

LEGEND

- EXISTING CONTOUR
- 300 --- PROPOSED CONTOUR
- - - - - APPROXIMATE PROPERTY LINE
- 1" IRON PIN FOUND
- PROPOSED 5/8" REBAR W/ CAP
- TEST PIT
- PERCOLATION TEST
- DECIDUOUS TREE
- CONIFEROUS TREE
- EDGE OF BRUSH/WOODS
- WELL
- BENCHMARK
- △ TRAVERSE POINT
- FM - FORCE MAIN
- SS - GRAVITY SEWER
- - - - - FENCE
- - - - - DRAINAGE SWALE
- [Hatched Box] CONSERVATION EASEMENT AREA

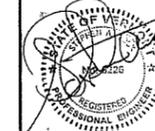
SITE ENGINEER:



CIVIL ENGINEERING ASSOCIATES, INC.
P.O. BOX 485 SHELburne, VT 05482
802-885-2223 FAX: 802-885-2271 web: www.cca-e.com

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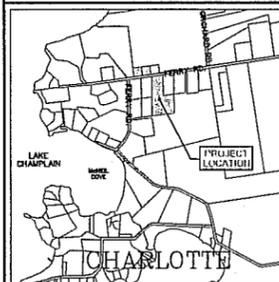
OWNER:

**ST. CLAIR GROUP/
ROGER &
HENRIETTA
FRIDHOLM**

PROJECT:

**ST. CLAIR GROUP/
FRIDHOLM
PRD**

2245 & 2278 FERRY
ROAD
CHARLOTTE
VERMONT



LOCATION MAP
1" = 200'

DATE	CHECKED	REVISION
2/23/07	PBS	CONSERVATION EASEMENT ADDED
2/23/07	PBS	DISPOSAL FIELD LOCATION
1/21/06	PBS	DRIVEWAY LOCATION
4/28/06	PBS	ADDED NOTES 6, 6, & 7
6/14/06	PBS	REVISED DRIVEWAY LOCATION
6/28/06	PBS	REVISED SEWER LINE EASEMENT

**PROPOSED
SITE
PLAN**

DATE
AUG., 2007

SCALE
1" = 60'

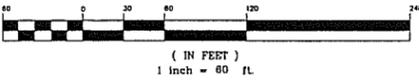
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06220

