



**Stormwater Report
For
Existing Portion of Colton Road for Colton Road Extension
Millbury, Massachusetts**

**Prepared for:
Next Grid Colton, LLC
P.O. Box 7775 #73069
San Francisco, California 94120-7775**

Prepared by:
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August 27, 2020
Atlantic Project No. 3085.00



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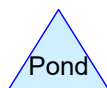
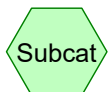
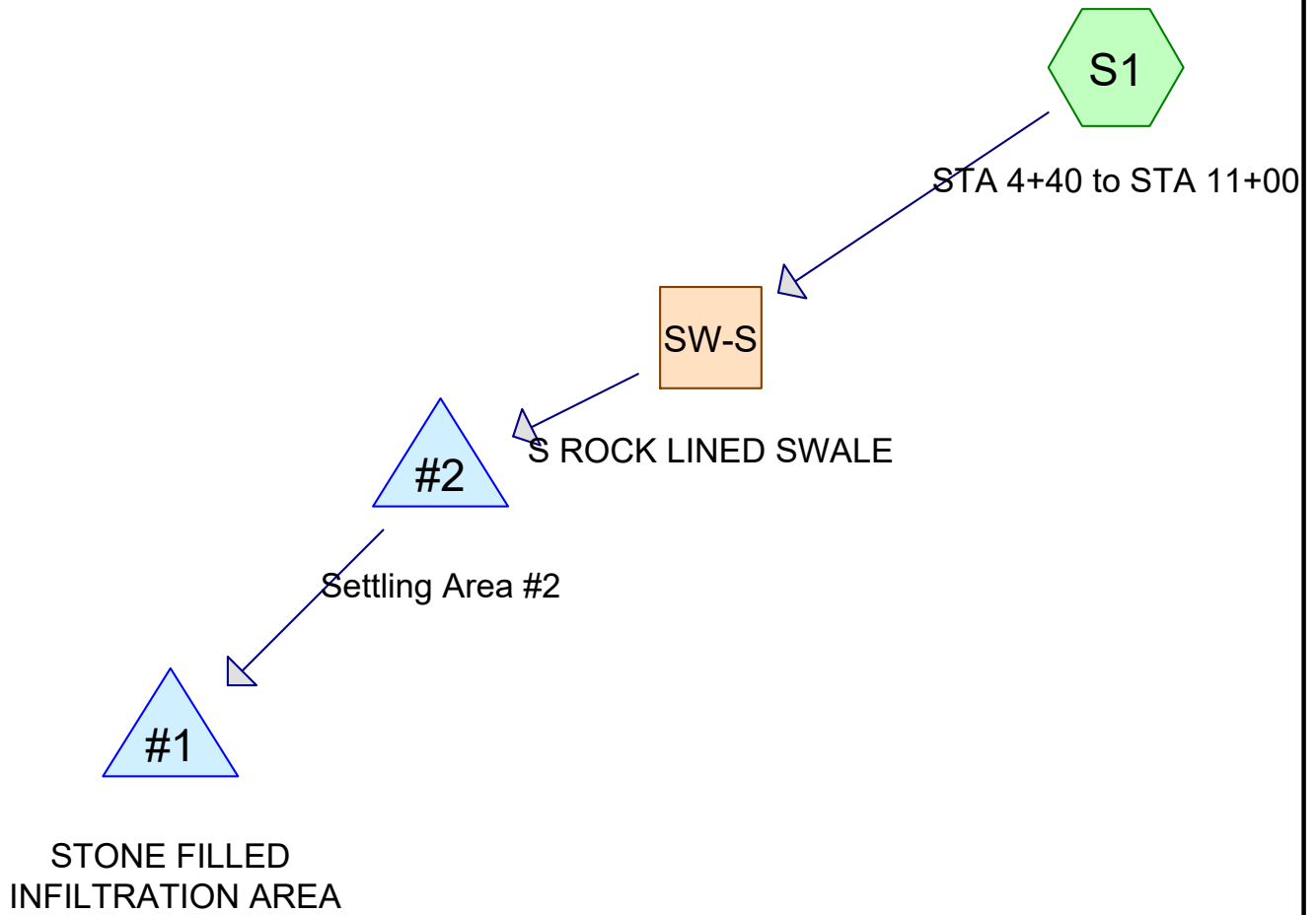
1.0 NARRATIVE

This report is being provided to analyze the proposed stormwater BMP improvements along the existing portions of Colton Road where minor widening and regrading is proposed. An analysis for the extension portion of Colton Road is provided under a separate cover, (see Stormwater Addendum #1 for Definitive Subdivision Plan for Colton Road Extension dated August 27, 2020). The improvements proposed to the existing portions of Colton road include widening less than a single lane and improving existing drainage systems, which meets the criteria for a Redevelopment classification per MassDEP Stormwater regulations. Currently, Colton Road does not have any stormwater structures or measures to attenuate or treat stormwater runoff. In addition to widening the road, the proposed work will include improvements to drainage such as: proper cross-slope road grading, road side rock lined swales, settling areas, an infiltration trench and area, and an overall reduction of longitudinal road slopes greater than 8%. Due to a lack of space within the limited width of the right-of-way, close proximity of adjacent wetland systems, residential driveways, ground water, and an informal parking lot for a nature trail it is not feasible to comply fully with all of the DEP Stormwater Management Standards. However, since the project is considered a Redevelopment, it is our opinion that we have provided stormwater mitigation to the maximum extent practicable considering the above constraints. Lastly, given the large watershed associated with Dorothy Brook and the Pond reservoir, the minimal widening proposed along the length of Colton road will have little effect on the post-development runoff rates and therefore is considered to be de minimus.

A stormwater analysis for the BMP structures has been performed and includes water quality, recharge, swale and pipe sizing calculations (see appendix).

