarterly DMR : Due by 21 days after the end of each calendar quarter following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)], Phases: Phase 1
WS 006	Intermediate: WW to Land	
		Waste Stream: Large Subsurface Sewage Treatment System Pretreatment Effluent Requirements
	6.10.1	The Permittee shall submit a quarterly DMR : Due by 21 days after the end of each calendar quarter following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)], Phases: Phase 1
WS007	Intermediate: WW to Land	
		Waste Stream: Large Subsurface Sewage Treatment System End-of-Pipe Requirements
	6.11.1	The Permittee shall submit a monthly DMR : Due by 21 days after the end of each calendar month following permit issuance. [Minn. R. 7001.0150, Subp. 2(B)], Phases: Phase 2

MN0064459	Frontier Trails Homeowners Association	
		Biosolids: Domestic Septage (No Analysis Required)
	6.12.1	The Permittee shall submit a biosolids annual report : Due annually, by the 31st of December on a form provided by or approved by the MPCA. The report shall include the requirements in Minnesota Rules, part 7041.1700. [Minn. R. 7041]
		Total Facility Requirements (SDS)
	6.13.2	Permit Reissuance. If the Permittee desires to continue permit coverage beyond the date of permit expiration, the Permittee shall submit an application for permit reissuance : Due by 180 days prior to permit expiration. If the Permittee does not intend to continue the activities authorized by this permit after the expiration date of this permit, the Permittee shall notify the MPCA in writing at least 180 days before permit expiration. If the Permittee has submitted a timely application for permit reissuance, the Permittee may continue to conduct the activities authorized by this permit, in compliance with the requirements of this permit, until the MPCA takes final action on the application, unless the MPCA determines any of the following (Minn. R. 7001.0040 and 7001.0160): a. The Permittee is not in substantial compliance with the requirements of this permit, or with a stipulation agreement or compliance schedule designed to bring the Permittee into compliance with this permit; b. The MPCA, as a result of an action or failure to act by the Permittee, has been unable to take final action on the application on or before the expiration date of the permit; c. The Permittee has submitted an application with major deficiencies or has failed to properly supplement the application in a timely manner after being informed of deficiencies. [Minn. R. 7001.0160]

7. Limits and monitoring

		Discharge limitations					Monitoring requirements					
Subject item	Parameter	Quantity /Loading avg.	Quantity /Loading max.	Quantity /Loading units	Quality /Conc. min.	Quality /Conc. avg.	Quality /Conc. max.	Quality/ Conc. units	Frequency	Sample type	Effective period	Notes
GW 001 200 ft. West of System #2 Phase 1	Chloride, Total						Monitor only. calendar month maximum	milligrams per liter	once per month	Grab	Apr, Jul, Oct	
GW 001 200 ft. West of System #2 Phase 1	Elevation of GW Relative to Mean Sea Level		Monitor only. instantaneous maximum	feet					once per month	Measurement, Instantaneous	Apr, Jul, Oct	
GW 001 200 ft. West of System #2 Phase 1	Nitrite Plus Nitrate, Total (as N)						Monitor only. calendar month maximum	milligrams per liter	once per month	Grab	Apr, Jul, Oct	
GW 001 200 ft. West of System #2 Phase 1	Nitrogen, Ammonia, Total (as N)						Monitor only. calendar month maximum	milligrams per liter	once per month	Grab	Apr, Jul, Oct	
GW 001 200 ft. West of System #2 Phase 1	Nitrogen, Kjeldahl, Total						Monitor only. calendar month maximum	milligrams per liter	once per month	Grab	Apr, Jul, Oct	
GW 001 200 ft. West of System #2 Phase 1	pH				Monitor only. instantaneous minimum		Monitor only. instantaneous maximum	standard units	once per month	Grab	Apr, Jul, Oct	
GW 001 200 ft. West of System #2 Phase 1	Specific Conductance						Monitor only. calendar month maximum	micromhos per cm	once per month	Grab	Apr, Jul, Oct	
GW 001 200 ft. West of System #2 Phase 1	Temperature, Water (C)						Monitor only. calendar month maximum	degrees Celsius	once per month	Grab	Apr, Jul, Oct	
GW 002 500 ft. S of System	Chloride, Total						Monitor only. calendar month	milligrams per liter	once per month	Grab	Apr, Jul, Oct	

