

LEGEND

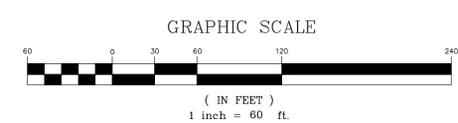
- PROPOSED PROPERTY LINE
- PROPOSED SETBACK LINE
- 100 --- PROPOSED CONTOUR
- ==== PROPOSED CURB
- ==== PROPOSED FENCE
- ==== PROPOSED GRAVEL
- ==== PROPOSED PAVEMENT
- ==== PROPOSED GUARD RAIL
- E --- PROPOSED ELECTRIC
- FM --- PROPOSED FORCEMAIN
- G --- PROPOSED GAS
- ST --- PROPOSED STORM
- S --- PROPOSED GRAVITY SEWER
- T --- PROPOSED TELEPHONE
- W --- PROPOSED WATER
- ← PROPOSED SWALE

- ⊙ PROPOSED SEWER MANHOLE
- ⊙ PROPOSED STORM MANHOLE
- ⊙ PROPOSED CATCH BASIN
- PROPOSED WELL
- ⊕ PROPOSED HYDRANT
- ⊕ PROPOSED SHUT OFF
- ⊕ PROPOSED UTILITY POLE
- ⊕ PROPOSED LIGHT POLE
- ⊕ PROPOSED EDGE OF BRUSH/WOODS
- ⊕ REBAR SET
- ⊕ CONCRETE MONUMENT SET

GENERAL 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. ALL EXISTING UTILITIES NOT INCORPORATED INTO THE FINAL DESIGN SHALL BE REMOVED OR ABANDONED AS INDICATED ON THE PLANS OR DIRECTED BY THE ENGINEER.
3. THE CONTRACTOR SHALL MAINTAIN AS-BUILT PLANS (WITH TIES) FOR ALL UNDERGROUND UTILITIES. THOSE PLANS SHALL BE SUBMITTED TO THE OWNER AT THE COMPLETION OF THE PROJECT.
4. THE CONTRACTOR SHALL REPAIR/RESTORE ALL DISTURBED AREAS (ON OR OFF THE SITE) AS A DIRECT OR INDIRECT RESULT OF THE CONSTRUCTION.
5. ALL GRASSED AREAS SHALL BE MAINTAINED UNTIL FULL VEGETATION IS ESTABLISHED.
6. MAINTAIN ALL TREES OUTSIDE OF CONSTRUCTION LIMITS.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WORK NECESSARY FOR COMPLETE AND OPERABLE FACILITIES AND UTILITIES.
8. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ALL ITEMS AND MATERIALS INCORPORATED INTO THE SITE WORK. WORK SHALL NOT BEGIN ON ANY ITEM UNTIL SHOP DRAWING APPROVAL IS GRANTED.
9. IN ADDITION TO THE REQUIREMENTS SET IN THESE PLANS AND SPECIFICATIONS, THE CONTRACTOR SHALL COMPLETE THE WORK IN ACCORDANCE WITH ALL PERMIT CONDITIONS AND ANY LOCAL PUBLIC WORKS STANDARDS.
10. THE TOLERANCE FOR FINISH GRADES FOR ALL PAVEMENT, WALKWAYS AND LAWN AREAS SHALL BE 0.1 FEET.
11. ANY DEWATERING NECESSARY FOR THE COMPLETION OF THE SITEWORK SHALL BE CONSIDERED AS PART OF THE CONTRACT AND SHALL BE THE CONTRACTOR'S RESPONSIBILITY.
12. THE CONTRACTOR SHALL COORDINATE ALL WORK WITHIN TOWN ROAD R.O.W. WITH TOWN AUTHORITIES.
13. THE CONTRACTOR SHALL INSTALL THE ELECTRICAL, CABLE AND TELEPHONE SERVICES IN ACCORDANCE WITH THE UTILITY COMPANIES REQUIREMENTS.
14. EXISTING PAVEMENT AND TREE STUMPS TO BE REMOVED SHALL BE DISPOSED OF AT AN APPROVED OFF-SITE LOCATION. ALL PAVEMENT CUTS SHALL BE MADE WITH A PAVEMENT SAW.
15. IF THERE ARE ANY CONFLICTS OR INCONSISTENCIES WITH THE PLANS OR SPECIFICATIONS, THE CONTRACTOR SHALL CONTACT THE ENGINEER FOR VERIFICATION BEFORE WORK CONTINUES ON THE ITEM IN QUESTION.
16. PROPERTY LINE INFORMATION IS APPROXIMATE AND BASED ON EXISTING TAX MAP INFORMATION. THIS PLAN IS NOT A BOUNDARY SURVEY AND IS NOT INTENDED TO BE USED AS ONE.
17. IF THE BUILDING IS TO BE SPRINKLERED, BACKFLOW PREVENTION SHALL BE PROVIDED IN ACCORDANCE WITH AWWA M14. THE SITE CONTRACTOR SHALL CONSTRUCT THE WATER LINE TO TWO FEET ABOVE THE FINISHED FLOOR. SEE MECHANICAL PLANS FOR RISER DETAIL.
18. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING TESTING AND INSPECTION SERVICES INDICATED IN THE CONTRACT DOCUMENTS, TYPICAL FOR CONCRETE AND SOIL TESTING.
19. THE CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT AND FIELD ENGINEERING REQUIRED FOR COMPLETION OF THE PROJECT. CIVIL ENGINEERING ASSOCIATES WILL PROVIDE AN AUTOCAD FILE WHERE APPLICABLE.

