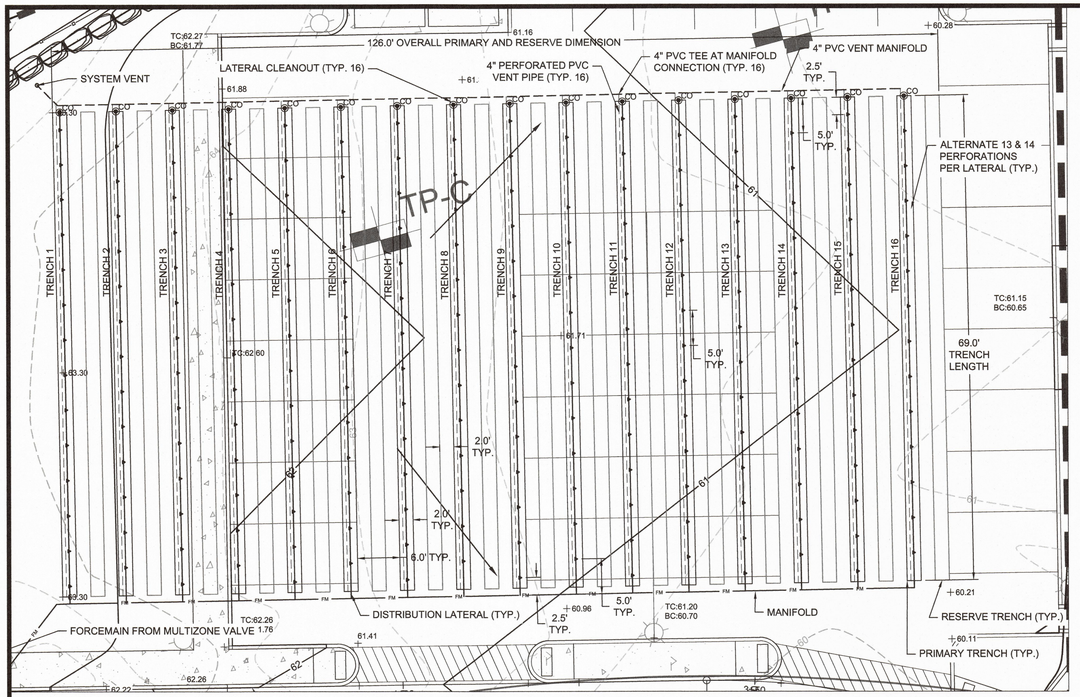
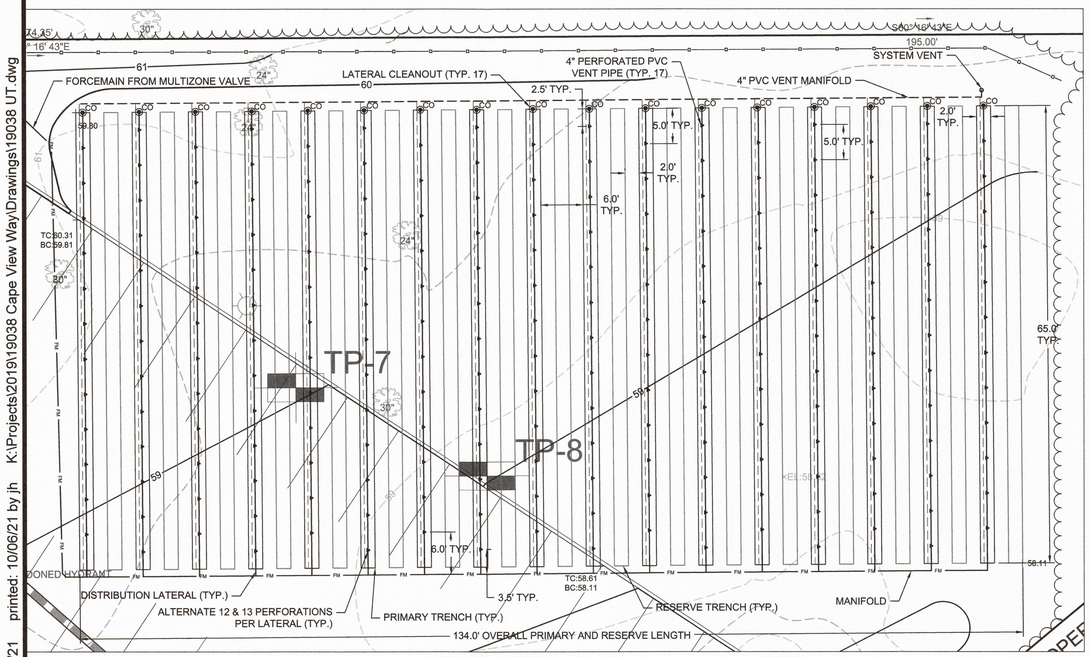