DRAWING NUMBER
C1.0

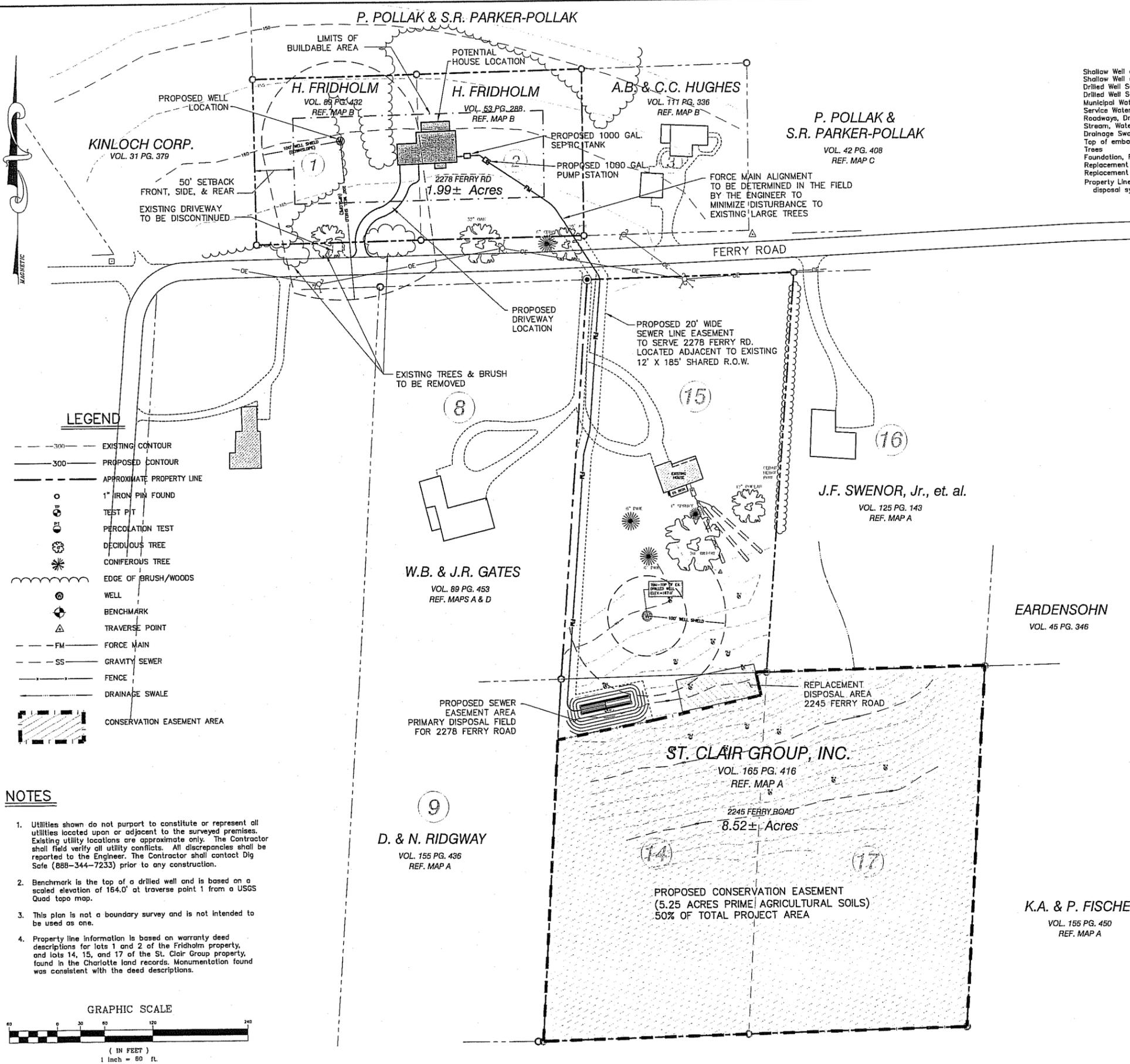
NOTES

1. Utilities shown do not purport to constitute or represent all utilities located upon or adjacent to the surveyed premises. Existing utility locations are approximate only. The Contractor shall field verify all utility conflicts. All discrepancies shall be reported to the Engineer. The Contractor shall contact Dig Safe (888-344-7233) prior to any construction.
2. Benchmark is the top of a drilled well and is based on a scaled elevation of 164.0' at traverse point 1 from a USGS Quad topo map.
3. This plan is not a boundary survey and is not intended to be used as one.
4. Property line information is based on warranty deed descriptions for lots 1 and 2 of the Fridholm property, and lots 14, 15, and 17 of the St. Clair Group property, found in the Charlotte land records. Monumentation found was consistent with the deed descriptions.
5. No pole-mounted light fixture shall be taller than 8' off the ground, and no building-mounted light fixture shall be taller than 20' off the ground. Fixtures will be shielded to direct light downward, and will not direct light onto adjacent properties or roads, and will not result in excessive lighting levels that are uncharacteristic of the neighborhood.
6. All new utility lines shall be underground.
7. All new driveways shall be surfaced with non-white crushed stone.

GRAPHIC SCALE



K.A. & P. FISCHER



MINIMUM ISOLATION DISTANCES
(Contact Engineer for any Clarifications or Conflicts)

	Horizontal Distance (FL)	
	Toe of Mound	Septic Tank
Shallow Well or Spring, Up Slope of Disposal Field	150*(Min.)	75
Shallow Well or Spring, Down Slope of Disposal Field	500*(Min.)	50
Drilled Well Serving 1 Home - Up Slope of Disposal Field	100*(Min.)	50
Drilled Well Serving 1 Home - Down Slope of Disposal Field	200*(Min.)	50
Municipal Water Main	50	25
Service Water Lines	25	5
Roadways, Driveways, Buildings	10 (25 Downslope)	5
Stream, Watercourse, Lake or Impoundment	50	25
Drainage Swales, Roadway Ditches	25	10
Top of embankment or slope > 30%	25	10
Trees	35 (75 Downslope)	10
Foundation, Footing Drains	10	10
Replacement Area - Sides	25	10
Replacement Area - Uphill or Downhill	25	10
Property Line - 10' from toe (or 25' from edge of disposal system, whichever is greater.)	10 (25 Downslope)	10

*Isolation distances to well locations may vary due to site conditions - contact Engineer for verification with the Vermont Water Supply Rule Regulations.

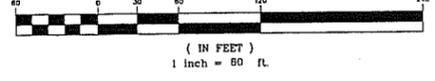
LEGEND

- - - 300 - EXISTING CONTOUR
- - - 300 - PROPOSED CONTOUR
- - - - - APPROXIMATE PROPERTY LINE
- o - 1" IRON PIN FOUND
- o - TEST PIT
- o - PERCOLATION TEST
- o - DECIDUOUS TREE
- o - CONIFEROUS TREE
- o - EDGE OF BRUSH/WOODS
- o - WELL
- o - BENCHMARK
- o - TRAVERSE POINT
- o - FM - FORCE MAIN
- o - SS - GRAVITY SEWER
- o - FENCE
- o - DRAINAGE SWALE
- o - CONSERVATION EASEMENT AREA

NOTES

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GRAPHIC SCALE



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OWNER:
**ST. CLAIR GROUP/
ROGER &
HENRIETTA
FRIDHOLM**

PROJECT:
**ST. CLAIR GROUP/
FRIDHOLM
PRD**
2245 & 2278 FERRY
ROAD
CHARLOTTE
VERMONT

LOCATION MAP
1" = 200'

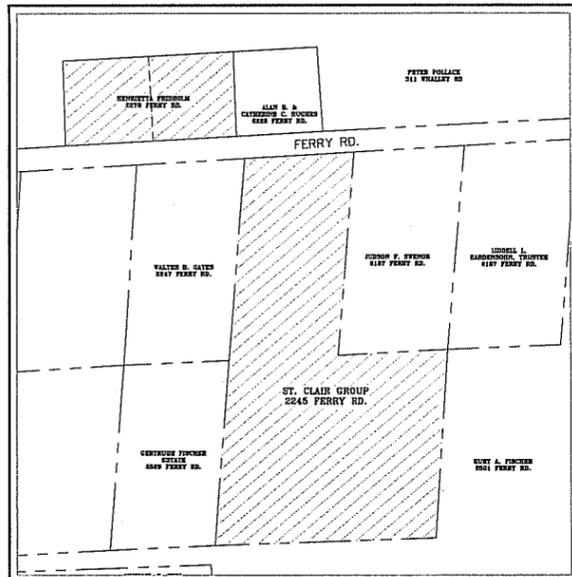
DATE	CHECKED	REVISION
2/23/07	PBS	CONSERVATION EASEMENT ADDED
2/23/07	PBS	DISPOSAL FIELD LOCATION
3/18/08	PBS	NEW WELL LOCATION, ADDED TP
5/14/08	PBS	REVISED DRIVEWAY LOCATION
5/28/08	PBS	REVISED SEWER LINE EASEMENT

**OVERALL
WASTEWATER
TREATMENT
PLAN**

DATE: AUG., 2007
SCALE: 1" = 60'
PROJ. NO. 06220

DRAWING NUMBER: **C1.1**

K.A. & P. FISCHER



OVERALL SITE MAP

1" = 200'