SOURCE OF CONTOUR INFORMATION: GOOGLE EARTH MAPPING



SITE ENGINEER:



CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
802-864-2323 FAX: 802-864-2271 web: www.cca-vt.com

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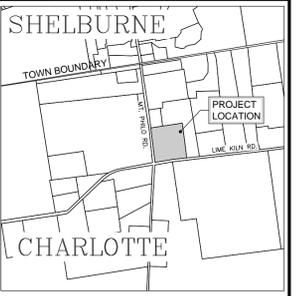
MARLYS BECK

1161 LIME KILN ROAD
CHARLOTTE, VERMONT

PROJECT:

PROPOSED WASTEWATER SYSTEM

1161 LIME KILN ROAD
CHARLOTTE, VT



LOCATION MAP
1" = 2000'

DATE	CHECKED	REVISION

PROPOSED CONDITIONS SITE PLAN

DATE
JUNE 19, 2015

SCALE
1" = 60'

PROJ. NO.
15150

DRAWING NUMBER

C1.0

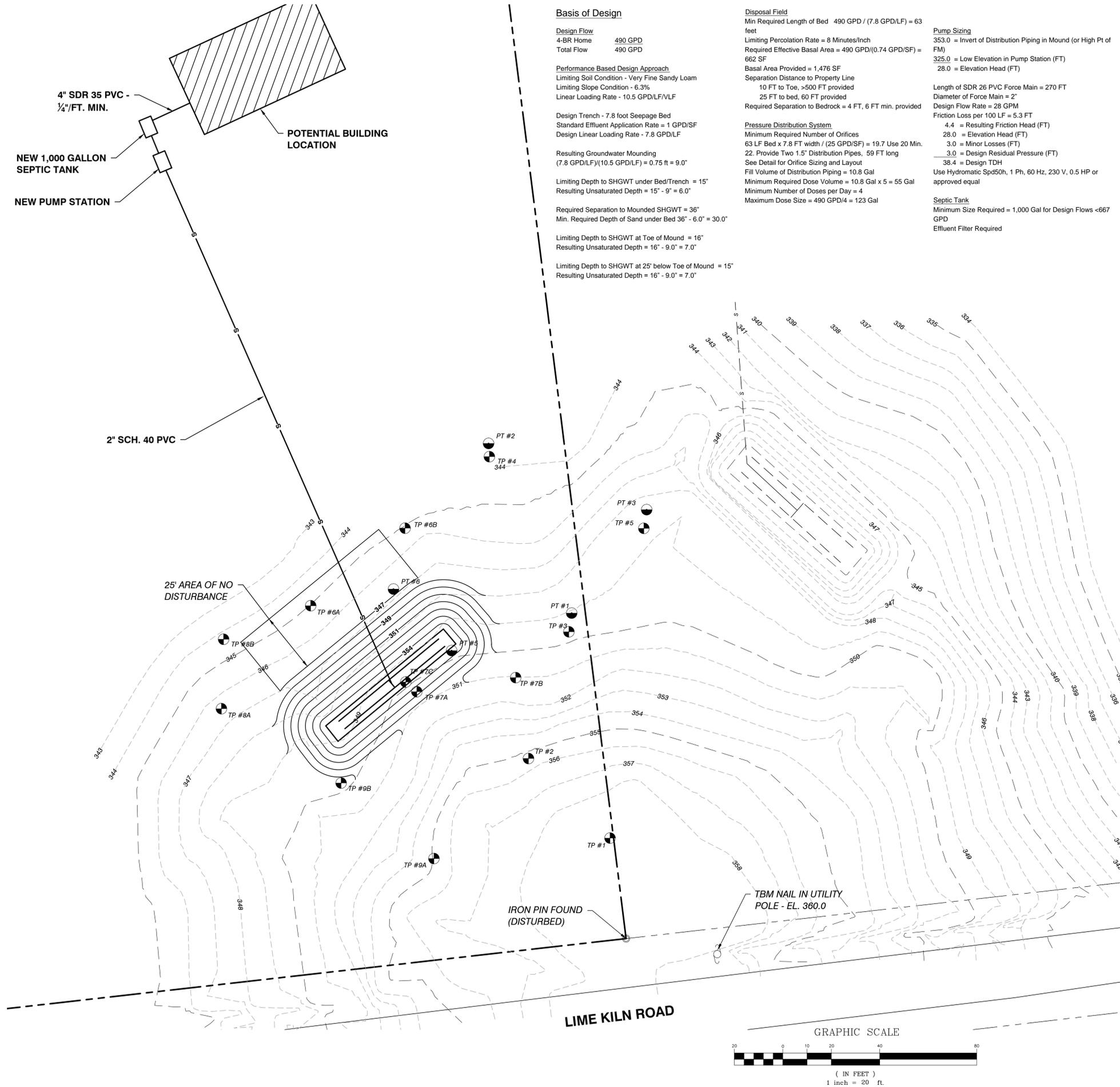
LEGEND

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SOIL DATA

1990 PAUL DUCHESNEAU, P.E.	MAY 11, 2015 BRAIN TREMBECK - TOWN OF CHARLOTTE JAMIE FISHER
TP #1	TP #6B
0' - 8" DARK TOPSOIL (SANDY)	0' - 1" LOOSE DARK BROWN FINE SANDY LOAM
8" - 40" SANDY LOAM	1" - 12" LOOSE LIGHT BROWN VERY FINE SANDY LOAM
40" - 56" SILTY LOAM - FIRM (MOTTLED)	12" - 17" MEDIUM COMPACT LIGHT BROWN VERY FINE SANDY LOAM
	17" - 28" COMPACT BROWN VERY FINE SANDY LOAM
	28" - 43" MEDIUM COMPACT BROWN LOAM
	SHGWT 16" NO SEEPS ROOTS TO 26" NO LEDGE
TP #2	TP #7B
0' - 7" TOPSOIL (SANDY)	0' - 2" LOOSE DARK BROWN VERY FINE SANDY LOAM
7" - 24" SAND	2" - 13" LOOSE LIGHT BROWN VERY FINE SANDY LOAM
24" - 38" SANDY LOAM (FIRM)	13" - 16" MEDIUM COMPACT BROWN VERY FINE SANDY LOAM
38" - 52" CLAY LOAM - VERY FIRM (MOTTLED)	16" - 24" COMPACT GRAY BROWN SANDY LOAM
	24" - 38" COMPACT BROWN SILT LOAM
TP #3	TP #7C
0' - 8" TOPSOIL (SOME SAND)	0' - 3" LOOSE DARK BROWN VERY FINE SANDY LOAM
8" - 20" SANDY LOAM	3" - 15" LOOSE BROWN FINE SANDY LOAM
20" - 42" LOAM - FIRM	15" - 32" COMPACT BROWN LOAM
42" - 52" CLAY LOAM - VERY FIRM	32" - 42" COMPACT BROWN FINE SANDY LOAM
	42" - 49" MEDIUM COMPACT BROWN LOAM
TP #4	TP #8A
0' - 8" TOPSOIL (DARK)	0' - 6" TOPSOIL
8" - 24" LOAM W/ STONES (FIRM)	6" - 24" SANDY LOAM - FIRM
24" - 48" SILTY LOAM - VERY FIRM	24" - 42" LOAM - VERY FIRM
	42" - 54" CLAY - VERY FIRM
TP #6A	TP #8B
0' - 10" SANDY TOPSOIL	0' - 3" LOOSE DARK BROWN VERY FINE SANDY LOAM
10" - 26" SANDY LOAM W/ SOME STONE - FIRM	3" - 14" LOOSE BROWN FINE SANDY LOAM
26" - 44" SILTY - CLAY - VERY FIRM	14" - 19" LOOSE BROWN VERY FINE SANDY LOAM
	19" - 23" COMPACT BROWN VERY FINE SANDY LOAM
TP #7A	TP #9A
0' - 10" SANDY TOPSOIL (HEAVY VEGETATION)	0' - 8" TOPSOIL
10" - 18" SANDY LOAM	8" - 18" SANDY LOAM
18" - 36" LOAM (MOTTLED AT 28")	18" - 27" LOAM - FIRM
	27" - 40" SILT - LOAM - VERY FIRM
TP #8A	
0' - 6" TOPSOIL	
6" - 24" SANDY LOAM - FIRM	
24" - 42" LOAM - VERY FIRM	
42" - 54" CLAY - VERY FIRM	
TP #9A	
0' - 8" TOPSOIL	
8" - 18" SANDY LOAM	
18" - 27" LOAM - FIRM	
27" - 40" SILT - LOAM - VERY FIRM	
PERCOLATION TESTS:	
PT #1 : 14 MINUTES INCH	SHGWT 18" NO SEEPS ROOTS TO 18" NO LEDGE
PT #2 : 72 MINUTES INCH	