LEACHING FIELD 1 PLAN

SCALE: 1"=10'

NOTE:
SEE PRESSURE DOSE CALCULATIONS FOR PIPE SIZES



LEACHING FIELD 2 PLAN

SCALE: 1"=10'

NOTE:
SEE PRESSURE DOSE CALCULATIONS FOR PIPE SIZES

FIELD 1 - PRESSURE DISTRIBUTION CALCULATIONS

TITLE 5 DESIGN FLOW	4,950	GPD
PERFORATIONS		
PERFORATION DIAMETER, Dp =	1/8	IN.
DISTAL IN-LINE PRESSURE, Hd =	3	FT. (2.5 FT. MIN.)
NUMBER OF PERFORATIONS/LATERAL, N =	14.00	
PERFORATION SPACING, S =	5	FT.
LATERALS		
LATERAL SPACING, Ls =	8	FT.
LATERAL DIAMETER, Ld =	2	IN.
LENGTH OF LATERALS, L =	69	FT.
HAZEN-WILLIAMS COEFFICIENT, Ch =	140	
NUMBER OF LATERALS, Ln =	16	
FORCE MAIN AND MANIFOLD		
FORCE MAIN DIAMETER, Dfm =	4	IN.
LENGTH OF FORCE MAIN, Lfm =	128	FT.
MANIFOLD DIAMETER, Dm =	4	IN.
MANIFOLD LENGTH, Lm =	120	FT.
DISCHARGE RATES		
PERFORATION DISCHARGE RATE, q = 11.79 x (Dp)2 x (Hd)1/2 =	0.32	GPM
LATERAL DISCHARGE RATE, Ql, q x N =	4.48	GPM
SYSTEM DISCHARGE RATE, Q, Ql x Ln =	72	GPM
DOSING CALCULATIONS		
PIPING SYSTEM VOLUME, Vs =	343	GAL.
DOSE VOLUME, (5.0 x Vs) =	1,719	GAL.
DOSE VOLUME 4950 GPD/4 DOSES/DAY =	1,238	GAL.
USE:	1,581	GALLON DOSE VOLUME
HEAD LOSSES		
FRICTION LOSS IN FORCE MAIN, fl =	0.5	FT.
FRICTION LOSS IN MANIFOLD, fl =	0.4	FT.
FRICTION LOSS IN FITTINGS AND VALVES, fl =	0.3	FT.
NETWORK LOSSES, nl =	3.9	FT.
HEAD LOSS THROUGH DISTRIBUTION VALVE=	17.0	FT.
STATIC HEAD =	10.0	FT.
TOTAL HEAD =	32.2	FT.
PUMP PARAMETERS		
FLOW, Q =	80	GPM
TOTAL DYNAMIC HEAD =	33.0	FT.
USE PUMPS CAPABLE OF 80 GPM AT 33 FT HEAD		