DESIGN DATA - FRIDHOLM PARCEL

- Design Daily Flow:**
- 4 Bedroom Design
 - Design flow = 3 bedrooms x 140 gpd + 70 gpd = 490 gpd
- Septic Tank Size:**
- Design flow < 667 gpd
 - Use (1) 1,000 gallon septic tank
- Application Rate:**
- Use 1.0 gpd/ square foot for mound design
- Absorption Trench Area:**
- 490 gal @ 1.0 gallons / square foot = 490 square feet required
 - Use two 4' x 66' trenches = 528 square feet provided
- Basal Area:**
- 490 gpd @ 0.74 gallons/square foot = 662 square feet required
 - Effective area of 66' x 20' = 1320 square feet provided
- Pump Requirements:**
- Twenty two 1/4" diameter orifice holes spaced @ 6'-0"
 - 1.25 gpm per orifice x 22 = 28.2 gpm
 - TDH @ 28.2 gpm
 - Elevation 12'
 - Friction 17'
 - Residual 3'
- TOTAL 32' TDH

NOTES

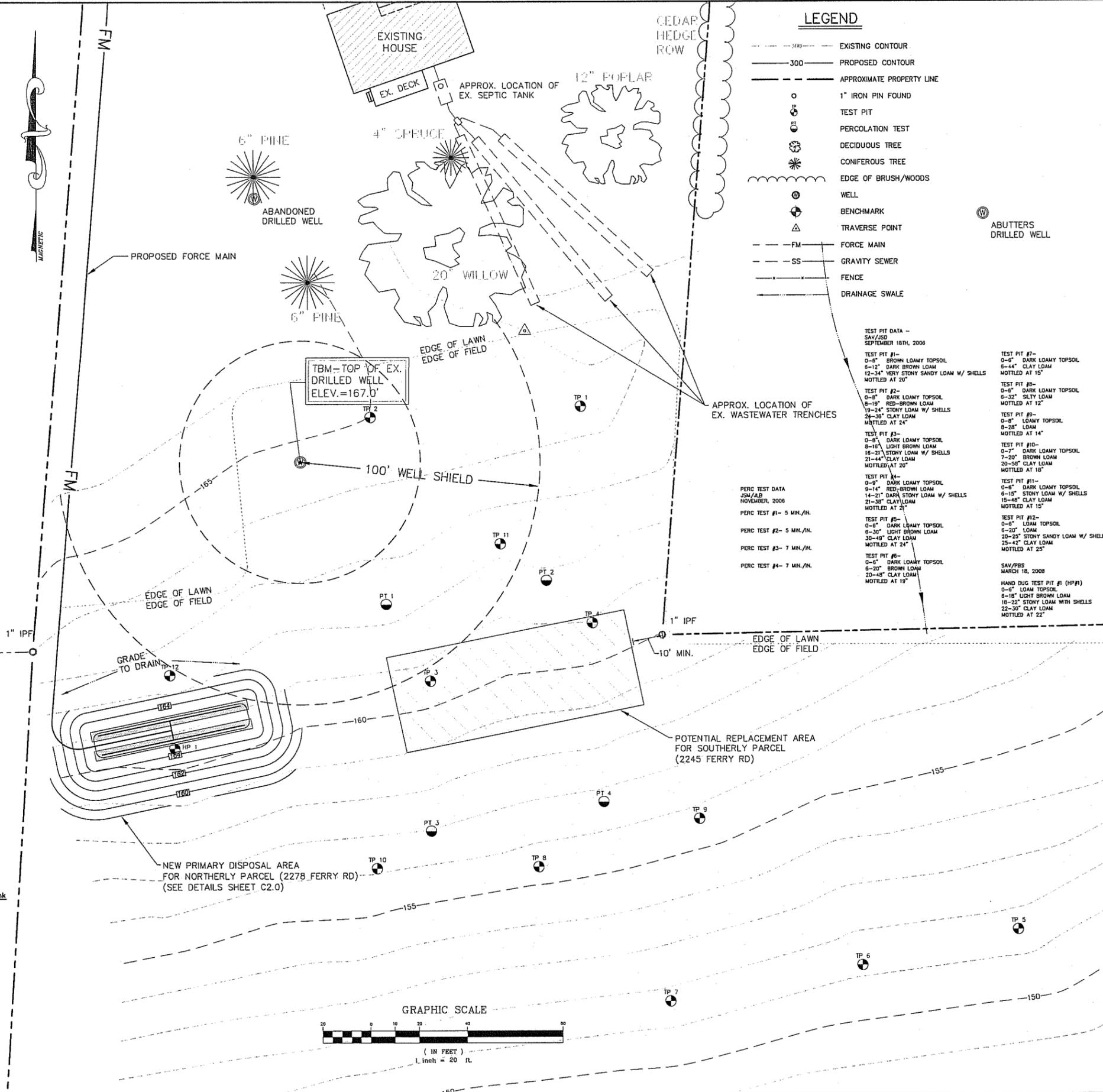
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MINIMUM ISOLATION DISTANCES

(Contact Engineer for any Clarifications or Conflicts)

	Horizontal Distances (FL)	
	Toe of Mound	Septic Tank
Shallow Well or Spring, Up Slope of Disposal Field	150*(Min.)	75
Shallow Well or Spring, Down Slope of Disposal Field	50*(Min.)	50
Drilled Well Serving 1 Home - Up Slope of Disposal Field	100*(Min.)	50
Drilled Well Serving 1 Home - Down Slope of Disposal Field	200*(Min.)	50
Municipal Water Main	50	25
Service Water Lines	25	25
Roadways, Driveways, Buildings	10 (25 Downslope)	5
Stream, Watercourse, Lake or Impoundment	50	25
Drainage Swales, Roadway Ditches	25	25
Top of embankment or slope > 30%	25	10
Trees	10	10
Foundation, Footing Drains	35 (75 Downslope)	10
Replacement Area - Sides	10	5
Replacement Area - Uphill or Downhill	25	5
Property Line - 10' from toe (or 25' from edge of disposal system, whichever is greater.)	10 (25 Downslope)	5

*Isolation distances to well locations may vary due to site conditions - contact Engineer for verification with the Vermont Water Supply Rule Regulations.