PT #5 : 8 MINUTES INCH	TP #9B
PT #6 : 8 MINUTES INCH	0' - 5" LOOSE DARK BROWN VERY FINE SANDY LOAM
	5" - 10" LOOSE BROWN VERY FINE SANDY LOAM
	10" - 16" MEDIUM COMPACT BROWN FINE SANDY LOAM
	16" - 32" COMPACT BROWN VERY FINE SANDY LOAM
	SHGWT 15" NO SEEPS ROOTS TO 16" BOULDER AT 24" NO LEDGE



Basis of Design

Design Flow
 4-BR Home 490 GPD
 Total Flow 490 GPD

Performance Based Design Approach
 Limiting Soil Condition - Very Fine Sandy Loam
 Limiting Slope Condition - 6.3%
 Linear Loading Rate - 10.5 GPD/LF/VLF

Design Trench - 7.8 foot Seepage Bed
 Standard Effluent Application Rate = 1 GPD/SF
 Design Linear Loading Rate - 7.8 GPD/LF

Resulting Groundwater Mounding
 (7.8 GPD/LF)/(10.5 GPD/LF) = 0.75 ft = 9.0"

Limiting Depth to SHGWT under Bed/Trench = 15"
 Resulting Unsaturated Depth = 15" - 9" = 6.0"

Required Separation to Mounded SHGWT = 36"
 Min. Required Depth of Sand under Bed 36" - 6.0" = 30.0"

Limiting Depth to SHGWT at Toe of Mound = 16"
 Resulting Unsaturated Depth = 16" - 9.0" = 7.0"

Limiting Depth to SHGWT at 25' below Toe of Mound = 15"
 Resulting Unsaturated Depth = 16" - 9.0" = 7.0"

Disposal Field
 Min Required Length of Bed 490 GPD / (7.8 GPD/LF) = 63 feet
 Limiting Percolation Rate = 8 Minutes/Inch
 Required Effective Basal Area = 490 GPD/(0.74 GPD/SF) = 662 SF
 Basal Area Provided = 1,476 SF
 Separation Distance to Property Line 10 FT to Toe, >500 FT provided
 25 FT to bed, 60 FT provided
 Required Separation to Bedrock = 4 FT, 6 FT min, provided

Pressure Distribution System
 Minimum Required Number of Orifices 63 LF Bed x 7.8 FT width / (25 GPD/SF) = 19.7 Use 20 Min.
 22. Provide Two 1.5" Distribution Pipes, 59 FT long
 See Detail for Orifice Sizing and Layout
 Fill Volume of Distribution Piping = 10.8 Gal
 Minimum Required Dose Volume = 10.8 Gal x 5 = 55 Gal
 Minimum Number of Doses per Day = 4
 Maximum Dose Size = 490 GPD/4 = 123 Gal

Pump Sizing
 353.0 = Invert of Distribution Piping in Mound (or High Pt of FM)
 325.0 = Low Elevation in Pump Station (FT)
 28.0 = Elevation Head (FT)

Length of SDR 26 PVC Force Main = 270 FT
 Diameter of Force Main = 2"
 Design Flow Rate = 28 GPM
 Friction Loss per 100 LF = 5.3 FT
 4.4 = Resulting Friction Head (FT)
 28.0 = Elevation Head (FT)
 3.0 = Minor Losses (FT)
 3.0 = Design Residual Pressure (FT)
 38.4 = Design TDH
 Use Hydromatic Spd50h, 1 Ph, 60 Hz, 230 V, 0.5 HP or approved equal

Septic Tank
 Minimum Size Required = 1,000 Gal for Design Flows <667 GPD
 Effluent Filter Required

SITE ENGINEER:

 CIVIL ENGINEERING ASSOCIATES, INC.
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OWNER:
MARLYS BECK
 1161 LIME KILN ROAD
 CHARLOTTE, VERMONT

PROJECT:
PROPOSED WASTEWATER SYSTEM
 1161 LIME KILN ROAD
 CHARLOTTE, VT

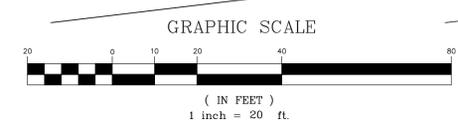


LOCATION MAP
 1" = 2000'