APPENDIX A

BMP HydroCAD Stormwater Analysis



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Type III 24-hr 2-yr Rainfall=3.24"

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Summary for Subcatchment S1: STA 4+40 to STA 11+00

Runoff = 0.64 cfs @ 12.30 hrs, Volume= 3,482 cf, Depth= 0.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.24"

	Area (sf)	CN	Description
*	11,880	98	Impervious
	35,182	55	Woods, Good, HSG B
*	2,800	85	Gravel roads, HSG B
	13,134	61	>75% Grass cover, Good, HSG B
	62,996	66	Weighted Average
	51,116		81.14% Pervious Area
	11,880		18.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	50	0.0400	0.05		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.00"
1.2	400	0.1280	5.76		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
18.0	450	Total			

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Type III 24-hr 2-yr Rainfall=3.24"

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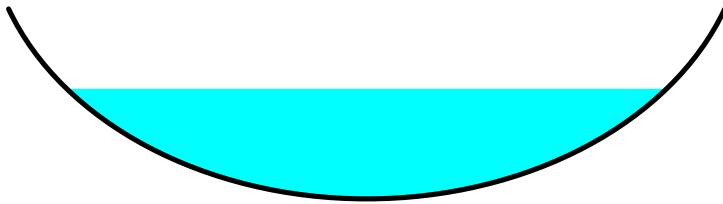
Summary for Reach SW-S: S ROCK LINED SWALE

Inflow Area = 62,996 sf, 18.86% Impervious, Inflow Depth = 0.66" for 2-yr event
Inflow = 0.64 cfs @ 12.30 hrs, Volume= 3,482 cf
Outflow = 0.62 cfs @ 12.36 hrs, Volume= 3,482 cf, Atten= 4%, Lag= 3.5 min

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.11 fps, Min. Travel Time= 4.0 min
Avg. Velocity = 0.85 fps, Avg. Travel Time= 10.0 min

Peak Storage= 150 cf @ 12.36 hrs
Average Depth at Peak Storage= 0.29'
Bank-Full Depth= 0.50' Flow Area= 0.7 sf, Capacity= 1.95 cfs

2.00' x 0.50' deep Parabolic Channel, n= 0.069 Riprap, 6-inch
Length= 510.0' Slope= 0.0961 '/
Inlet Invert= 442.00', Outlet Invert= 393.00'



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Stage-Area-Storage for Reach SW-S: S ROCK LINED SWALE

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
442.00	0.0	0
442.01	0.0	1
442.02	0.0	3
442.03	0.0	5
442.04	0.0	8
442.05	0.0	11
442.06	0.0	14
442.07	0.0	18
442.08	0.0	22
442.09	0.1	26
442.10	0.1	30
442.11	0.1	35
442.12	0.1	40
442.13	0.1	45
442.14	0.1	50
442.15	0.1	56
442.16	0.1	62
442.17	0.1	67
442.18	0.1	73
442.19	0.2	80
442.20	0.2	86
442.21	0.2	93
442.22	0.2	99
442.23	0.2	106
442.24	0.2	113
442.25	0.2	120
442.26	0.2	127
442.27	0.3	135
442.28	0.3	142
442.29	0.3	150
442.30	0.3	158
442.31	0.3	166
442.32	0.3	174
442.33	0.4	182
442.34	0.4	191
442.35	0.4	199
442.36	0.4	208
442.37	0.4	216
442.38	0.4	225
442.39	0.5	234
442.40	0.5	243
442.41	0.5	252
442.42	0.5	262
442.43	0.5	271
442.44	0.6	281
442.45	0.6	290
442.46	0.6	300
442.47	0.6	310
442.48	0.6	320
442.49	0.6	330
442.50	0.7	340

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Type III 24-hr 2-yr Rainfall=3.24"

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Summary for Pond #1: STONE FILLED INFILTRATION AREA

Inflow Area = 62,996 sf, 18.86% Impervious, Inflow Depth = 0.66" for 2-yr event
 Inflow = 0.62 cfs @ 12.36 hrs, Volume= 3,471 cf
 Outflow = 0.62 cfs @ 12.36 hrs, Volume= 3,455 cf, Atten= 0%, Lag= 0.1 min
 Primary = 0.62 cfs @ 12.36 hrs, Volume= 3,455 cf

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 389.07' @ 12.36 hrs Surf.Area= 56 sf Storage= 19 cf

Plug-Flow detention time= 3.8 min calculated for 3,455 cf (100% of inflow)
 Center-of-Mass det. time= 1.0 min (910.0 - 909.0)

Volume	Invert	Avail.Storage	Storage Description			
#1	388.00'	419 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
388.00	5	10.0	0	0	5	
389.00	31	25.0	16	16	50	
390.00	1,000	75.0	402	419	451	

Device	Routing	Invert	Outlet Devices											
#1	Primary	389.00'	12.0' long x 2.0' breadth Broad-Crested Rectangular Weir											
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	
				2.50	3.00	3.50								
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88		
				2.85	3.07	3.20	3.32							

Primary OutFlow Max=0.61 cfs @ 12.36 hrs HW=389.07' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir** (Weir Controls 0.61 cfs @ 0.69 fps)

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Type III 24-hr 2-yr Rainfall=3.24"

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Stage-Area-Storage for Pond #1: STONE FILLED INFILTRATION AREA

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
388.00	5	0	389.06	51	19
388.02	5	0	389.08	59	20
388.04	6	0	389.10	67	21
388.06	6	0	389.12	76	22
388.08	6	0	389.14	85	24
388.10	7	1	389.16	95	26
388.12	7	1	389.18	105	28
388.14	7	1	389.20	116	30
388.16	8	1	389.22	128	32
388.18	8	1	389.24	140	35
388.20	8	1	389.26	152	38
388.22	9	1	389.28	165	41
388.24	9	2	389.30	179	45
388.26	10	2	389.32	193	48
388.28	10	2	389.34	208	52
388.30	10	2	389.36	223	57
388.32	11	2	389.38	239	61
388.34	11	3	389.40	256	66
388.36	12	3	389.42	273	72
388.38	12	3	389.44	290	77
388.40	13	3	389.46	308	83
388.42	13	4	389.48	327	89
388.44	14	4	389.50	346	96
388.46	14	4	389.52	365	103
388.48	15	5	389.54	386	111
388.50	15	5	389.56	406	119
388.52	16	5	389.58	428	127
388.54	16	5	389.60	449	136
388.56	17	6	389.62	472	145
388.58	17	6	389.64	495	155
388.60	18	6	389.66	518	165
388.62	19	7	389.68	542	175
388.64	19	7	389.70	567	187
388.66	20	8	389.72	592	198
388.68	20	8	389.74	617	210
388.70	21	8	389.76	644	223
388.72	21	9	389.78	670	236
388.74	22	9	389.80	698	250
388.76	23	10	389.82	725	264
388.78	23	10	389.84	754	279
388.80	24	11	389.86	783	294
388.82	25	11	389.88	812	310
388.84	25	12	389.90	842	327
388.86	26	12	389.92	873	344
388.88	27	13	389.94	904	361
388.90	27	13	389.96	935	380
388.92	28	14	389.98	967	399
388.94	29	14	390.00	1,000	419
388.96	30	15			
388.98	30	16			
389.00	31	16			
389.02	37	17			
389.04	44	18			