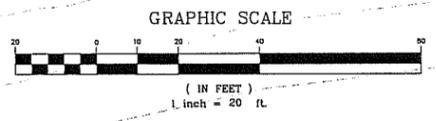
LEGEND

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- EDGE OF BRUSH/WOODS
- WELL
- BENCHMARK
- △ TRAVERSE POINT
- FM --- FORCE MAIN
- SS --- GRAVITY SEWER
- --- FENCE
- --- DRAINAGE SWALE
- ABUTTERS DRILLED WELL

- TEST PIT DATA - SAV/USD SEPTEMBER 18TH, 2008**
- TEST PIT #1- 0-8" BROWN LOAMY TOPSOIL 6-12" DARK BROWN LOAM 12-24" VERY STONY SANDY LOAM W/ SHELLS MOTTLLED AT 20"
 - TEST PIT #2- 0-8" DARK LOAMY TOPSOIL 8-19" RED-BROWN LOAM 19-24" STONY LOAM W/ SHELLS 24-38" CLAY LOAM MOTTLLED AT 24"
 - TEST PIT #3- 0-8" DARK LOAMY TOPSOIL 8-16" LIGHT BROWN LOAM 16-21" STONY LOAM W/ SHELLS 21-44" CLAY LOAM MOTTLLED AT 20"
 - TEST PIT #4- 0-8" DARK LOAMY TOPSOIL 8-14" RED-BROWN LOAM 14-21" DARK STONY LOAM W/ SHELLS 21-38" CLAY LOAM MOTTLLED AT 24"
 - TEST PIT #5- 0-8" DARK LOAMY TOPSOIL 8-30" LIGHT BROWN LOAM 30-48" CLAY LOAM MOTTLLED AT 24"
 - TEST PIT #6- 0-8" DARK LOAMY TOPSOIL 8-20" BROWN LOAM 20-48" CLAY LOAM MOTTLLED AT 19"
 - TEST PIT #7- 0-8" DARK LOAMY TOPSOIL 6-44" CLAY LOAM MOTTLLED AT 15"
 - TEST PIT #8- 0-8" DARK LOAMY TOPSOIL 6-32" SILTY LOAM MOTTLLED AT 12"
 - TEST PIT #9- 0-8" LOAMY TOPSOIL 8-28" LOAM MOTTLLED AT 14"
 - TEST PIT #10- 0-7" DARK LOAMY TOPSOIL 7-20" BROWN LOAM 20-38" CLAY LOAM MOTTLLED AT 18"
 - TEST PIT #11- 0-8" DARK LOAMY TOPSOIL 6-15" STONY LOAM W/ SHELLS 15-48" CLAY LOAM MOTTLLED AT 15"
 - TEST PIT #12- 0-8" LOAM TOPSOIL 8-20" LOAM 20-25" STONY SANDY LOAM W/ SHELLS 25-42" CLAY LOAM MOTTLLED AT 25"
- SAV/PBS MARCH 16, 2008**
- HAND DUG TEST PIT #1 (HP#1) 0-8" LOAM TOPSOIL 8-18" LIGHT BROWN LOAM 18-22" STONY LOAM WITH SHELLS 22-30" CLAY LOAM MOTTLLED AT 22"

PERC TEST DATA JSA/ALB NOVEMBER, 2008

- PERC TEST #1- 5 MIN./IN.
- PERC TEST #2- 5 MIN./IN.
- PERC TEST #3- 7 MIN./IN.
- PERC TEST #4- 7 MIN./IN.



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OWNER: ST. CLAIR GROUP / ROGER & HENRIETTA FRIDHOLM

PROJECT: ST. CLAIR GROUP / FRIDHOLM PRD
2245 & 2278 FERRY ROAD CHARLOTTE VERMONT

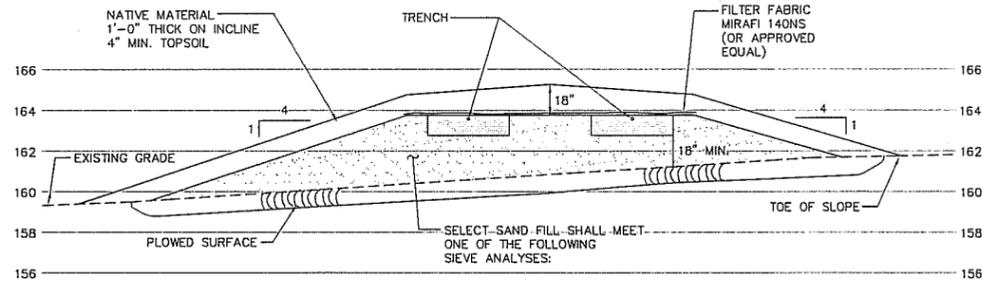
LOCATION MAP 1" = 2000'

DATE	CHECKED	REVISION
3/18/08	PBS	NEW WELL LOCATION, ADDED TP

WASTEWATER DISPOSAL AREA PLAN

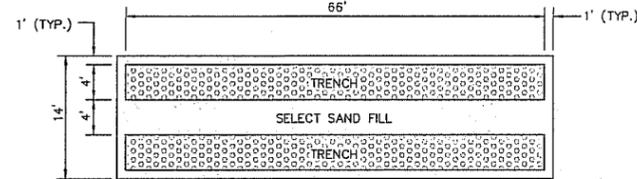
DATE: JAN., 2008
SCALE: 1" = 20'
PROJ. NO. 06220

DRAWING NUMBER: C1.2

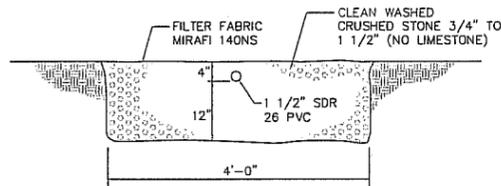


SIEVE #	% PASSING	SIEVE #	% PASSING	SIEVE #	% PASSING
10	85-100	8	80-100	10	85-100
40	25-75	16	50-85	40	30-50
60	0-30	30	25-60	200	0-10
100	0-10	50	10-30		
200	0-5	100	2-10		