DATE	CHECKED	REVISION

PROPOSED CONDITIONS SITE PLAN

DATE
JUNE 19, 2015
 SCALE
1" = 20'
 PROJ. NO.
15150
 DRAWING NUMBER
C1.1

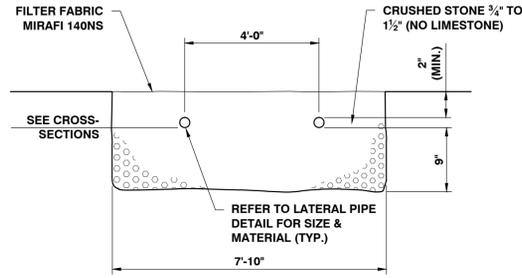


	Horizontal Distance (Feet)		
	Leach field	Septic Tank	Sewer
Drilled Well Serving 1 Home - Up Slope of Disposal Field	100 (Min.)	50	50
Drilled Well Serving 1 Home - Down Slope of Disposal Field	200 (Min.)	50	50
Shallow Well or Spring, Up Slope of Disposal Field	150 (Min.)	75	75
Shallow Well or Spring, Down Slope of Disposal Field	500 (Min.)	75	75
Lakes, Ponds and Impoundment	50	25	25
Rivers, Streams	50	25	10
Drainage Swales, Roadway Ditches	25	50	10
Municipal Water Main	50	50	10
Service Water Lines	25	25	10
Roadways, Driveways, Buildings	10	5	5
Top of embankment or slope > 30%	25	10	-
Property Line	10 (25 Downslope) ²	10	10
Trees	10	10	10
Replacement Area	10	10	-
Foundation, Footing Drains	35 (75 Downslope) ³	10	-

- Isolation distances to well locations may vary due to site conditions - contact Engineer for verification with the Vermont Water Supply Rule Regulations.
- For mound disposal systems, the limit of mound fill must be 25 feet from any downhill property line and 10 feet from side or uphill property lines.
- If a curtain or foundation drain is downslope of the leach field, the leach field cannot be closer than 75 feet to the drain. If the drain is upslope of the leach field, it shall be 35' if possible and 20' minimum.
- Sewers under roads, driveways or parking lots may require protective conduits or sleeves.

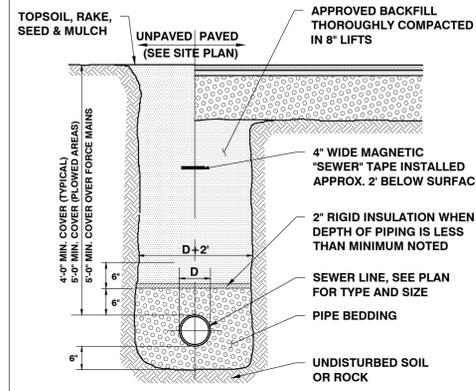
MINIMUM ISOLATION DISTANCES

(CONTACT ENGINEER FOR ANY CLARIFICATIONS OR CONFLICTS)



TYPICAL DISPOSAL FIELD TRENCH SECTION

N.T.S.



TYPICAL SEWER TRENCH DETAIL

N.T.S.

NOTES:

- COMPACTION OF BACKFILL AND BEDDING SHALL BE A MINIMUM OF 90% (85% UNDER ROADWAY SURFACES) OF MAXIMUM DRY DENSITY DETERMINED IN THE STANDARD PROCTOR TEST (ASTM D698).
- BEDDING MATERIAL SHALL NOT BE PLACED ON FROZEN SUBGRADE.
- APPROVED BACKFILL SHALL NOT CONTAIN ANY STONES MORE THAN 12" IN LARGEST DIMENSION (6" IN ROADWAYS, 1 1/2" MAXIMUM DIAMETER WITHIN 24" OF THE OUTSIDE OF THE PIPE), OR CONTAIN ANY FROZEN, WET, OR ORGANIC MATERIAL.
- TRENCHES SHALL BE COMPLETELY DEWATERED PRIOR TO PLACING OF PIPE BEDDING MATERIAL AND PIPE AND BACKFILL. DEWATERED DURING INSTALLATION OF TRENCH AND BACKFILL.
- IN TRENCHES WITH UNSTABLE MATERIALS, TRENCH BOTTOM SHALL FIRST BE STABILIZED BY PLACEMENT OF FILTER FABRIC THEN CRUSHED STONE (3/4" MAXIMUM).
- 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.
- BEDDING MATERIAL FOR WASTEWATER LINES SHALL CONSIST OF CRUSHED STONE OR GRAVEL WITH A MAXIMUM SIZE OF 3/4". SUBMIT A SAMPLE TO THE ENGINEER FOR APPROVAL.
- ALL JOINTS TO BE INSPECTED BY OWNER/ENGINEER/TOWN PRIOR TO BACKFILL.

SITE ENGINEER:



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OWNER:

MARLYS BECK

1161 LIME KILN ROAD
CHARLOTTE, VERMONT

PROJECT:

PROPOSED
WASTEWATER
SYSTEM

1161 LIME KILN ROAD
CHARLOTTE, VT



LOCATION MAP

1" = 2000'

DATE	CHECKED	REVISION
XX/XX/XX	XXX	PLAN REVISIONS

DETAILS

DATE

JUNE 19, 2015

SCALE

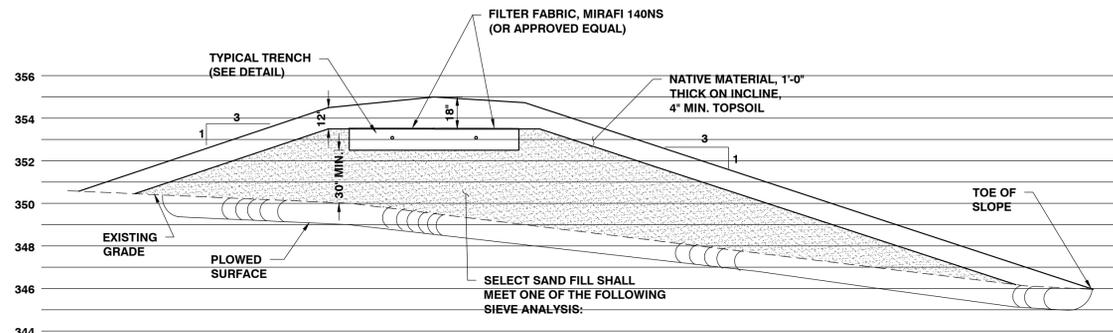
AS SHOWN

PROJ. NO.