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Type III 24-hr 2-yr Rainfall=3.24"

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Summary for Pond #2: Settling Area #2

Inflow Area = 62,996 sf, 18.86% Impervious, Inflow Depth = 0.66" for 2-yr event
 Inflow = 0.62 cfs @ 12.36 hrs, Volume= 3,482 cf
 Outflow = 0.62 cfs @ 12.36 hrs, Volume= 3,471 cf, Atten= 0%, Lag= 0.2 min
 Primary = 0.62 cfs @ 12.36 hrs, Volume= 3,471 cf

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 390.34' @ 12.36 hrs Surf.Area= 34 sf Storage= 20 cf

Plug-Flow detention time= 3.1 min calculated for 3,471 cf (100% of inflow)
 Center-of-Mass det. time= 1.1 min (909.0 - 907.9)

Volume	Invert	Avail.Storage	Storage Description		
#1	389.00'	144 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
389.00	3	8.0	0	0	3
390.00	22	18.0	11	11	27
391.00	64	32.0	41	52	88
392.00	122	44.0	91	144	170

Device	Routing	Invert	Outlet Devices
#1	Primary	390.00'	8.0" Round Culvert X 2.00 L= 41.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 390.00' / 389.60' S= 0.0098 ' S= 0.0098 ' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.62 cfs @ 12.36 hrs HW=390.34' (Free Discharge)

↑**1=Culvert** (Inlet Controls 0.62 cfs @ 1.74 fps)

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Stage-Area-Storage for Pond #2: Settling Area #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
389.00	3	0	391.65	100	105
389.05	4	0	391.70	103	110
389.10	4	0	391.75	106	115
389.15	5	1	391.80	109	121
389.20	5	1	391.85	112	126
389.25	6	1	391.90	115	132
389.30	7	1	391.95	119	138
389.35	8	2	392.00	122	144
389.40	8	2			
389.45	9	3			
389.50	10	3			
389.55	11	4			
389.60	12	4			
389.65	13	5			
389.70	14	6			
389.75	16	6			
389.80	17	7			
389.85	18	8			
389.90	19	9			
389.95	21	10			
390.00	22	11			
390.05	24	12			
390.10	25	13			
390.15	27	15			
390.20	29	16			
390.25	30	18			
390.30	32	19			
390.35	34	21			
390.40	36	23			
390.45	38	24			
390.50	40	26			
390.55	42	28			
390.60	45	31			
390.65	47	33			
390.70	49	35			
390.75	51	38			
390.80	54	40			
390.85	56	43			
390.90	59	46			
390.95	61	49			
391.00	64	52			
391.05	66	55			
391.10	69	59			
391.15	72	62			
391.20	74	66			
391.25	77	70			
391.30	79	74			
391.35	82	78			
391.40	85	82			
391.45	88	86			
391.50	91	91			
391.55	94	95			
391.60	97	100			

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Type III 24-hr 10-yr Rainfall=5.01"

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Summary for Subcatchment S1: STA 4+40 to STA 11+00

Runoff = 1.97 cfs @ 12.26 hrs, Volume= 9,105 cf, Depth= 1.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.01"

	Area (sf)	CN	Description
*	11,880	98	Impervious
	35,182	55	Woods, Good, HSG B
*	2,800	85	Gravel roads, HSG B
	13,134	61	>75% Grass cover, Good, HSG B
	62,996	66	Weighted Average
	51,116		81.14% Pervious Area
	11,880		18.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	50	0.0400	0.05		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.00"
1.2	400	0.1280	5.76		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
18.0	450	Total			

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Type III 24-hr 10-yr Rainfall=5.01"

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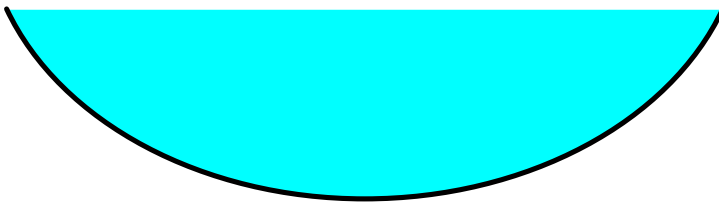
Summary for Reach SW-S: S ROCK LINED SWALE

Inflow Area = 62,996 sf, 18.86% Impervious, Inflow Depth = 1.73" for 10-yr event
Inflow = 1.97 cfs @ 12.26 hrs, Volume= 9,105 cf
Outflow = 1.93 cfs @ 12.30 hrs, Volume= 9,105 cf, Atten= 2%, Lag= 2.5 min

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.92 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 1.06 fps, Avg. Travel Time= 8.0 min

Peak Storage= 337 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.50'
Bank-Full Depth= 0.50' Flow Area= 0.7 sf, Capacity= 1.95 cfs

2.00' x 0.50' deep Parabolic Channel, n= 0.069 Riprap, 6-inch
Length= 510.0' Slope= 0.0961 '/
Inlet Invert= 442.00', Outlet Invert= 393.00'



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Stage-Area-Storage for Reach SW-S: S ROCK LINED SWALE