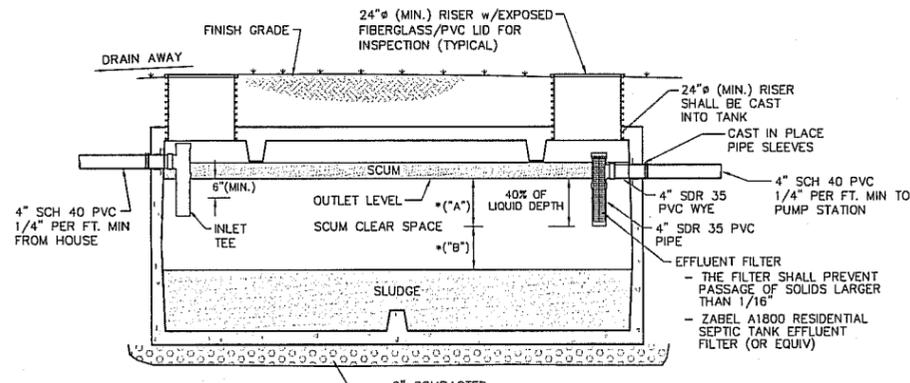
SECTION A-A
1/4" = 1'-0"



TYPICAL TRENCH PLAN
N.T.S.



TYPICAL TRENCH SECTION
N.T.S.



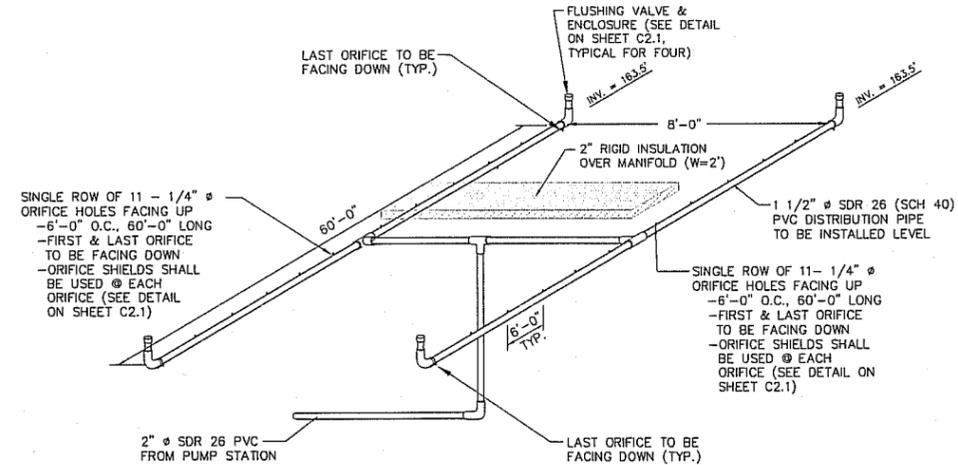
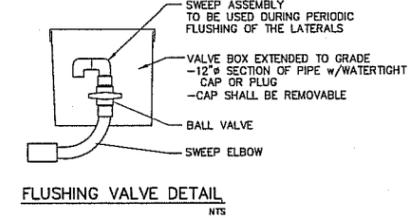
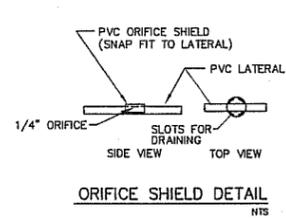
1000 GALLON SEPTIC TANK
N.T.S.

Septic Tank Notes

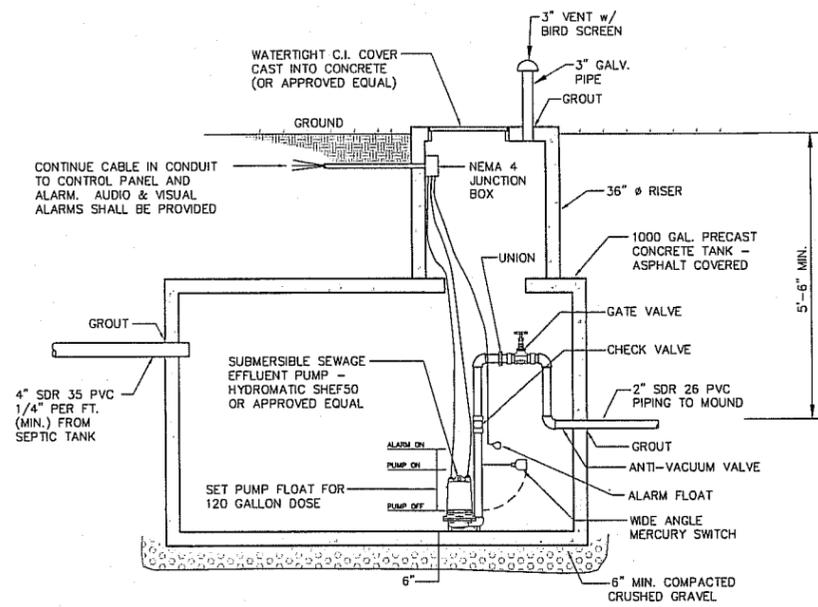
- Septic tank shall be a precast concrete tank, unless otherwise approved.
- Maintenance
 - At least once a year, the depth of sludge and scum in the septic tank should be measured. The tank should be pumped if:
 - Sludge is closer than twelve inches to the outlet baffle or;
 - Scum layer is closer than three inches to the outlet baffle.
 - Under no circumstances should anyone enter a septic tank.
- Recommendations
 - The use of garbage grinders is discouraged as sludge accumulation in the septic tank can be increased by up to 40%. If used, the septic tank will require more frequent pumping.
 - The septic system is designed to handle human waste and toilet paper, plus water from plumbing fixtures such as toilets, baths and sinks. Moderate use of household cleaners, detergents and bleach should not damage your system; however, indiscriminate use may cause problems. Non-degradable paper products and any other non-biodegradable substances should not be put in your wastewater system.
 - Minimize the amount of water used in the household. Excessive water could flush solids from the septic tank to the disposal field which leads to clogging or plugging of the piping. When dishwashers and washers are used, make sure loads are full and stagger their use to reduce peak flows, i.e. stagger loads of laundry over several days instead of one day.
- Walkways, patios and decks or other permanent structures should not be constructed over the septic tank.
- There should be no need to use commercial "starter", "bacterial feeds", or "cleaners", etc. Bacteria in a septic tank system occurs naturally.

