J.N.2421

EMERSON DESIGN DATA

HYDRAULIC LOADING:
System Design Flow Required – As approved by DEP
= Maximum population of 613 people x 2 gppd = **1,226 gallons per day**
System Future Capacity Design Flow Provided = **7,500 gallons per day**

PRIMARY LEACHING AREA:
Design Percolation Rate = **<5 M.P.I. (Soil Class I)**
Effluent Loading Rate = **0.74** gallons/S.F. (Per 310 CMR 15.242)
Total Leaching Area Required (7,500 GPD / 0.74 GPD/S.F.) = **10,135 S.F.**

RESERVE LEACHING AREA:
Design Percolation Rate = **<5 M.P.I. (Soil Class I)**
Effluent Loading Rate = **0.74** gallons/S.F. (Per 310 CMR 15.242)
Total Leaching Area Required (7,500 GPD / 0.74 GPD/S.F.) = **10,135 S.F.**

TRENCH CONFIGURATION:
Use Infiltrator Chamber Type: **Standard Chamber***
Trench Height = **12"**
Trench Width = **34"**
Effective Leaching Area/LF = **6.53***
LF Required (10,135 S.F./6.53 SF/LF) = **1,552 LF**
Number of Trenches = **16**
Trench Length = **100'**
Total Leaching Area Provided = (16' x 100' x 6.53 SF) = **10,448 SF**
Total Design Flow Rate = (10,448 SF x 0.74 GPD/SF) = **7,731.52 GPD**

Invert at begining of leaching line = **See Trench Schedule**
invert at end of leaching line = **of Elevations**
elevation of trench bottom = **This Sheet**

*Effective Leaching Area based on DEP Approval Letter "Modified Certification for General Use" Infiltrator Systems Inc. for Standard Chamber in Trench Configuration. Design Leaching Area refers to the under Section II 5 pf the letter.

EXISTING SEPTIC TANK:
Design Flow = 1,226 gpd x 200% (First Compartment) + 100% (Second Compartment): 2,452 gallons + 1,226 gallons = 3,678 gallons
Septic Tank Provided = 14,500 gallons

RECIRCULATION TANK SIZING:
Future Capacity Design Flow = 7,500 gpd x 200% = 15,000 gallons
Recirculation Tank Provided = 16,000 gallons

SAS PUMP CHAMBER:
Future Emergency Storage Required = 7,500 gpd
Pump Chamber Emergency Storage Provided within 3,000 gallon pump chamber & 12,000 gallon Pump Chamber
Soil Texture Class = Sand & Gravel therefore – 4 doses per day
Future Capacity Design Flow = 7,500 gpd/ 4 doses @ 1,875 gallons/dose
Approved DEP Design Flow = 1,226 gpd/ 4 doses @ 306 gallons/dose

RECIRULATING SAND FILTER:(ORGANIC LOADING)
(BOD = 230)(0.0075)(8.43) = 14.54 lb/day
$\frac{14.54}{0.005}$ = 2,908 S.F. Required
Use 3,200 S.F. (50' x 64' Sand Filter)

In compliance with the Bolton BOH Regulation 10c, the sewage disposal system in located as follows:

FEATURE	DISTANCE
1. Zone I	>400'±
2. Zone II & IWPA	>50±
3. High or Medium Yield Aquifer	>5,000'±
4. 100 year Flood Plain	>200'±
5. Surface Water Supplies	N/A
6. Tributaries or Surface Water Supplies	N/A