		Discharge limitations							Monitoring requirements			
Subject item	Parameter	Quantity /Loading avg.	Quantity /Loading max.	Quantity /Loading units	Quality /Conc. min.	Quality /Conc. avg.	Quality /Conc. max.	Quality/ Conc. units	Frequency	Sample type	Effective period	Notes
#2 Phase 1							maximum					
GW 002 500 ft. S of System #2 Phase 1	Elevation of GW Relative to Mean Sea Level		Monitor only. instantaneous maximum	feet					once per month	Measurement, Instantaneous	Apr, Jul, Oct	
GW 002 500 ft. S of System #2 Phase 1	Nitrite Plus Nitrate, Total (as N)						Monitor only. calendar month maximum	milligrams per liter	once per month	Grab	Apr, Jul, Oct	
GW 002 500 ft. S of System #2 Phase 1	Nitrogen, Ammonia, Total (as N)						Monitor only. calendar month maximum	milligrams per liter	once per month	Grab	Apr, Jul, Oct	
GW 002 500 ft. S of System #2 Phase 1	Nitrogen, Kjeldahl, Total						Monitor only. calendar month maximum	milligrams per liter	once per month	Grab	Apr, Jul, Oct	
GW 002 500 ft. S of System #2 Phase 1	pH				Monitor only. instantaneous minimum		Monitor only. instantaneous maximum	standard units	once per month	Grab	Apr, Jul, Oct	
GW 002 500 ft. S of System #2 Phase 1	Specific Conductance						Monitor only. calendar month maximum	micromhos per cm	once per month	Grab	Apr, Jul, Oct	
GW 002 500 ft. S of System #2 Phase 1	Temperature, Water (C)						Monitor only. calendar month maximum	degrees Celsius	once per month	Grab	Apr, Jul, Oct	
GW 003 500 ft. S of System #1 Phase 1	Chloride, Total						Monitor only. calendar month maximum	milligrams per liter	once per month	Grab	Apr, Jul, Oct	
GW 003 500 ft. S of System #1 Phase 1	Elevation of GW Relative to Mean Sea Level		Monitor only. instantaneous maximum	feet					once per month	Measurement, Instantaneous	Apr, Jul, Oct	
GW 003 500 ft. S of System #1 Phase 1	Nitrite Plus Nitrate, Total (as N)						Monitor only. calendar month maximum	milligrams per liter	once per month	Grab	Apr, Jul, Oct	
GW 003 500 ft. S of System #1 Phase 1	Nitrogen, Ammonia, Total (as N)						Monitor only. calendar month maximum	milligrams per liter	once per month	Grab	Apr, Jul, Oct	
GW 003 500 ft. S of System	Nitrogen, Kjeldahl, Total						Monitor only. calendar month	milligrams per liter	once per month	Grab	Apr, Jul, Oct	

		Discharge limitations						Monitoring requirements				
Subject item	Parameter	Quantity /Loading avg.	Quantity /Loading max.	Quantity /Loading units	Quality /Conc. min.	Quality /Conc. avg.	Quality /Conc. max.	Quality/ Conc. units	Frequency	Sample type	Effective period	Notes
#1 Phase 1							maximum					
GW 003 500 ft. S of System #1 Phase 1	pH				Monitor only. instantaneous minimum		Monitor only. instantaneous maximum	standard units	once per month	Grab	Apr, Jul, Oct	
GW 003 500 ft. S of System #1 Phase 1	Specific Conductance						Monitor only. calendar month maximum	micromhos per cm	once per month	Grab	Apr, Jul, Oct	
GW 003 500 ft. S of System #1 Phase 1	Temperature, Water (C)						Monitor only. calendar month maximum	degrees Celsius	once per month	Grab	Apr, Jul, Oct	
GW 004 200 ft W of System #1 Phase 1	Elevation of GW Relative to Mean Sea Level		Monitor only. instantaneous maximum	feet					once per month	Measurement	Apr, Jul, Oct	
WS 001 Influent Waste System #1	BOD, Carbonaceous 05 Day (20 Deg C)					Monitor only. calendar month average		milligrams per liter	twice per month	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 001 Influent Waste System #1	Flow		Monitor only. calendar month total	million gallons		0.00682 calendar month average	0.01023 daily maximum	million gallons per day	once per day	Measurement, Continuous	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 001 Influent Waste System #1	pH				Monitor only. calendar month minimum		Monitor only. calendar month maximum	standard units	twice per month	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 001 Influent Waste System #1	Precipitation		Monitor only. calendar month total	inches					once per day	Measurement	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 001 Influent Waste System #1	Solids, Total Suspended (TSS)					Monitor only. calendar month average		milligrams per liter	twice per month	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	

		Discharge limitations						Monitoring requirements				
Subject item	Parameter	Quantity /Loading avg.	Quantity /Loading max.	Quantity /Loading units	Quality /Conc. min.	Quality /Conc. avg.	Quality /Conc. max.	Quality/ Conc. units	Frequency	Sample type	Effective period	Notes
WS 002 EQ Tank - System #1 Phase 1	Remaining Scum Capacity		Monitor only. calendar quarter maximum	inches					once per quarter	Measurement	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 002 EQ Tank - System #1 Phase 1	Remaining Sludge Capacity		Monitor only. calendar quarter maximum	inches					once per quarter	Measurement	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 002 EQ Tank - System #1 Phase 1	Scum Depth, Maximum of Sample		Monitor only. calendar quarter maximum	inches					once per quarter	Measurement	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 002 EQ Tank - System #1 Phase 1	Sludge Depth, Maximum of Sample		Monitor only. calendar quarter maximum	inches					once per quarter	Measurement	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 003 Dosing Tank - System #1 Phase 1	BOD, Carbonaceous 05 Day (20 Deg C)						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 003 Dosing Tank - System #1 Phase 1	Chloride, Total						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 003 Dosing Tank - System #1 Phase 1	Nitrite Plus Nitrate, Total (as N)						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 003 Dosing Tank - System #1 Phase 1	Nitrogen, Ammonia, Total (as N)						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 003 Dosing Tank - System #1 Phase 1	Nitrogen, Kjeldahl, Total						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 003 Dosing Tank - System #1 Phase 1	Nitrogen, Total (as N)						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	