Wastewater Design Data
Fridholm Property
November, 2007

Design Flow	4	Number of Bedrooms
490	4	Design Flow (GPD)
0.51	0.51	Average Daily Flow (GPM)
Trench Sizing	4.0	Allowable Application Rate per Linear Foot (GPD/FT)
123	123	Linear Feet of Trench Required (FT)
132	132	Linear Feet of Trench Proposed (FT)
2	2	Number of Trenches Proposed
Dosing Requirements	2	Diameter of Distribution Pipe (Inches)
240	240	Length of Distribution Pipe (FT)
39.2	39.2	Distribution System Volume (Gallons)
5	5	Required Dose Volume Factor
196	196	Required Minimum Dose Volume (Gallons)
4	4	Minimum Required Doses per Day
122.5	122.5	Maximum Dose Allowed (Gallons)
120	120	Chosen Dose Volume (Gallons)
30.00	4	Recommended Pumping Duration per Dose (Minutes)
30.51	30.00	Recommended Pumping Rate w/o Inflow (GPM)
	30.51	Recommended Pumping Rate with Inflow (GPM)
Distribution Requirements	132	Length of Trench
4	4	Trench width (FT)
528	528	Total Trench Area (SF)
25	25	Maximum Area per orifice Hole (SF)
21.2	21.2	Required Number of Orifice Holes
22	22	Number of Orifice Holes Proposed
1.14	1.14	Avg. Flow per Orifice (GPM)
TRENCH 1	0.25	Diameter of orifice (Inches)
11	11	Number of orifices
123	123	Residual pressure (FT)
1.28	1.28	Design Flow per orifice (GPM)
14.04	14.04	Subtotal flow (GPM)
60	60	Length of Distribution Pipe (FT)
6.00	6.00	Spacing of orifice holes (FT)
TRENCH 2	0.25	Diameter of orifice (Inches)
11	11	Number of orifices
123	123	Residual pressure (FT)
1.28	1.28	Design Flow per orifice (GPM)
14.04	14.04	Subtotal flow (GPM)
60	60	Length of Distribution Pipe (FT)
6.00	6.00	Spacing of orifice holes (FT)
26.16	26.16	Total Design Flow (GPM)
4.26	4.26	Actual Duration of Pumping Cycle (minutes)



TRENCH PIPING DETAIL
N.T.S.



1000 GALLON PUMP STATION DETAIL
N.T.S.

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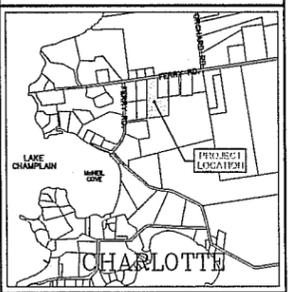
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FRIDHOLM**

PROJECT:

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FRIDHOLM
PRD**

2245 & 2278 FERRY
ROAD
CHARLOTTE
VERMONT



LOCATION MAP
1" = 200'

DATE	CHECKED	REVISION

**WASTEWATER
DETAILS**

DATE: NOV., 2006
SCALE: 1" = 30'
PROJ. NO.: 06220

DRAWING NUMBER:
C2.0

DISPOSAL FIELDS & FORCE MAINS

PART 1 - GENERAL

1.01 Summary

A. Section Includes:

1. Wastewater Disposal Field
2. Force Main Materials

1.02 References

- A. All work shall be done in accordance with the State of Vermont Environmental Protection Rules effective August 8, 1996.

PART 2 - PRODUCTS

2.01 General

- A. Disposal Fields: Schedule 40 PVC pipe meeting the requirements of the latest revision of ASTM Specification D-1785. Fittings used in the disposal fields shall be compatible with distribution lines material.
- B. Force Mains: PVC pipe shall conform in all respects to the latest revisions of ASTM Specifications D-2241. All pipe fittings shall be SDR 26 (or SCH 40) clearly marked as follows:
- Manufacturer's Name and Trademark
 - Nominal Pipe Size (as shown on plans)
 - Material Designation
- Joints shall be push-on type using elastomeric gaskets factory installed conforming to ASTM Specification D-3212.
- C. Crushed stone shall be clean, durable and no smaller than 3/4" or larger than 1 1/2 inches in diameter.

PART 3 - EXECUTION

MOUND CONSTRUCTION

- A. Aboveground vegetation shall be closely cut and removed from the ground surface throughout the area to be utilized for the placement of the fill material. Prior to plowing, the dosing pump discharge line from the pump chamber or dosing chamber to the point of connection with the distribution piping header shall be installed. The area shall then be plowed to a depth of seven to eight inches, parallel to the land contour with the plow throwing the soil upstate to provide a proper interface between the fill and natural soils. Tree stumps should be cut flush with the surface of the ground and roots should not be pulled. Once plowing of the mound area is completed, the area shall be fenced to prevent vehicles and equipment from entering the plowed area.
- B. To prevent compaction, construction equipment shall not be moved across the plowed surface or the effluent disposal area. However, after placement of a minimum of six inches of sand fill over the plowed area, construction equipment may be driven over the protected surface to expedite construction. Construction equipment shall be kept off the area down gradient of the disposal field. Construction and/or plowing shall not be initiated when the soil moisture content is high.
- C. Construction should be initiated immediately after preparation of the soil interface by placing all of the sand fill needed for the mound to a minimum depth of 27 inches. This depth will permit excavation of trenches to accommodate the crushed stone (12 inches) necessary for the distribution piping.
- D. The pressure distribution pipe should be laid level on top of the stone and flushing valves installed at the ends of the pipe. Upon completion of the distribution piping, the qualified consultant shall test the system with clean water. The test shall show that a minimum pressure of three feet of head is present at the ends of the pipe and that the difference in discharge rate between the two orifices with the greatest difference in discharge rates is not greater than 15 percent. After connecting the distribution pipe to the force main, the distribution pipe shall be covered with at least two inches of clean stone aggregate. The stone aggregate shall be covered completely with filter fabric.
- E. After installation of the distribution system, crown the entire mound with cover of soil less permeable than the mound fill, covering with 12 inches on the side slopes and a minimum of 18 inches over the center of the mound. Native soil from the site is normally suitable for cover material, though the top two to four inches of this cover should be topsoil. The entire mound shall be seeded, sodded or otherwise provided with vegetative cover to assure stability of the installation.
- F. The area surrounding the disposal field shall be graded to provide diversion of surface runoff waters if required.