15150

DRAWING NUMBER

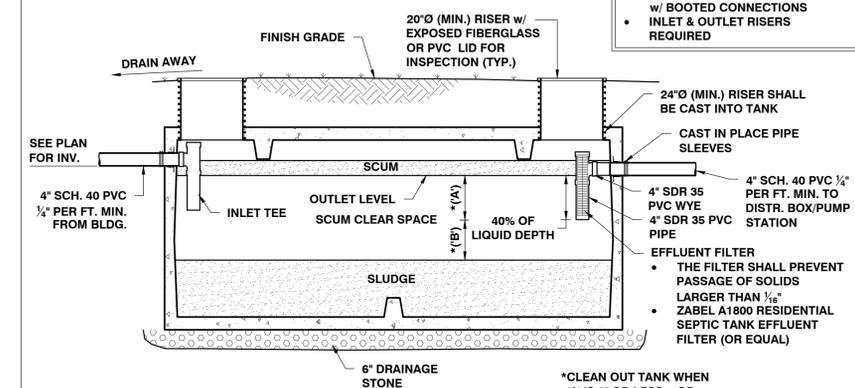
C2.0



SIEVE #	% PASSING	SIEVE #	% PASSING	SIEVE #	% PASSING
3/8	85-100	4	95-100	3/8	85-100
40	25-75	8	80-100	40	30-50
60	0-30	16	50-85	200	0-10
100	0-10	30	25-60		
200	0-5	50	10-30		
		100	2-10		

TYPICAL MOUND SECTION

1/4" = 1'-0"



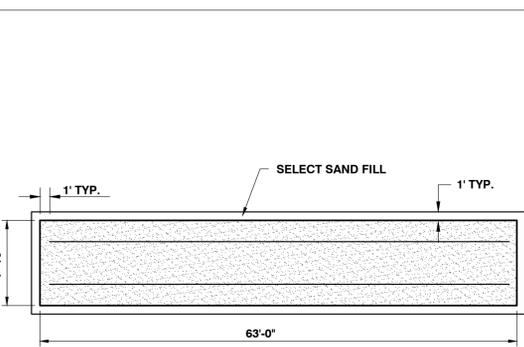
1,000 GALLON SEPTIC TANK

N.T.S.

- GENERAL NOTES:
- ALL TANKS TO BE WATER-PROOF w/ BOOTED CONNECTIONS
 - INLET & OUTLET RISERS REQUIRED

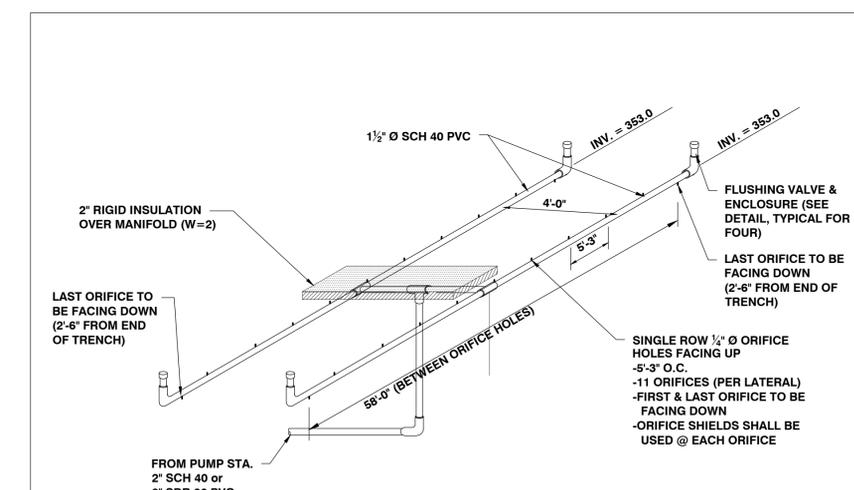
Septic Tank Notes

- 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:
 - The sludge is closer than twelve inches to the outlet baffle or;
 - The 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.



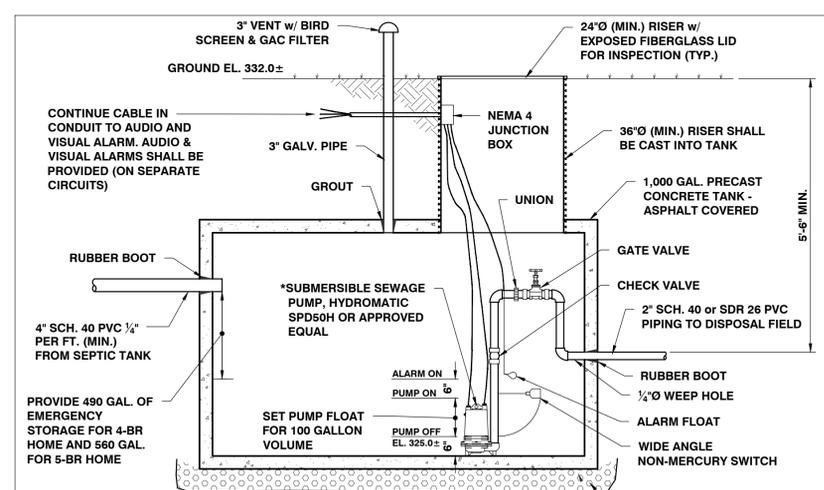
TYPICAL TRENCH PLAN

N.T.S.



TRENCH PIPING DETAIL

N.T.S.



1,000 GALLON PUMP STATION

4 BEDROOM AND ABOVE HOMES

N.T.S.