FIELD 2 - PRESSURE DISTRIBUTION CALCULATIONS

TITLE 5 DESIGN FLOW	4,950	GPD
PERFORATIONS		
PERFORATION DIAMETER, Dp =	1/8	IN.
DISTAL IN-LINE PRESSURE, Hd =	2.5	FT. (2.5 FT. MIN.)
NUMBER OF PERFORATIONS/LATERAL, N =	13.00	
PERFORATION SPACING, S =	5	FT.
LATERALS		
LATERAL SPACING, Ls =	8	FT.
LATERAL DIAMETER, Ld =	2	IN.
LENGTH OF LATERALS, L =	65	FT.
HAZEN-WILLIAMS COEFFICIENT, Ch =	140	
NUMBER OF LATERALS, Ln =	17	
FORCE MAIN AND MANIFOLD		
FORCE MAIN DIAMETER, Dfm =	4	IN.
LENGTH OF FORCE MAIN, Lfm =	442	FT.
MANIFOLD DIAMETER, Dm =	4	IN.
MANIFOLD LENGTH, Lm =	128	FT.
DISCHARGE RATES		
PERFORATION DISCHARGE RATE, q = 11.79 x (Dp)2 x (Hd)1/2 =	0.3	GPM
LATERAL DISCHARGE RATE, Ql, q x N =	3.90	GPM
SYSTEM DISCHARGE RATE, Q, Ql x Ln =	67	GPM
DOSING CALCULATIONS		
PIPING SYSTEM VOLUME, Vs =	553	GAL.
DOSE VOLUME, (5.0 x Vs) =	2,769	GAL.
DOSE VOLUME 4950 GPD/4 DOSES/DAY =	1,238	GAL.
USE:	1,791	GALLON DOSE VOLUME
HEAD LOSSES		
FRICTION LOSS IN FORCE MAIN, fl =	1.4	FT.
FRICTION LOSS IN MANIFOLD, fl =	0.4	FT.
FRICTION LOSS IN FITTINGS AND VALVES, fl =	0.4	FT.
NETWORK LOSSES, nl =	3.3	FT.
HEAD LOSS THROUGH DISTRIBUTION VALVE=	14.0	FT.
STATIC HEAD =	10.0	FT.
TOTAL HEAD =	29.5	FT.
PUMP PARAMETERS		
FLOW, Q =	70	GPM
TOTAL DYNAMIC HEAD =	30.0	FT.
USE PUMPS CAPABLE OF 80 GPM AT 33 FT HEAD		

LEACHING FIELD 1

Water Table Mounding Estimate Beneath Center of Entire Drain Field (L*W)

Meters and Days	Length of Drain Field Subunit	Width of Drain Field Subunit		Separation between Drain Field Subunits	Fraction of Drain Field Subunit that is Trench Area	Horizontal Hydraulic Conductivity	Specific Yield use 0.001 to approximate steady state at 10 years	time use 10 years to approximate steady state
	l_s	w_s		Sp	f	Kh	Sy	time
	ft	ft		ft		ft/days	none	days
	126	69		0	0.25	9	0.001	3650

Number of subunits, n	L	W	q effective in subunit l s x ws	q in trenches	q' effective on LxW	Q	Zmax 12 Iterations (Estimated Mound)	Initial Saturated Thickness
	ft	ft	ft/day	ft/day	ft/day	gallons/day	ft	ft
1	126	69	0.1167	0.4669	0.1167	7590	1.387	100

NOTE: Saturated thickness of Aquifer estimated based on available water table contour and bedrock maps.
Horizonal Hydraulic Conductivity is based on conversion of observed percolation rate.

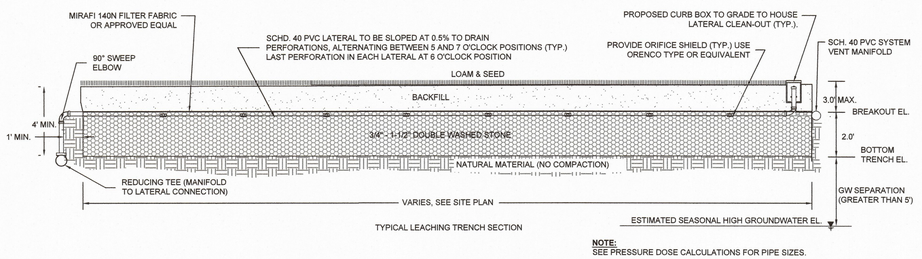
LEACHING FIELD 2

Water Table Mounding Estimate Beneath Center of Entire Drain Field (L*W)

Meters and Days	Length of Drain Field Subunit	Width of Drain Field Subunit		Separation between Drain Field Subunits	Fraction of Drain Field Subunit that is Trench Area	Horizontal Hydraulic Conductivity	Specific Yield use 0.001 to approximate steady state at 10 years	time use 10 years to approximate steady state
	l_s	w_s		Sp	f	Kh	Sy	time
	ft	ft		ft		ft/days	none	days
	134	65		0	0.25	9	0.001	3650