3.02 Testing Notes

- A. The wastewater system shall be inspected during critical stages of construction by a qualified consultant. This shall include at a minimum the staking of the disposal field, the trenches after the initial 9 inches of stone and distribution piping is placed, the installation and pressure test of distribution piping, and a final inspection of the entire system. The Contractor will be responsible for contacting the Engineer to set up the inspection schedule.
- B. Testing of pressure distribution shall be done in the Engineer's presence. Pressure shall be measured to insure a minimum of 1 psi. (See section D above).
- C. The distribution line shall then be carefully placed on the bedding with no slope, orifice shields snapped into place, and covered with at least 2" of crushed stone.
- D. All work shall be done in accordance with the State of Vermont Environmental Protection Rules and the Town of Charlotte Sewage Ordinance Standards.
- E. Prior to use of the system, the qualified consultant shall submit a written report to the Town of Charlotte stating that the system has been installed according to the approved plans and permit. The report shall specifically address the inspection of the site preparations and include numerical results of the orifice discharge rate comparison.

3.07 PRESSURE PIPE TESTING

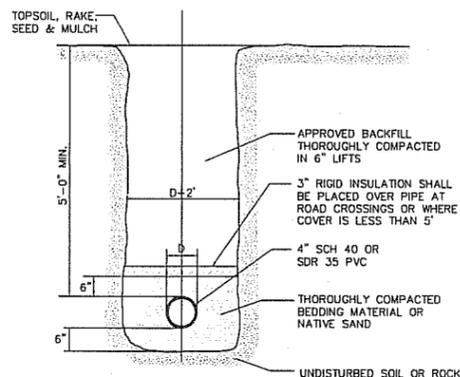
- A. General: The proposed force main shall pass the hydrostatic pressure test and leakage test described herein. Prior to testing, all anchors and braces shall be installed. All concrete thrust blocks and restraints shall be in place and cured at least seven days. All buried pipe shall be backfilled. Suitable test plugs shall be installed and air release valves shall be installed at the high points.
- B. Hydrostatic Test: The following procedure shall be used:
1. All air release valves shall be opened and the pipe shall be filled with water at a rate not to exceed the venting capacity of the air release valves.
 2. The water pressure shall be raised to 150 percent of the designed operating pressure or 60 psi minimum at the highest point.
 3. Failure to hold the designated pressure within 5 psi of the specified test pressure for the two hour period constitutes a failure of the section tested.
- C. Leakage Test: The following procedure shall be used:
1. Leakage shall be defined as the quantity of water that must be supplied into the pipe being tested to maintain pressure within 5 psi of the specified test pressure.
 2. No pipe installation shall be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{ND(P)0.5}{7,400}$$

$$L = \frac{SD(P)0.5}{133,100} \text{ Whichever is less}$$

S = Length of Pipe Testing
 L = Allowable Leakage in Gal/Hr
 D = Nominal Diameter of Pipe (")
 P = Average Test Pressure (psi)
 N = Number of Joints in the Pipeline Tested

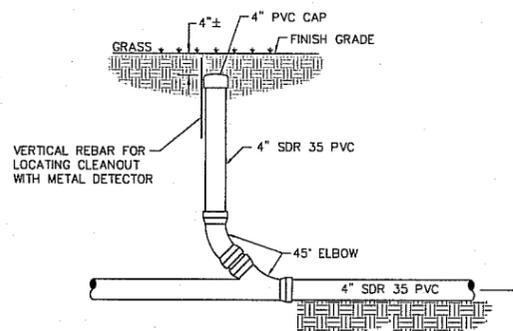
All testing shall be conducted in accordance with AWWA C600-87 or latest revision.



TYPICAL TRENCH DETAIL
 N.T.S.

NOTES:

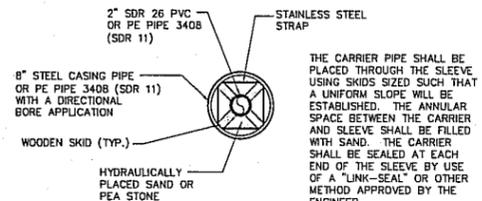
1. Compaction of backfill and bedding shall be a minimum of 90% (95% under roadway surfaces) of maximum dry density determined in the standard proctor test (ASTM D698).
2. Bedding material shall consist of crushed stone, gravel or sand with a maximum size of 3/4". Submit a sample to the Engineer for approval.
3. In trenches with unstable materials, trench bottom shall first be stabilized by placement of filter fabric then crushed stone (3/4" maximum).
4. Where 4 ft. of cover cannot be maintained the sewer pipe shall be protected against freezing by installation of a minimum of 3 inch thick styrofoam insulating sheets.
5. Approved backfill shall not contain any stones more than 12" in largest dimension (6" in roadways, 2" maximum diameter within 2' of the outside of the pipe), or contain any frozen, wet, or organic material.
6. Use 3 inch styrofoam sheets at all road crossings or areas that are to be plowed during the winter.
7. The sides of trenches 4' or more in depth entered by personnel shall be sheeted or sloped to the angle of repose as defined by O.S.H.A. standards.