*VERIFY PUMP REQUIREMENTS WITH THE ENGINEER IF FINAL SITE SELECTED IS OTHER THAN SHOWN ON PLAN

SANITARY SEWER SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes:
 1. Gravity Sewer Pipe
 2. Manhole Structures and Appurtenances
- B. Related Sections:
 1. Section 02225 – Utility Trenching and Backfilling

1.02 SUBMITTALS

- A. Product Data: Submit published data from manufacturers of products and accessories specified, indicating compliance with requirements.

1.03 QUALITY ASSURANCE

- A. All sanitary sewer materials and construction of same shall be as shown on the Contract Plans and shall meet the requirements of the State of Vermont Agency of Natural Resources (Department of Environmental Conservation) and the Public Works Standards and Specifications of the local municipality.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Furnish ells, tees, reducing tees, wyes, couplings, increasers, crosses, transitions and end caps of the same type and class of material as the conduit, or of material having equal or superior physical and chemical properties as acceptable to the Engineer to provide a complete and operable system.

2.02 PVC GRAVITY SANITARY SEWER PIPE

- A. PVC sewer pipe shall conform in all respects to the latest revision of ASTM Specifications D-3034 or F679, Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings, SDR 35 pipe. All pipe and fittings shall be clearly marked as follows:

- Manufacturer's Name and Trademark
- Nominal Pipe Size (as shown on plans)
- Material Designation 12454-C PVC
- Legend "Type PSM SDR 35 PVC Sewer Pipe" or "PS 46 PVC Sewer Pipe"
- Designation ASTM D-3034 or F679

- B. Joints shall be push-on type using elastomeric gaskets and shall conform to ASTM D-3212. The gaskets shall be factory installed. The pipe shall be furnished in nominal 13 foot lengths. Sufficient numbers of short lengths and full machine fittings shall be provided for use at manholes and connections. All connections will require the use of manufactured fittings. Field fabricated, saddle-type connections will not be considered acceptable.

- C. Any pipe or fitting having a crack or other defect or which has received a severe blow shall be marked rejected and removed at once from the work site. All field cuts are to be made with saw and 90 degree miter box. Bevel the cut end to the same as the factory bevel and remove all interior burrs. Measure and place a honing mark on the pipe before assembling. The pipe installed under this specification shall be installed so that the initial deflection, measured as described below, shall be less than five percent (5%).

- D. The manhole water stop gasket and stainless steel clamp assembly must be approved by the Town Wastewater Treatment Department prior to the installation of any pipe.

- E. The Contractor will submit certification that the materials of construction have been sampled, tested, inspected, and meet all the requirements including wall thickness in accordance with ASTM D-3034 or ASTM F679 for all pipe and fittings to be included in project work. PVC pipe shall not be installed when the temperature drops below 32 degrees Fahrenheit or goes above 100 degrees Fahrenheit. During cold weather, the flexibility and impact resistance of PVC pipe is reduced. Extra care is required when handling PVC pipe during cold weather. PVC pipe shall not be stored outside and exposed to prolonged periods of sunlight, as pipe discoloration and reduction in pipe impact strength will occur. Canvas and other opaque material shall be used to cover PVC pipe when stored outside.

2.04 MANHOLES

- A. Manholes shall be sized as indicated on the plan and shall be precast concrete with a monolithic base and shall conform to the latest version of ASTM Specification C478.

- B. Shelves shall be constructed with concrete having a minimum compressive strength of 3,000 psi at 28 days. Inverts for sewer manholes shall be as shown on the plans and details and shall be constructed with concrete or brick, as per the local municipality's standards. Inverts shall have the exact shape of the sewer to which they are connected, and any change in size of direction shall be gradual and even.

- C. All manholes are to be provided with copolymer polypropylene plastic steps with steel reinforcement 12 inches on center.

- D. All manholes shall be provided with rough, gray, cast iron manhole frames and covers. All iron castings shall be thoroughly cleaned and then coated with hot tar before being delivered. Frames and covers shall be LeBaron LC 266, or an approved equal, and have a minimum weight of 400 pounds.

- E. Precast risers and bases for manholes shall conform to ASTM Specification C-478. The pipe opening in the precast manhole system shall have a cast-in-place flexible gasket or an equivalent system for pipe installation as approved by the Engineer. Joints between manhole risers shall be 1" minimum width flexible gasket or approved equals.

2.05 CLEANOUTS

- A. Cleanouts for gravity sewers and force mains shall be provided at locations indicated on the plans or as directed by the Engineer. Cleanout frames and covers shall be of tough gray cast iron. Castings shall be true to pattern and free from flows. The bearing surface of cleanout frames and covers against each other shall be machined to give continuous contact throughout their circumference.

2.06 PIPELINE INSULATION

- A. Approved sewer lines with less than four feet (4'-0") of cover over the crown, five (5'-0") in plowed areas that cross a storm sewer, or where indicated on the plans, shall be protected against freezing by the installation of two inch (2") thick highest available density extruded polystyrene insulating sheets or equivalent. Sheets shall be the lesser of 3' or 2 x diameter of the pipe. The sheets shall be placed six inches (6") above the crown after placement of four to six inches (4"-6") of clean medium or coarse sand below the pipe bottom and four to six inches (4"-6") above the crown. Joints shall be overlapped so there is no gap that will allow frost to penetrate. Care shall be exercised during backfill and compaction over the polystyrene sheets to prevent damage to the sheets. The polystyrene sheets shall meet the comprehensive strength requirements of ASTM D1621-73. In no cases shall the waterline have less than four feet (4') of cover over the top of the pipe. When sewer line passes within 5 feet of a catch basin install 2" min. rigid insulation, polystyrene sheets, between sewer line and cb.

PART 3 – EXECUTION

3.01 GENERAL

- A. Care shall be exercised by the Contractor to avoid disrupting the operation of existing sanitary sewer facilities without prior written approval of the Engineer.

- B. When existing underground utilities not scheduled for removal or abandonment are encountered in the excavation, they shall be adequately supported and protected from damage. Any damage to utilities shall be repaired promptly at no additional cost to the Owner.

- C. Installation of pipe shall be in accordance with the Utility Trenching and Backfilling and as specified by this section.

3.02 BEDDING FOR PIPE

- A. The bedding material shall be shaped to fit the pipe for a depth of not less than 10 percent of its total height and shall have recesses to receive the bell.