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
442.00	0.0	0
442.01	0.0	1
442.02	0.0	3
442.03	0.0	5
442.04	0.0	8
442.05	0.0	11
442.06	0.0	14
442.07	0.0	18
442.08	0.0	22
442.09	0.1	26
442.10	0.1	30
442.11	0.1	35
442.12	0.1	40
442.13	0.1	45
442.14	0.1	50
442.15	0.1	56
442.16	0.1	62
442.17	0.1	67
442.18	0.1	73
442.19	0.2	80
442.20	0.2	86
442.21	0.2	93
442.22	0.2	99
442.23	0.2	106
442.24	0.2	113
442.25	0.2	120
442.26	0.2	127
442.27	0.3	135
442.28	0.3	142
442.29	0.3	150
442.30	0.3	158
442.31	0.3	166
442.32	0.3	174
442.33	0.4	182
442.34	0.4	191
442.35	0.4	199
442.36	0.4	208
442.37	0.4	216
442.38	0.4	225
442.39	0.5	234
442.40	0.5	243
442.41	0.5	252
442.42	0.5	262
442.43	0.5	271
442.44	0.6	281
442.45	0.6	290
442.46	0.6	300
442.47	0.6	310
442.48	0.6	320
442.49	0.6	330
442.50	0.7	340

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Type III 24-hr 10-yr Rainfall=5.01"

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Summary for Pond #1: STONE FILLED INFILTRATION AREA

Inflow Area = 62,996 sf, 18.86% Impervious, Inflow Depth = 1.73" for 10-yr event
 Inflow = 1.93 cfs @ 12.31 hrs, Volume= 9,095 cf
 Outflow = 1.93 cfs @ 12.31 hrs, Volume= 9,078 cf, Atten= 0%, Lag= 0.1 min
 Primary = 1.93 cfs @ 12.31 hrs, Volume= 9,078 cf

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 389.16' @ 12.31 hrs Surf.Area= 94 sf Storage= 26 cf

Plug-Flow detention time= 1.7 min calculated for 9,078 cf (100% of inflow)
 Center-of-Mass det. time= 0.5 min (875.3 - 874.8)

Volume	Invert	Avail.Storage	Storage Description			
#1	388.00'	419 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
388.00	5	10.0	0	0	5	
389.00	31	25.0	16	16	50	
390.00	1,000	75.0	402	419	451	

Device	Routing	Invert	Outlet Devices											
#1	Primary	389.00'	12.0' long x 2.0' breadth Broad-Crested Rectangular Weir											
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	
				2.50	3.00	3.50								
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88		
				2.85	3.07	3.20	3.32							

Primary OutFlow Max=1.93 cfs @ 12.31 hrs HW=389.16' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir** (Weir Controls 1.93 cfs @ 1.01 fps)

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Type III 24-hr 10-yr Rainfall=5.01"

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Stage-Area-Storage for Pond #1: STONE FILLED INFILTRATION AREA

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
388.00	5	0	389.06	51	19
388.02	5	0	389.08	59	20
388.04	6	0	389.10	67	21
388.06	6	0	389.12	76	22
388.08	6	0	389.14	85	24
388.10	7	1	389.16	95	26
388.12	7	1	389.18	105	28
388.14	7	1	389.20	116	30
388.16	8	1	389.22	128	32
388.18	8	1	389.24	140	35
388.20	8	1	389.26	152	38
388.22	9	1	389.28	165	41
388.24	9	2	389.30	179	45
388.26	10	2	389.32	193	48
388.28	10	2	389.34	208	52
388.30	10	2	389.36	223	57
388.32	11	2	389.38	239	61
388.34	11	3	389.40	256	66
388.36	12	3	389.42	273	72
388.38	12	3	389.44	290	77
388.40	13	3	389.46	308	83
388.42	13	4	389.48	327	89
388.44	14	4	389.50	346	96
388.46	14	4	389.52	365	103
388.48	15	5	389.54	386	111
388.50	15	5	389.56	406	119
388.52	16	5	389.58	428	127
388.54	16	5	389.60	449	136
388.56	17	6	389.62	472	145
388.58	17	6	389.64	495	155
388.60	18	6	389.66	518	165
388.62	19	7	389.68	542	175
388.64	19	7	389.70	567	187
388.66	20	8	389.72	592	198
388.68	20	8	389.74	617	210
388.70	21	8	389.76	644	223
388.72	21	9	389.78	670	236
388.74	22	9	389.80	698	250
388.76	23	10	389.82	725	264
388.78	23	10	389.84	754	279
388.80	24	11	389.86	783	294
388.82	25	11	389.88	812	310
388.84	25	12	389.90	842	327
388.86	26	12	389.92	873	344
388.88	27	13	389.94	904	361
388.90	27	13	389.96	935	380
388.92	28	14	389.98	967	399
388.94	29	14	390.00	1,000	419
388.96	30	15			
388.98	30	16			
389.00	31	16			
389.02	37	17			
389.04	44	18			

3085.00 - Colton EXISTING - BMP

Type III 24-hr 10-yr Rainfall=5.01"

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Summary for Pond #2: Settling Area #2

Inflow Area = 62,996 sf, 18.86% Impervious, Inflow Depth = 1.73" for 10-yr event
 Inflow = 1.93 cfs @ 12.30 hrs, Volume= 9,105 cf
 Outflow = 1.93 cfs @ 12.31 hrs, Volume= 9,095 cf, Atten= 0%, Lag= 0.4 min
 Primary = 1.93 cfs @ 12.31 hrs, Volume= 9,095 cf

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 390.76' @ 12.31 hrs Surf.Area= 52 sf Storage= 38 cf

Plug-Flow detention time= 1.5 min calculated for 9,095 cf (100% of inflow)
 Center-of-Mass det. time= 0.6 min (874.8 - 874.2)

Volume	Invert	Avail.Storage	Storage Description		
#1	389.00'	144 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
389.00	3	8.0	0	0	3
390.00	22	18.0	11	11	27
391.00	64	32.0	41	52	88
392.00	122	44.0	91	144	170

Device	Routing	Invert	Outlet Devices
#1	Primary	390.00'	8.0" Round Culvert X 2.00 L= 41.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 390.00' / 389.60' S= 0.0098 ' S= 0.0098 ' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.93 cfs @ 12.31 hrs HW=390.76' (Free Discharge)