TYPICAL CLEANOUT DETAIL
 N.T.S.

NOTES:

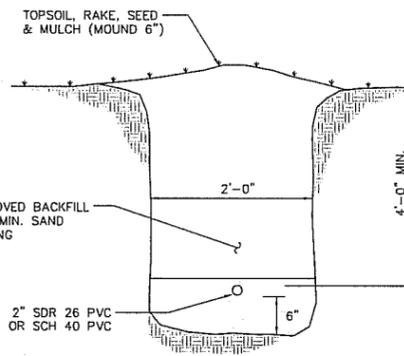
1. CONTRACTOR SHALL PROVIDE TWO TIES TO ALL BURIED C.O.'s ON THE AS-BUILT PLANS SUBMITTED TO THE OWNER.
2. CLEANOUT TO BE INSTALLED AT INTERVALS OF NOT MORE THAN 100 FEET, AND UPSTREAM OF BEND(S) IN BUILDING SEWER(S) WHEN CHANGE IN PIPE DIRECTION EXCEEDS 45° (USE LONG SWEEP FITTINGS WHEN EXCEEDING 45°)



THE CONTRACTOR MAY SUBSTITUTE STAINLESS STEEL CASING SPACERS BY CASCADE WATERWORKS CO. FOR THE WOODEN SKIDS (OR APPROVED EQUAL)

HIGHWAY CROSSING SLEEVES SHALL MEET THE REQUIREMENTS OF VERMONT AOT STANDARD D-20 AND SPECIFICATION SECTION 625

FORCE MAIN CASING AND CARRIER PIPE DETAIL
 N.T.S.



FM TRENCH SECTION
 N.T.S.

Horizontal Directional Drilling with Polyethylene Pipe

A. Directional boring with PE3408 pipe shall be completed in accordance with the manufacturer's requirements and shall not in any way affect the joint connections or the overall strength characteristics of the pipe.

B. References:

- "Mini-Horizontal Directional Drilling Manual" published by North American Society for Trenchless Technology (NASTT).
- "Guidelines for a Successful Directional Crossing Bid Package" published by Directional Crossing Contractors Association (DCCA).
- "Polyethylene Pipe for Horizontal Directional Drilling" of the Plastic Pipe Institute's Handbook of Polyethylene Piping.

C. Quality Control: All directional boring shall be completed in such a way as not to jeopardize the existing infrastructure/facilities, such as the roadway, utility poles, subsurface utilities, structures/foundations, or significant landscaping, including existing trees. All potential conflicts shall be field verified with the Engineer prior to directional drilling.

D. General

1. Directional drilling shall be performed in a manner required to install HDPE utility line as indicated on the drawings. Furnish all manpower and equipment required to perform the pipeline installation. The operation shall include all excavation and dewatering, drilling calculations, pilot hole, and pullback operations. Contractor shall be responsible for type of reamer, diameter, and other pertinent operations required for a complete installation. Contractor shall be responsible for mobilizing on-site with a full range of drill stems and reaming heads to allow for various factors which may occur. Drill stems shall be of proper size and diameter to allow for full thrust and torque capabilities of the drilling machines.
2. Contractor shall perform utility survey to locate information concerning existing utility lines located in the areas of the directional drilling work.
3. Directional drilling shall be accomplished by drilling from one side of the crossing to the other using an approved method. One method shall be drilling a small diameter pilot hole along the proposed utility route. Steering shall be accomplished by using drilling mud which is pumped into the drill pipe to provide rotational energy in a drill bit at the end of the drill pipe. A jet bit shall force the mud through small orifices and jet away the earth and to allow the drilled path to curve in the proper direction as the drill pipe is thrust forward. An electronic survey instrument shall be placed inside the drill pipe head. The instrument shall signal a computer of the drilled path's magnetic azimuth, vertical inclination, and orientation of the bend. This data shall be used by the drilling contractor to calculate location of the drill bit and allow steering adjustments to be made.
4. After completing the pilot hole, larger diameter reaming heads shall be pulled back in order to enlarge the hole as required to allow for the pipe pullback. The Contractor shall be responsible for multiple reaming operations as required to complete the work. Pull back operations shall be carried out as soon as possible following the final ream. During this phase of the work, the Contractor shall continue his work operations without interruption regardless of the day of week or hour of the day. A pullback head shall be attached to the pipe to allow fastening to the shovel head reamer. The head shall be closed to prevent drilling mud from entering the main during the pullback operation.
5. Upon completion of the drilling operations, the equipment and materials used shall be removed from the site and the areas disturbed shall be restored to original conditions. The main shall be tested in accordance with Section 02730 of the Specifications. If the main fails the testing, it shall be removed and the work repeated at no additional cost to the Owner.

SITE ENGINEER:



CIVIL ENGINEERING ASSOCIATES, INC.
 P.O. BOX 485 SHELburne, VT 05482
 802-985-2323 FAX: 802-985-2271 web: www.caa-vt.com

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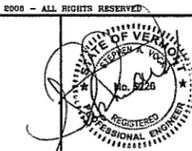
PBS

CHECKED

SAV

APPROVED

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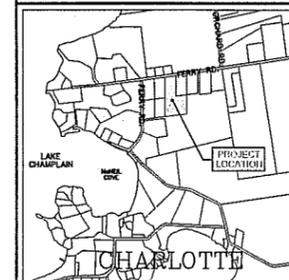


OWNER:

ST. CLAIR GROUP/
 ROGER &
 HENRIETTA
 FRIDHOLM

PROJECT:

ST. CLAIR GROUP/
 FRIDHOLM
 PRD
 2245 & 2278 FERRY
 ROAD
 CHARLOTTE
 VERMONT



LOCATION MAP
 1" = 2000'

DATE	CHECKED	REVISION

WASTEWATER
 DETAILS

DATE
 NOV., 2006
 SCALE
 AS SHOWN
 PROJ. NO.
 06220

DRAWING NUMBER
 C2.1