3.03 LAYING PIPE

- A. In general, sewer pipe shall be installed in accordance with the latest detailed instructions of the manufacturer.

- B. The laying shall begin at the outlet end and the lower segment of the pipe shall be in contact with the shaped bedding throughout its full length. Bell or grooved ends of rigid pipes and the circumferential laps of flexible pipe shall be placed facing upstream.

- C. All pipe and fittings shall be carefully examined for defects and no pipe or fittings shall be laid which are known to be defective. If any defective piece is discovered after laying, it shall be removed and replaced at the Contractor's expense. All pipes and fittings shall be cleaned before they are laid and shall be kept clean until accepted in the completed work.

- D. The pipe shall be laid to conform to the lines and grades indicated on the drawings or given by the Engineer. Each pipe shall be so laid as to form a close joint with the next adjoining pipe and to bring the inverts continuously to the required grade.

- E. The Contractor shall take all necessary precautions to prevent flotation of the pipe in the trench.

- F. When pipe laying is not in progress, the open ends of the pipe shall be closed with temporary watertight plugs. If water is in the trench when work is resumed, the plug shall not be removed until all danger of water entering the pipe is eliminated.

- G. For force mains, concrete reaction blocking shall be provided as detailed at all bends deflecting 22+ degrees or more. At the Contractor's option, retainer glands may be used at bends in lieu of concrete blocking. Retainer glands shall also be provided at all joints within three pipe lengths each side of the bends.

- H. Any pipe that is not laid to grade and alignment shall be re-laid to the satisfaction of the Town Wastewater Department. The bedding material shall be placed and compacted on each side of the pipe to a height equal to one-half (1/2) the pipe diameter and for the full width of the excavated trench and as shown on the accepted plans. Bedding shall be #2 pea stone from Shelburne Limestone or an equivalent approved by the Town Wastewater Department and the Engineer.

- I. All sewer pipes shall be marked with magnetic marking tape. The marking tape shall be installed one (1) foot directly over . Concrete thrust blocks "sewer" the pipe and shall be labeled or anchors shall be placed at bends, tees, fittings, and other locations on the force main as shown on the contract drawings or as directed by the Town Wastewater Department. Concrete for thrust blocks and anchors shall be Class B concrete. Steel rods and clamps as required shall be galvanized and rust proofed or painted.

3.04 GRAVITY SEWER PIPE TESTING

- A. The Contractor shall provide all necessary equipment and instrumentation required for proper completion of the flushing and testing. Quality of water, test procedure, and method of disposal of water shall be approved by the Engineer. Prior to testing, flush with water to remove construction debris and pass through a full gauge squeegee.

- B. All tests shall be made in the presence of the Engineer. Preliminary tests made by the Contractor without being observed by the Engineer will not be accepted. The Engineer will be notified at least eight hours before any work is to be inspected or tested. The Town shall be notified at least two (2) days before testing.

- C. The maximum sewer length to be tested at one time shall be that length between any two manholes.

- D. Air Testing: Low pressure air testing shall be conducted in accordance with the following procedures:

- 1. Each end of the test section and laterals shall be plugged, capped and braced. Necessary safety precautions shall be taken to prevent blowouts and possible injury.

- 2. An air hose shall be connected to a tapped plug used for an air inlet. The hose will be connected to the air control equipment, which shall include valves and pressure gauges. These shall allow air to enter the sewer test line, monitor air pressure in the sewer, shut off air, and provide pressure reduction and relief. The monitoring pressure gauge shall have a range of 0-10 psi with divisions of 0.10 psi and accuracy of 0.05 psif.
- 3. The air compressor and air supply shall be connected to the test line and the test section filled slowly, until a constant pressure of 4.0 psig is maintained.

- 4. A pressure above 3.0 psig shall be maintained for at least five minutes to allow the temperature to stabilize. A check for leaks shall be made and if any are found, the pressure shall be released and the fitting replaced or repaired.

- 5. After the stabilization period, the pressure shall be adjusted to 3.5 psig and the air supply disconnected.

- 6. Measure and record the time interval for the test line pressure to drop from 3.5 psig to 2.5 psig.

- 7. If the groundwater table is above the pipe, increase above test pressures 0.5 psig for each foot the groundwater is above the invert of the pipe.

- 8. The requirements of this specification shall be considered satisfied if the time required in seconds for the pressure to decrease from 3.5 to 2.5 psi greater than the average back pressure of any groundwater that may submerge the pipe is not less than that computed according to the following table:

Minimum Test Time for Various Pipe Sizes	
Diameter (Inches)	Time (Sec./100 Ft.)
4	18
6	45
8	75
10	90
12	110

3.05 MANHOLES

- A. The excavation shall be to the depth indicated on the plans r ordered by the Engineer, and carefully shaped and graded.

- B. Manhole sections shall be precast concrete and shall conform to the dimensions indicated on the plans or ordered by the Engineer.

- C. Channels, inverts and floor areas for sewer manholes shall be constructed of concrete. Inverts shall have the exact shape of the sewer to which they are connected and any change in size or direction shall be gradual and even. All construction of sewer manholes must be carried out to insure watertight work.

- D. The cast iron frame shall be set as indicated on the plans in a full mortar bed. The grade or cover shall be properly placed in the frame.

3.06 MANHOLE TESTING

- A. Manholes shall be tested separately by one of the following two procedures:

- 1. Exfiltration Leakage Test: All pipes and other openings into the manhole shall be suitably plugged and the plugs braced to prevent blowout. The manhole shall then be filled with water to the top of the cone section. A period of time may be permitted, if the Contractor so wishes, to allow for absorption. At the end of this period, the manhole shall be refilled to the top of the cone, if necessary, and the measuring time of at least four hours begun. At the end of the test period, the manhole shall be refilled to the top of the cone, measuring the volume of water added. This amount shall be converted to gallons per vertical foot depth for 24 hours. The leakage for each manhole shall not exceed one gallon/vertical foot/day. If leakage exceeds the allowable rate, repairs shall be made as approved by the Engineer and the manhole retested. If the Contractor elects to backfill prior to testing, the testing shall be at his own risk, and it shall be incumbent upon the Contractor to determine the reason for any failure of the test. No adjustment in the leakage allowance will be made for unknown causes such as leaking plugs, absorption, etc. It will be assumed that all loss of water during the test is a result of leaks through the joints or through the concrete. Furthermore, the Contractor shall take any steps necessary to assure the Engineer that the water table is below the bottom of the manhole throughout the test.