EMERSON SYSTEM ELEVATIONS

STRUCTURE	ELEVATIONS		
	PROP.	AS-BUILT	FIN. GRADE
INVERT OF EXIST. 14,500 GAL. SEPTIC TANK (OUT)	368.91	–	377.0±
INVERT OF MANHOLE "A" INLET	368.50	–	376.7±
INVERT OF MANHOLE "A" OUTLET	368.40	–	376.7±
INVERT OF MANHOLE "B" INLET	367.88	–	375.7±
INVERT OF MANHOLE "B" OUTLET	367.78	–	375.7±
INVERT OF MANHOLE "C" INLET	364.17	–	369.1±
INVERT OF MANHOLE "C" OUTLET	364.07	–	369.1±
INVERT OF INSIDE DROP MANHOLE "D" INLET	362.18	–	366.2±
INVERT OF INSIDE DROP MANHOLE "D" OUTLET	361.74	–	366.2±
INVERT OF (12,000 GAL.) PUMP CHAMBER INLET	361.14	–	366.0±
INVERT OF (12,000 GAL.) PUMP CHAMBER OUTLET	361.14	–	366.0±
INVERT OF (16,000 GAL.) RECIRCULATION TANK INLET	358.67	–	366.0±
INVERT OF (16,000 GAL.) RECIRCULATION TANK OUTLET	362.00	–	366.0±
INVERT OF SAND FILTER UNDER DRAIN RETURN	361.00	–	366.0±
TOP OF SPLITTER VALVE CAGE	357.75	–	366.0±
INVERT OF (3,000 GAL.) PUMP CHAMBER INLET	360.10	–	366.5±
INVERT OF (3,000 GAL.) PUMP CHAMBER OUTLET	360.10	–	366.5±

FLORENCE SAWYER DESIGN DATA

HYDRAULIC LOADING:
System Design Flow Required – As approved by DEP
= Maximum population of 750 people x 11 gppd = **8,250 gallons per day**
Existing System Capacity Design Flow = **7,500 gallons per day**
As designed in compliance with Title V requirements

Note: This design provides for the diversion of 750 gpd from the Florence Sawyer DEP approved design flow to the Emerson School system there by reducing the design flow to 7,500 gpd to meet the flow requirements for the existing system.

EXISTING SEPTIC TANK:
Design Flow = 8,250 gpd – two compartment tank required
Septic Tank Provided = 24,000 gallon, provides 91% of the required capacity

RECIRCULATION TANK SIZING:
Design Flow = 7,500 gpd x 200% = 15,000 gallons
Recirculation Tank Provided = 16,000 gallons

EXISTING SAS PUMP CHAMBER:
Emergency Storage Required = 7,500 gallons
Existing Pump Chamber = 12,000 gallons

RECIRULATING SAND FILTER:(ORGANIC LOADING)
(BOD = 230)(0.0075)(8.43) = 14.54 lb/day
$\frac{14.54}{0.005}$ = 2,908 S.F. Required
Use 3,200 S.F. (50' x 64' Sand Filter)

FLORENCE SAWYER SYSTEM ELEVATIONS

STRUCTURE	ELEVATIONS		
	PROP.	AS-BUILT	FIN. GRADE
INVERT OF EXIST. 24,000 GAL. SEPTIC TANK OUTLET	370.97	–	375.8±
INVERT OF 2,000 GALLON PUMP CHAMBER INLET	370.00	–	375.2±
INVERT OF 2,000 GALLON PUMP CHAMBER OUTLET	369.75	–	375.2±
INVERT OF 2,000 GALLON PUMP CHAMBER 2" F.M. OUTLET	369.75	–	375.2±
INVERT OF 16,000 GALLON RECIRCULATION TANK INLET	367.67	–	374.0±
INVERT OF 16,000 GALLON RECIRCULATION TANK OUTLET	367.00	–	374.0±
INVERT OF SAND FILTER UNDER DRAIN RETURN	370.21	–	374.0±
TOP OF SPLITTER VALVE CAGE	367.00	–	374.0±
INVERT OF 1,500 GALLON PUMP CHAMBER INLET	369.45	–	374.0±
INVERT OF 1,500 GALLON PUMP CHAMBER OUTLET	369.20	–	374.0±
INVERT OF EXIST. 12,000 GAL. PUMP CHAMBER INLET	370.67	–	375.5±
INVERT OF MANHOLE "E" INLET	372.00	–	374.8±
INVERT OF MANHOLE "E" OUTLET	370.02	–	374.8±
INVERT OF MANHOLE "F" INLET	365.08	–	370.2±
INVERT OF MANHOLE "F" OUTLET	364.74	–	370.2±
INVERT OF MANHOLE "G" INLET	362.52	–	367.0±
INVERT OF MANHOLE "G" OUTLET	362.37	–	367.0±