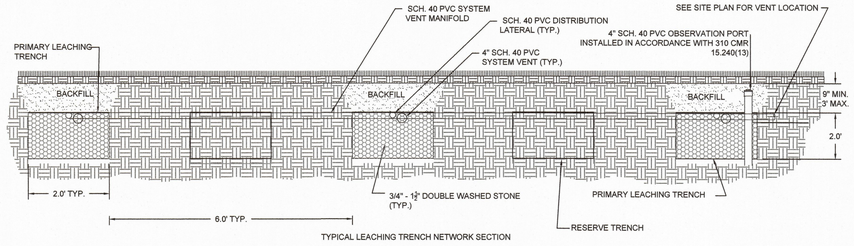
Number of subunits, n	L	W	q effective in subunit l s x ws	q in trenches	q' effective on LxW	Q	Zmax 12 Iterations (Estimated Mound)	Initial Saturated Thickness
	ft	ft	ft/day	ft/day	ft/day	gallons/day	ft	ft
1	134	65	0.1165	0.4660	0.1165	7590	1.384	100

NOTE: Saturated thickness of Aquifer estimated based on available water table contour and bedrock maps.
Horizonal Hydraulic Conductivity is based on conversion of observed percolation rate.



TYPICAL LEACHING TRENCH SECTION

NOTE:
SEE PRESSURE DOSE CALCULATIONS FOR PIPE SIZES.



TYPICAL LEACHING TRENCH NETWORK SECTION

LEACHING TRENCH DETAIL

NOT TO SCALE

LEACHING FIELD 1 (TRENCHES 1-7) - SCHEDULE OF ELEVATIONS

TRENCH INVERT IN	60.33
BREAKOUT	60.50
LATERAL DISTAL INVERT	59.99
BOTTOM OF SYSTEM	58.50
ESHGW (BASED ON REGIONAL GW DATA)	10.00
MOUNDING (HANTUSH METHOD)	1.39
GW SEPARATION	47.11

LEACHING FIELD 1 (TRENCHS 8-16) - SCHEDULE OF ELEVATIONS

TRENCH INVERT IN	58.88
BREAKOUT	59.05
LATERAL DISTAL INVERT	58.54
BOTTOM OF SYSTEM	57.05
ESHGW (BASED ON REGIONAL GW DATA)	10.00
MOUNDING (HANTUSH METHOD)	1.39
GW SEPARATION	45.66

LEACHING FIELD 2 - SCHEDULE OF ELEVATIONS

TRENCH INVERT IN	56.69
BREAKOUT	56.86
LATERAL DISTAL INVERT	56.37
BOTTOM OF SYSTEM	54.86
ESHGW (BASED ON REGIONAL GW DATA)	10.00
MOUNDING (HANTUSH METHOD)	1.38
GW SEPARATION	43.48

RECEIVED
OCT 18 2021
Bourne Health Department
24 Perry Avenue
Buzzards Bay, MA 02532

Revisions

Rev.	Date	By	Appr.	Description
1	9/30/2021	JEH	PPL	SECOND PEER REVIEW COMMENT EDITS

Horsley Witten Group, Inc.
Sustainable Environmental Solutions
90 Route 6A
Sandwich, MA 02563
508-833-6600 voice
508-833-3150 fax

Checked By: BRK
Drawn By: EWH
Designed By: EWH
Date: SEPTEMBER 2021

Plan Set:

Plan Title: WASTEWATER LEACHFIELD DETAILS

CAPE VIEW WAY
PERMITTING PLANS
BOURNE, MASSACHUSETTS

Prepared For:
PRESERVATION OF AFFORDABLE HOUSING
2 OLIVER STREET, SUITE 500
BOSTON, MA 02109
Phone: (617) 261-9888
Fax: —

Survey Provided By:
Horsley Witten Group, Inc.
90 Route 6A
Sandwich, MA 02563
Phone: (508) 833-6600
Fax: (508) 833-3150
Dated: JUNE 2019

Registration:
COMMONWEALTH OF MASSACHUSETTS
JOSEPH E. HENDERSON
CIVIL
No. 46644
REGISTERED PROFESSIONAL ENGINEER
10-14-21

Project Number: 19038
Sheet: 14 of 23
Sheet Number: C - 14

last modified: 10/05/21 printed: 10/06/21 by jh K:\Projects\2019\19038 Cape View Way\Drawings\19038 UT.dwg