↑**1=Culvert** (Inlet Controls 1.93 cfs @ 2.76 fps)

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Type III 24-hr 10-yr Rainfall=5.01"

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Stage-Area-Storage for Pond #2: Settling Area #2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
389.00	3	0	391.65	100	105
389.05	4	0	391.70	103	110
389.10	4	0	391.75	106	115
389.15	5	1	391.80	109	121
389.20	5	1	391.85	112	126
389.25	6	1	391.90	115	132
389.30	7	1	391.95	119	138
389.35	8	2	392.00	122	144
389.40	8	2			
389.45	9	3			
389.50	10	3			
389.55	11	4			
389.60	12	4			
389.65	13	5			
389.70	14	6			
389.75	16	6			
389.80	17	7			
389.85	18	8			
389.90	19	9			
389.95	21	10			
390.00	22	11			
390.05	24	12			
390.10	25	13			
390.15	27	15			
390.20	29	16			
390.25	30	18			
390.30	32	19			
390.35	34	21			
390.40	36	23			
390.45	38	24			
390.50	40	26			
390.55	42	28			
390.60	45	31			
390.65	47	33			
390.70	49	35			
390.75	51	38			
390.80	54	40			
390.85	56	43			
390.90	59	46			
390.95	61	49			
391.00	64	52			
391.05	66	55			
391.10	69	59			
391.15	72	62			
391.20	74	66			
391.25	77	70			
391.30	79	74			
391.35	82	78			
391.40	85	82			
391.45	88	86			
391.50	91	91			
391.55	94	95			
391.60	97	100			

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Type III 24-hr 25-yr Rainfall=6.12"

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Summary for Subcatchment S1: STA 4+40 to STA 11+00

Runoff = 2.96 cfs @ 12.26 hrs, Volume= 13,279 cf, Depth= 2.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.12"

	Area (sf)	CN	Description
*	11,880	98	Impervious
	35,182	55	Woods, Good, HSG B
*	2,800	85	Gravel roads, HSG B
	13,134	61	>75% Grass cover, Good, HSG B
	62,996	66	Weighted Average
	51,116		81.14% Pervious Area
	11,880		18.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	50	0.0400	0.05		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.00"
1.2	400	0.1280	5.76		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
18.0	450	Total			

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Type III 24-hr 25-yr Rainfall=6.12"

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Summary for Pond #1: STONE FILLED INFILTRATION AREA

Inflow Area = 62,996 sf, 18.86% Impervious, Inflow Depth = 2.53" for 25-yr event
 Inflow = 2.89 cfs @ 12.31 hrs, Volume= 13,268 cf
 Outflow = 2.89 cfs @ 12.31 hrs, Volume= 13,252 cf, Atten= 0%, Lag= 0.1 min
 Primary = 2.89 cfs @ 12.31 hrs, Volume= 13,252 cf

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 389.21' @ 12.31 hrs Surf.Area= 120 sf Storage= 31 cf

Plug-Flow detention time= 1.3 min calculated for 13,252 cf (100% of inflow)
 Center-of-Mass det. time= 0.4 min (863.3 - 862.9)

Volume	Invert	Avail.Storage	Storage Description			
#1	388.00'	419 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
388.00	5	10.0	0	0	5	
389.00	31	25.0	16	16	50	
390.00	1,000	75.0	402	419	451	

Device	Routing	Invert	Outlet Devices											
#1	Primary	389.00'	12.0' long x 2.0' breadth Broad-Crested Rectangular Weir											
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	
				2.50	3.00	3.50								
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88		
				2.85	3.07	3.20	3.32							

Primary OutFlow Max=2.88 cfs @ 12.31 hrs HW=389.21' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir** (Weir Controls 2.88 cfs @ 1.16 fps)

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Type III 24-hr 25-yr Rainfall=6.12"

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Stage-Area-Storage for Pond #1: STONE FILLED INFILTRATION AREA

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
388.00	5	0	389.06	51	19
388.02	5	0	389.08	59	20
388.04	6	0	389.10	67	21
388.06	6	0	389.12	76	22
388.08	6	0	389.14	85	24
388.10	7	1	389.16	95	26
388.12	7	1	389.18	105	28
388.14	7	1	389.20	116	30
388.16	8	1	389.22	128	32
388.18	8	1	389.24	140	35
388.20	8	1	389.26	152	38
388.22	9	1	389.28	165	41
388.24	9	2	389.30	179	45
388.26	10	2	389.32	193	48
388.28	10	2	389.34	208	52
388.30	10	2	389.36	223	57
388.32	11	2	389.38	239	61
388.34	11	3	389.40	256	66
388.36	12	3	389.42	273	72
388.38	12	3	389.44	290	77
388.40	13	3	389.46	308	83
388.42	13	4	389.48	327	89
388.44	14	4	389.50	346	96
388.46	14	4	389.52	365	103
388.48	15	5	389.54	386	111
388.50	15	5	389.56	406	119
388.52	16	5	389.58	428	127
388.54	16	5	389.60	449	136
388.56	17	6	389.62	472	145
388.58	17	6	389.64	495	155
388.60	18	6	389.66	518	165
388.62	19	7	389.68	542	175
388.64	19	7	389.70	567	187
388.66	20	8	389.72	592	198
388.68	20	8	389.74	617	210
388.70	21	8	389.76	644	223
388.72	21	9	389.78	670	236
388.74	22	9	389.80	698	250
388.76	23	10	389.82	725	264
388.78	23	10	389.84	754	279
388.80	24	11	389.86	783	294
388.82	25	11	389.88	812	310
388.84	25	12	389.90	842	327
388.86	26	12	389.92	873	344
388.88	27	13	389.94	904	361
388.90	27	13	389.96	935	380
388.92	28	14	389.98	967	399
388.94	29	14	390.00	1,000	419
388.96	30	15			
388.98	30	16			
389.00	31	16			
389.02	37	17			
389.04	44	18			

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Type III 24-hr 25-yr Rainfall=6.12"

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Summary for Pond #2: Settling Area #2