- 2. Vacuum Test: This method of testing manholes for leakage involves the use of a device for sealing the top of the manhole cone section and pumping the air out of the manhole, creating a vacuum and holding this vacuum for a prescribed period of time. The procedure for this test is as follows:

- a. All lifting holes and exterior joints shall be filled and pointed with an approved non-shrinking mortar. The completed manhole shall not be backfilled prior to testing. Manholes which have been backfilled shall be excavated to expose the entire exterior prior to vacuum testing or the manhole shall be tested for leakage by means of the exfiltration leakage test.

- b. All pipes and other openings into the manhole shall be suitably plugged in a manner to prevent displacement.

- c. A plate with an inflatable rubber ring the size of the top of the manhole shall be installed by inflating the ring with air to pressure adequate to prevent leakage of air between the rubber ring and the manhole wall.

- d. Air shall then be pumped out of the manhole through an opening in the plate until a vacuum is created inside of the manhole equal to 10 inches of mercury on an approved vacuum gauge. The removal of air shall then be stopped and the test begun.

- e. The manhole shall pass this test if the vacuum holds at 10" Hg or drops no lower than 9" Hg within the following times:

Depth of 4' Manhole	Minutes	Seconds
0' - 10'	2	0
10' - 15'	2	30
15' - 20'	3	0
20' - 25'	3	30

- f. If the vacuum drop exceeds 1" Hg during the specified time periods, the manhole shall be resealed and Steps 2 through 5 above repeated until the vacuum holds for the specified time.

- g. After the manhole passes the vacuum test, it shall be backfilled carefully so that no leaks are created. If the manhole is disturbed in any way during backfill, it shall again be vacuum tested according to Steps 1 through 5 above. If the manhole fails the vacuum test, the Contractor shall test the manhole using the manhole exfiltration test.

- h. The Contractor shall provide the Engineer with a written log of each manhole leakage test result.

- i. Manholes shall be tested and accepted prior to building manhole inverts.

3.07 SERVICE CONNECTION

No sanitary sewer shall be placed in service until such time as the Town has given final approval to the sewer installation, including satisfactory completion of all required tests. Service connections shall not be made until all receiving sewer mains have been completed and approved and as-built received along with GPS coordinates and approved by the Town Wastewater Department.

A. Laterals

Where required on the plans, sewer service connections for one house shall be constructed of four inch (4") pipe, unless otherwise noted on the plans, of the type material specified under this section. The pipe shall be laid and its joints made as required for sewer construction in this specification. Open ends of pipes shall be properly sealed to prevent damage and intrusion of foreign matter where hookup to the building sewer is not coincident with sewer main construction. Additionally, the Contractor will provide a stable, temporary marker approved by the Town Wastewater Department from the sewer service invert up to six inches (6") above the finish grade and seated securely into the ground for ease in relocating the end of sewer service connection for hooking up the building sewer. Two (2) tie points to permanent objects shall be documented. The tie points shall be submitted to the homeowner and to the Wastewater Department.

In the case of reconnection of existing services, such reconnection will be made only after the new sewer main has been completed, tested, and accepted. The excavation, bedding material, installation, and backfill for service connections shall be the same as for sewer mains.

B. Cleanouts for Sewers

Cleanouts for gravity sewers and force mains shall be provided at locations indicated on the plans or as directed by the Town Wastewater Department. Cleanout frames and covers against each other shall be machined to give continuous contact throughout their circumference. All iron castings shall be thoroughly cleaned and then coated with hot coal tar before being delivered. Individual laterals shall have cleanouts every one hundred feet (100'). Cleanouts shall also be installed in laterals with changes of alignment of 45 degrees or greater.

C. Chimneys

Chimneys shall be built of four inch (4") pipe and/or as indicated on the contract drawings. Each chimney shall be plugged or capped at end until ready to connect to existing services. Chimneys are required where the vertical drop between the finished grade surface and the main sewer line exceeds fifteen feet (15') at the wye from a service connection.

3.08 Force Main

After force mains have been laid and the trench backfilled, the pipe shall be subjected to a hydrostatic pressure test in accordance with AWWA Standard for Installation of Cast Iron Water Main, AWWA C600 (latest issue), Section 13. The hydrostatic pressure shall be 150 percent (150%) of normal operational pressure. After the pressure test has been satisfactorily completed, a leakage test shall be conducted in accordance with AWWA C600 (latest issue), Section 13. The minimum test pressure shall be 75 pounds per square inch at the high point in the system.

3.09 Wet well

The pre-cast concrete wet well shall be externally coated with an asphaltic sealant and tested for water tightness using an approved vacuum or water testing procedure.

SITE ENGINEER:



CIVIL ENGINEERING ASSOCIATES, INC.
 10 MANSFIELD VIEW LANE, SOUTH BURLINGTON, VT 05403
 802-864-2323 FAX: 802-864-2271 web: www.ceavt.com

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DRAWN	
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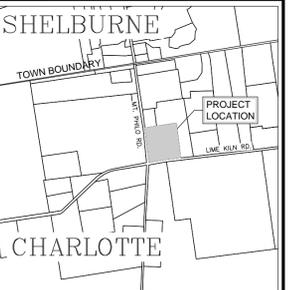
MARLYS BECK

**1161 LIME KILN ROAD
 CHARLOTTE, VERMONT**

PROJECT:

**PROPOSED
 WASTEWATER
 SYSTEM**

**1161 LIME KILN ROAD
 CHARLOTTE, VT**



LOCATION MAP

1" = 2000'

DATE	CHECKED	REVISION
XX/XX/XX	XXX	PLAN REVISIONS

SPECIFICATIONS

DATE
 JUNE 19, 2015

SCALE
 AS SHOWN

PROJ. NO.
 15150

DRAWING NUMBER
C3.0