EMERSON TRENCH ELEVATIONS

	TRENCH NUMBER	TRENCH BOTTOM	END INVERT		BEG. INVERT	
			PROP.	AS-BUILT	PROP.	AS-BUILT
PRIMARY & RESERVE LEACHING TRENCHES STANDARD INFILTRATOR CHAMBER (34"x12"x100')	1	368.8	369.34	–	369.34	–
	2	368.8	369.34	–	369.34	–
	3	368.8	369.34	–	369.34	–
	4	368.8	369.34	–	369.34	–
	5	368.8	369.34	–	369.34	–
	6	368.8	369.34	–	369.34	–
	7	368.8	369.34	–	369.34	–
	8	368.8	369.34	–	369.34	–
	9	368.8	369.34	–	369.34	–
	10	368.8	369.34	–	369.34	–
	11	368.8	369.34	–	369.34	–
	12	368.8	369.34	–	369.34	–
	13	368.8	369.34	–	369.34	–
	14	368.8	369.34	–	369.34	–
	15	368.8	369.34	–	369.34	–
	16	368.8	369.34	–	369.34	–

SOIL TEST DATA

NAME OF SOIL EVALUATOR:
DUCHARME & WHELEER, INC.
BRANDON J. DUCHARME, R.S.

NAME OF APPROVING AUTHORITY:
MASSACHUSETTS DEP
MARGO WEBBER, P.E.
BOLTON BOARD OF HEALTH
WILLIAM BROOKINGS, R.S. (AGENT)

SOIL CLASSIFICATION: MeB MERRIMAC
GEOLOGICAL MATERIAL: Qkt
LANDFORM: KAME TERRACE
PARENT MATERIAL: OUTWASH
SOIL LIMITATIONS: POOR FILTER

*PERC TEST WAS NOT RUN DUE TO CONSISTENT MATERIAL ENCOUNTERED

IN-SEASON GROUND WATER TESTING

TEST PIT NO.	DATE	SURFACE ELEVATION	DEPTH TO OBSERVED GROUNDWATER	GROUNDWATER ELEVATION
497-3	4/29/97	369.7	110"	361.9
497-5	4/29/97	367.3	100"	359.0
497-7	4/29/97	365.8	108"	356.8
497-8	4/29/97	367.4	104"	358.7
497-9	4/29/97	368.7	82"	361.9

PERCOLATION TEST DATA

TEST PIT NO.	DATE	TOP OF 12" OF WATER		RATE: MINUTES PER INCH
		DEPTH FROM SURFACE	SURFACE ELEVATION	
204-A	2/13/04	72"	368.3	*
204-B	2/13/04	64"	370.4	<2
204-C	2/13/04	72"	369.2	*
204-D	2/13/04	70"	367.9	<2
204-E	2/13/04	60"	367.9	<2

DEEP TEST PIT: **204-1**
DATE OF TEST: 2/13/2004
REFUSAL AT: NONE
SURFACE ELEV.= 367.8

DEPTH (in.)	SOIL HORIZON	MATRIX COLOR	REDOX FEATURES DEPTH	COLOR	PERCENT	SOIL TEXTURE	COURSE FRAG. GRAV.	C&S	SOIL STRUCTURE	SOIL CONSISTENCE	OTHER
0–18"	Ap	10YR 3/2	–	–	–	SL	10	5	SBK	FRIABLE	
18–29"	Bw	10YR 5/6	–	–	–	FSL	5	10	SBK	FRIABLE	
29–144"	C	10YR 4/4	–	–	–	S	5	30	SG	LOOSE	

GROUND WATER OBSERVED AT 136" (ELEVATION = 356.5)