Inflow Area = 62,996 sf, 18.86% Impervious, Inflow Depth = 2.53" for 25-yr event
 Inflow = 2.90 cfs @ 12.29 hrs, Volume= 13,279 cf
 Outflow = 2.89 cfs @ 12.31 hrs, Volume= 13,268 cf, Atten= 0%, Lag= 0.8 min
 Primary = 2.89 cfs @ 12.31 hrs, Volume= 13,268 cf

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 391.28' @ 12.31 hrs Surf.Area= 78 sf Storage= 72 cf

Plug-Flow detention time= 1.1 min calculated for 13,265 cf (100% of inflow)
 Center-of-Mass det. time= 0.6 min (862.9 - 862.3)

Volume	Invert	Avail.Storage	Storage Description		
#1	389.00'	144 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
389.00	3	8.0	0	0	3
390.00	22	18.0	11	11	27
391.00	64	32.0	41	52	88
392.00	122	44.0	91	144	170

Device	Routing	Invert	Outlet Devices
#1	Primary	390.00'	8.0" Round Culvert X 2.00 L= 41.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 390.00' / 389.60' S= 0.0098 ' S= 0.0098 ' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=2.89 cfs @ 12.31 hrs HW=391.28' (Free Discharge)

↑**1=Culvert** (Inlet Controls 2.89 cfs @ 4.13 fps)

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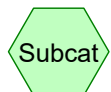
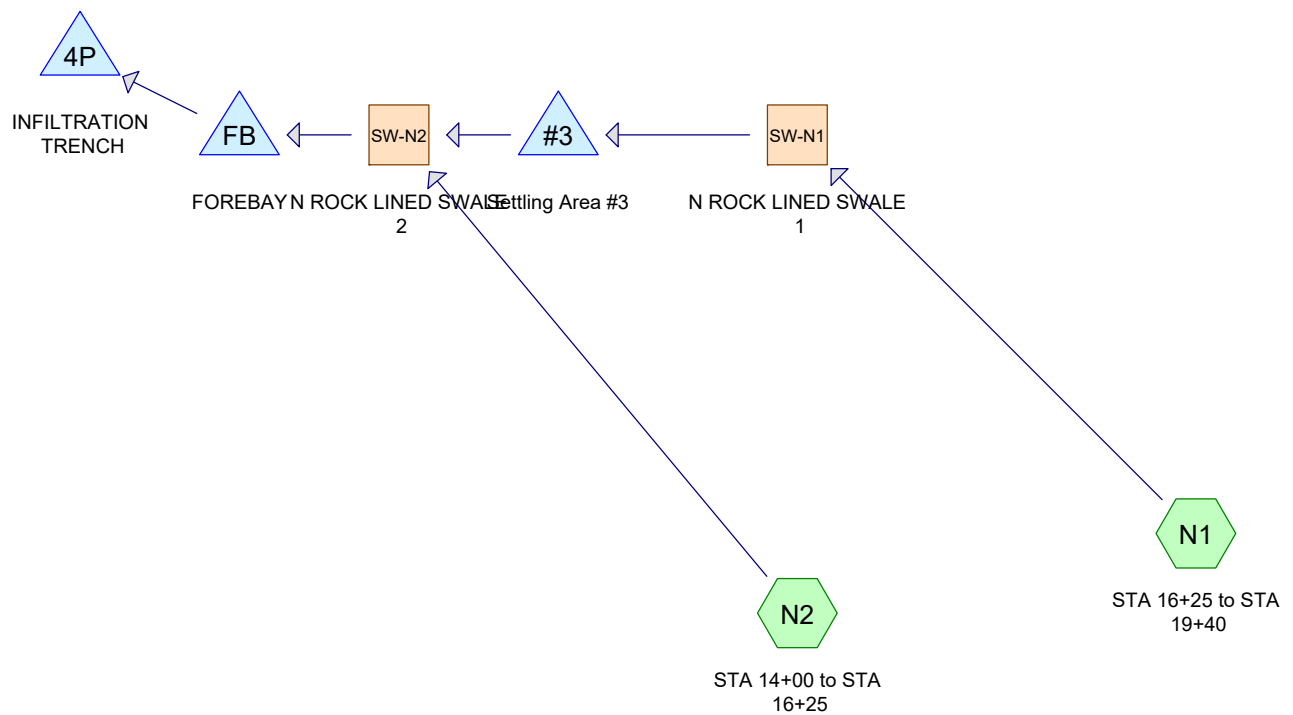
Type III 24-hr 25-yr Rainfall=6.12"

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Stage-Area-Storage for Pond #2: Settling Area #2

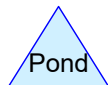
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
389.00	3	0	391.65	100	105
389.05	4	0	391.70	103	110
389.10	4	0	391.75	106	115
389.15	5	1	391.80	109	121
389.20	5	1	391.85	112	126
389.25	6	1	391.90	115	132
389.30	7	1	391.95	119	138
389.35	8	2	392.00	122	144
389.40	8	2			
389.45	9	3			
389.50	10	3			
389.55	11	4			
389.60	12	4			
389.65	13	5			
389.70	14	6			
389.75	16	6			
389.80	17	7			
389.85	18	8			
389.90	19	9			
389.95	21	10			
390.00	22	11			
390.05	24	12			
390.10	25	13			
390.15	27	15			
390.20	29	16			
390.25	30	18			
390.30	32	19			
390.35	34	21			
390.40	36	23			
390.45	38	24			
390.50	40	26			
390.55	42	28			
390.60	45	31			
390.65	47	33			
390.70	49	35			
390.75	51	38			
390.80	54	40			
390.85	56	43			
390.90	59	46			
390.95	61	49			
391.00	64	52			
391.05	66	55			
391.10	69	59			
391.15	72	62			
391.20	74	66			
391.25	77	70			
391.30	79	74			
391.35	82	78			
391.40	85	82			
391.45	88	86			
391.50	91	91			
391.55	94	95			
391.60	97	100			



Subcat



Reach



Pond



Link

Routing Diagram for 3085.00 - Colton EXISTING - BMP
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3085.00 - Colton EXISTING - BMP

Type III 24-hr 2-yr Rainfall=3.24"