		Discharge limitations						Monitoring requirements				
Subject item	Parameter	Quantity /Loading avg.	Quantity /Loading max.	Quantity /Loading units	Quality /Conc. min.	Quality /Conc. avg.	Quality /Conc. max.	Quality/ Conc. units	Frequency	Sample type	Effective period	Notes
WS 003 Dosing Tank - System #1 Phase 1	Solids, Total Suspended (TSS)						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 004 Influent Waste System #2	BOD, Carbonaceous 05 Day (20 Deg C)					Monitor only. calendar month average		milligrams per liter	twice per month	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 004 Influent Waste System #2	Flow		Monitor only. calendar month total	million gallons		0.00682 calendar month average	0.01023 daily maximum	million gallons per day	once per day	Measurement, Continuous	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 004 Influent Waste System #2	pH				Monitor only. calendar month minimum		Monitor only. calendar month maximum	standard units	twice per month	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 004 Influent Waste System #2	Solids, Total Suspended (TSS)					Monitor only. calendar month average		milligrams per liter	twice per month	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 005 EQ Tanks - System #2 Phase 1	Remaining Scum Capacity		Monitor only. calendar quarter maximum	inches					once per quarter	Measurement	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 005 EQ Tanks - System #2 Phase 1	Remaining Sludge Capacity		Monitor only. calendar quarter maximum	inches					once per quarter	Measurement	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 005 EQ Tanks - System #2 Phase 1	Scum Depth, Maximum of Sample		Monitor only. calendar quarter maximum	inches					once per quarter	Measurement	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 005 EQ Tanks -	Sludge Depth, Maximum of		Monitor only. calendar quarter	inches					once per quarter	Measurement	Jan-Dec (Sep-Aug)	

		Discharge limitations						Monitoring requirements				
Subject item	Parameter	Quantity /Loading avg.	Quantity /Loading max.	Quantity /Loading units	Quality /Conc. min.	Quality /Conc. avg.	Quality /Conc. max.	Quality/ Conc. units	Frequency	Sample type	Effective period	Notes
System #2 Phase 1	Sample		maximum								(Oct-Sep)	
WS 006 Dosing Tanks - System #2 Phase 1	BOD, Carbonaceous 05 Day (20 Deg C)						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 006 Dosing Tanks - System #2 Phase 1	Chloride, Total						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 006 Dosing Tanks - System #2 Phase 1	Nitrite Plus Nitrate, Total (as N)						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 006 Dosing Tanks - System #2 Phase 1	Nitrogen, Ammonia, Total (as N)						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 006 Dosing Tanks - System #2 Phase 1	Nitrogen, Kjeldahl, Total						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 006 Dosing Tanks - System #2 Phase 1	Nitrogen, Total (as N)						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS 006 Dosing Tanks - System #2 Phase 1	Solids, Total Suspended (TSS)						Monitor only. calendar quarter maximum	milligrams per liter	once per quarter	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS007 End of Pipe New Drainfield Phase 2	BOD, Carbonaceous 05 Day (20 Deg C)					Monitor only. calendar month average		milligrams per liter	twice per month	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS007 End of	Chloride, Total					Monitor		milligrams	twice per	Grab	Jan-Dec	

		Discharge limitations						Monitoring requirements				
Subject item	Parameter	Quantity /Loading avg.	Quantity /Loading max.	Quantity /Loading units	Quality /Conc. min.	Quality /Conc. avg.	Quality /Conc. max.	Quality/ Conc. units	Frequency	Sample type	Effective period	Notes
Pipe New Drainfield Phase 2						only. calendar month average		per liter	month		(Sep-Aug) (Oct-Sep)	
WS007 End of Pipe New Drainfield Phase 2	Nitrite Plus Nitrate, Total (as N)					Monitor only. calendar month average		milligrams per liter	twice per month	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS007 End of Pipe New Drainfield Phase 2	Nitrogen, Kjeldahl, Total					Monitor only. calendar month average		milligrams per liter	twice per month	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS007 End of Pipe New Drainfield Phase 2	Nitrogen, Total (as N)					10.0 calendar month average		milligrams per liter	twice per month	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	
WS007 End of Pipe New Drainfield Phase 2	Solids, Total Suspended (TSS)					Monitor only. calendar month average		milligrams per liter	twice per month	Grab	Jan-Dec (Sep-Aug) (Oct-Sep)	