DEEP TEST PIT: **204-2**
DATE OF TEST: 2/13/2004
REFUSAL AT: NONE
SURFACE ELEV.= 370.2

DEPTH (in.)	SOIL HORIZON	MATRIX COLOR	REDOX FEATURES DEPTH	COLOR	PERCENT	SOIL TEXTURE	COURSE FRAG. GRAV.	C&S	SOIL STRUCTURE	SOIL CONSISTENCE	OTHER
0–12"	Ap	10YR 3/2	–	–	–	SL	<5	<5	SBK	FRIABLE	
12–24"	Bw	10YR 5/6	–	–	–	FSL	<5	<5	SBK	FRIABLE	
24–144"	C	10YR 4/4	–	–	–	S	40	40	SG	LOOSE	

GROUND WATER OBSERVED AT 132" (ELEVATION = 359.2)

DEEP TEST PIT: **204-3**
DATE OF TEST: 2/13/2004
REFUSAL AT: NONE
SURFACE ELEV.= 369.4

DEPTH (in.)	SOIL HORIZON	MATRIX COLOR	REDOX FEATURES DEPTH	COLOR	PERCENT	SOIL TEXTURE	COURSE FRAG. GRAV.	C&S	SOIL STRUCTURE	SOIL CONSISTENCE	OTHER
0–7"	Ap	10YR 3/2	–	–	–	SL	5	5	SBK	FRIABLE	
7–27"	C1	2.5Y 5/4	–	–	–	LS	30	20	SG	LOOSE	
27–33"	C2	10YR 5/8	–	–	–	GS	50	20	SG	LOOSE	
33–138"	C3	10YR 4/4	–	–	–	GS	50	40	SG	LOOSE	

GROUND WATER OBSERVED AT >138" (ELEVATION = 357.9)

DEEP TEST PIT: **204-4**
DATE OF TEST: 2/13/2004
REFUSAL AT: NONE
SURFACE ELEV.= 367.9

DEPTH (in.)	SOIL HORIZON	MATRIX COLOR	REDOX FEATURES DEPTH	COLOR	PERCENT	SOIL TEXTURE	COURSE FRAG. GRAV.	C&S	SOIL STRUCTURE	SOIL CONSISTENCE	OTHER
0–12"	Ap	10YR 3/2	–	–	–	SL	5	5	SBK	FRIABLE	
12–27"	Bw	10YR 5/6	–	–	–	FSL	5	5	SBK	FRIABLE	
27–128"	C	10YR 4/4	–	–	–	S	20	20	SG	LOOSE	

GROUND WATER OBSERVED AT 100" (ELEVATION = 359.6)

DEEP TEST PIT: **204-5**
DATE OF TEST: 2/13/2004
REFUSAL AT: NONE
SURFACE ELEV.= 368.4

DEPTH (in.)	SOIL HORIZON	MATRIX COLOR	REDOX FEATURES DEPTH	COLOR	PERCENT	SOIL TEXTURE	COURSE FRAG. GRAV.	C&S	SOIL STRUCTURE	SOIL CONSISTENCE	OTHER
0–8"	Ap	10YR 3/2	–	–	–	SL	5	10	SBK	FRIABLE	
8–20"	C1	10YR 4/6	–	–	–	GS	50	50	SG	LOOSE	
20–132"	C2	10YR 4/4	–	–	–	GS	50	50	SG	LOOSE	

GROUND WATER OBSERVED AT 129" (ELEVATION = 357.7)

DESIGN DATA / SOILS INFORMATION

50 MECHANIC STREET
BOLTON, MASSACHUSETTS

PREPARED FOR: TOWN OF BOLTON
P.O. 27B
BOLTON, MA 01740

TEL: (978) 779-2297
DATE: MARCH 31, 2004

NO.	DATE	DESCRIPTION	BY
2.	1/13/05	DEP COMMENTS	LRD
1.	10/27/04	DEP COMMENTS	EAW

DESIGN BY:	GSR FEB 04
DRAWN BY:	GSR FEB 04
CHECKED BY:	CDM 10/28/04

DUCHARME & WHEELER, INC.
1092 MAIN STREET, P.O.BOX 428, BOLTON, MA., 01740

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