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Page 2

Summary for Subcatchment N1: STA 16+25 to STA 19+40

Runoff = 0.48 cfs @ 12.28 hrs, Volume= 2,218 cf, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.24"

	Area (sf)	CN	Description
*	5,670	98	Impervious
	8,713	70	Woods, Good, HSG C
	900	89	Gravel roads, HSG C
	1,957	74	>75% Grass cover, Good, HSG C
	500	98	Unconnected roofs, HSG C
	17,740	81	Weighted Average
	11,570		65.22% Pervious Area
	6,170		34.78% Impervious Area
	500		8.10% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.9	50	0.0300	0.04		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.00"
0.8	210	0.0670	4.17		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
19.7	260	Total			

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Type III 24-hr 2-yr Rainfall=3.24"

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Summary for Subcatchment N2: STA 14+00 to STA 16+25

Runoff = 0.47 cfs @ 12.25 hrs, Volume= 2,133 cf, Depth= 1.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.24"

Area (sf)	CN	Description			
4,050	98	Impervious			
16,894	70	Woods, Good, HSG C			
303	98	Unconnected roofs, HSG C			
450	89	Gravel roads, HSG C			
21,697	76	Weighted Average			
17,344		79.94% Pervious Area			
4,353		20.06% Impervious Area			
303		6.96% Unconnected			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0420	0.05		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.00"
1.2	393	0.1100	5.34		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.7	443	Total			

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Type III 24-hr 2-yr Rainfall=3.24"

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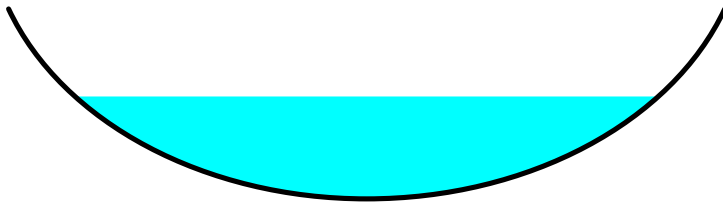
Summary for Reach SW-N1: N ROCK LINED SWALE 1

Inflow Area = 17,740 sf, 34.78% Impervious, Inflow Depth = 1.50" for 2-yr event
Inflow = 0.48 cfs @ 12.28 hrs, Volume= 2,218 cf
Outflow = 0.47 cfs @ 12.31 hrs, Volume= 2,218 cf, Atten= 2%, Lag= 2.1 min

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.80 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 0.67 fps, Avg. Travel Time= 7.5 min

Peak Storage= 79 cf @ 12.31 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 0.50' Flow Area= 0.7 sf, Capacity= 1.74 cfs

2.00' x 0.50' deep Parabolic Channel, n= 0.069 Riprap, 6-inch
Length= 300.0' Slope= 0.0767 '/'
Inlet Invert= 503.00', Outlet Invert= 480.00'



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Stage-Area-Storage for Reach SW-N1: N ROCK LINED SWALE 1

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
503.00	0.0	0
503.01	0.0	1
503.02	0.0	2
503.03	0.0	3
503.04	0.0	5
503.05	0.0	6
503.06	0.0	8
503.07	0.0	10
503.08	0.0	13
503.09	0.1	15
503.10	0.1	18
503.11	0.1	21
503.12	0.1	24
503.13	0.1	27
503.14	0.1	30
503.15	0.1	33
503.16	0.1	36
503.17	0.1	40
503.18	0.1	43
503.19	0.2	47
503.20	0.2	51
503.21	0.2	54
503.22	0.2	58
503.23	0.2	62
503.24	0.2	67
503.25	0.2	71
503.26	0.2	75
503.27	0.3	79
503.28	0.3	84
503.29	0.3	88
503.30	0.3	93
503.31	0.3	98
503.32	0.3	102
503.33	0.4	107
503.34	0.4	112
503.35	0.4	117
503.36	0.4	122
503.37	0.4	127
503.38	0.4	133
503.39	0.5	138
503.40	0.5	143
503.41	0.5	149
503.42	0.5	154
503.43	0.5	160
503.44	0.6	165
503.45	0.6	171
503.46	0.6	176
503.47	0.6	182
503.48	0.6	188
503.49	0.6	194
503.50	0.7	200

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Type III 24-hr 2-yr Rainfall=3.24"

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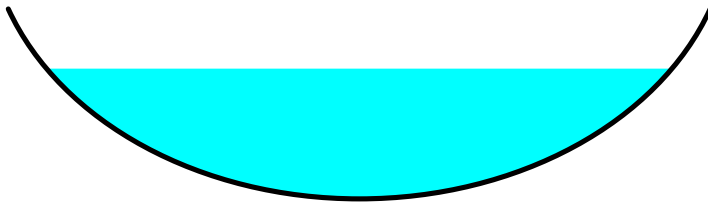
Summary for Reach SW-N2: N ROCK LINED SWALE 2

Inflow Area = 39,437 sf, 26.68% Impervious, Inflow Depth = 1.32" for 2-yr event
Inflow = 0.93 cfs @ 12.29 hrs, Volume= 4,345 cf
Outflow = 0.93 cfs @ 12.30 hrs, Volume= 4,345 cf, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.41 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 0.91 fps, Avg. Travel Time= 2.8 min

Peak Storage= 60 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.35'
Bank-Full Depth= 0.51' Flow Area= 0.7 sf, Capacity= 2.05 cfs

2.00' x 0.51' deep Parabolic Channel, n= 0.069 Riprap, 6-inch
Length= 155.0' Slope= 0.1000 '/
Inlet Invert= 470.50', Outlet Invert= 455.00'



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Stage-Area-Storage for Reach SW-N2: N ROCK LINED SWALE 2

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
470.50	0.0	0
470.51	0.0	0
470.52	0.0	1
470.53	0.0	2
470.54	0.0	2
470.55	0.0	3
470.56	0.0	4
470.57	0.0	5
470.58	0.0	7
470.59	0.1	8
470.60	0.1	9
470.61	0.1	11
470.62	0.1	12
470.63	0.1	14
470.64	0.1	15
470.65	0.1	17
470.66	0.1	19
470.67	0.1	20
470.68	0.1	22
470.69	0.2	24
470.70	0.2	26
470.71	0.2	28
470.72	0.2	30
470.73	0.2	32
470.74	0.2	34
470.75	0.2	36
470.76	0.2	38
470.77	0.3	41
470.78	0.3	43
470.79	0.3	45
470.80	0.3	48
470.81	0.3	50
470.82	0.3	52
470.83	0.4	55
470.84	0.4	57
470.85	0.4	60
470.86	0.4	63
470.87	0.4	65
470.88	0.4	68
470.89	0.5	70
470.90	0.5	73
470.91	0.5	76
470.92	0.5	79
470.93	0.5	82
470.94	0.5	84
470.95	0.6	87
470.96	0.6	90
470.97	0.6	93
470.98	0.6	96
470.99	0.6	99
471.00	0.7	102
471.01	0.7	105

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Summary for Pond #3: Settling Area #3

Inflow Area = 17,740 sf, 34.78% Impervious, Inflow Depth = 1.50" for 2-yr event
 Inflow = 0.47 cfs @ 12.31 hrs, Volume= 2,218 cf
 Outflow = 0.47 cfs @ 12.32 hrs, Volume= 2,211 cf, Atten= 0%, Lag= 0.2 min
 Primary = 0.47 cfs @ 12.32 hrs, Volume= 2,211 cf

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 476.83' @ 12.32 hrs Surf.Area= 27 sf Storage= 15 cf

Plug-Flow detention time= 3.4 min calculated for 2,211 cf (100% of inflow)
 Center-of-Mass det. time= 1.4 min (858.0 - 856.5)

Volume	Invert	Avail.Storage	Storage Description		
#1	476.00'	65 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
476.00	10	23.0	0	0	10
477.00	31	26.0	20	20	37
478.00	61	33.0	45	65	81

Device	Routing	Invert	Outlet Devices
#1	Primary	476.50'	6.0" Round Culvert X 2.00 L= 50.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 476.50' / 471.00' S= 0.1100 ' S Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.47 cfs @ 12.32 hrs HW=476.83' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.47 cfs @ 1.72 fps)

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Type III 24-hr 2-yr Rainfall=3.24"

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Stage-Area-Storage for Pond #3: Settling Area #3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
476.00	10	0	477.06	33	21
476.02	10	0	477.08	33	22
476.04	11	0	477.10	34	23
476.06	11	1	477.12	34	23
476.08	11	1	477.14	35	24
476.10	12	1	477.16	35	25
476.12	12	1	477.18	36	26
476.14	12	2	477.20	36	26
476.16	13	2	477.22	37	27
476.18	13	2	477.24	37	28
476.20	13	2	477.26	38	28
476.22	14	3	477.28	38	29
476.24	14	3	477.30	39	30
476.26	14	3	477.32	40	31
476.28	15	3	477.34	40	32
476.30	15	4	477.36	41	32
476.32	15	4	477.38	41	33
476.34	16	4	477.40	42	34
476.36	16	5	477.42	42	35
476.38	17	5	477.44	43	36
476.40	17	5	477.46	44	37
476.42	17	6	477.48	44	37
476.44	18	6	477.50	45	38
476.46	18	6	477.52	45	39
476.48	19	7	477.54	46	40
476.50	19	7	477.56	47	41
476.52	19	8	477.58	47	42
476.54	20	8	477.60	48	43
476.56	20	8	477.62	48	44
476.58	21	9	477.64	49	45
476.60	21	9	477.66	50	46
476.62	22	10	477.68	50	47
476.64	22	10	477.70	51	48
476.66	23	10	477.72	52	49
476.68	23	11	477.74	52	50
476.70	23	11	477.76	53	51
476.72	24	12	477.78	54	52
476.74	24	12	477.80	54	53
476.76	25	13	477.82	55	54
476.78	25	13	477.84	56	55
476.80	26	14	477.86	56	56
476.82	26	14	477.88	57	58
476.84	27	15	477.90	58	59
476.86	27	15	477.92	58	60
476.88	28	16	477.94	59	61
476.90	28	17	477.96	60	62
476.92	29	17	477.98	60	63
476.94	29	18	478.00	61	65
476.96	30	18			
476.98	30	19			
477.00	31	20			
477.02	32	20			
477.04	32	21			

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Summary for Pond 4P: INFILTRATION TRENCH

Inflow Area = 39,437 sf, 26.68% Impervious, Inflow Depth = 1.31" for 2-yr event
 Inflow = 0.93 cfs @ 12.30 hrs, Volume= 4,321 cf
 Outflow = 0.93 cfs @ 12.31 hrs, Volume= 4,205 cf, Atten= 0%, Lag= 0.2 min
 Primary = 0.93 cfs @ 12.31 hrs, Volume= 4,205 cf

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 450.73' @ 12.31 hrs Surf.Area= 275 sf Storage= 136 cf

Plug-Flow detention time= 20.9 min calculated for 4,204 cf (97% of inflow)
 Center-of-Mass det. time= 5.6 min (870.7 - 865.1)

Volume	Invert	Avail.Storage	Storage Description											
#1	449.50'	165 cf	Custom Stage Data (Irregular) Listed below (Recalc)											
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)				Cum.Store (cubic-feet)				Wet.Area (sq-ft)		
449.50	275	106.0	0.0	0				0				275		
451.00	275	111.0	40.0	165				165				459		
Device	Routing	Invert	Outlet Devices											
#1	Primary	450.56'	5.0' long x 2.0' breadth Broad-Crested Rectangular Weir											
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	
				2.50	3.00	3.50								
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88		
				2.85	3.07	3.20	3.32							

Primary OutFlow Max=0.93 cfs @ 12.31 hrs HW=450.73' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir** (Weir Controls 0.93 cfs @ 1.06 fps)

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Type III 24-hr 2-yr Rainfall=3.24"

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Stage-Area-Storage for Pond 4P: INFILTRATION TRENCH

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
449.50	275	0	450.56	275	117
449.52	275	2	450.58	275	119
449.54	275	4	450.60	275	121
449.56	275	7	450.62	275	123
449.58	275	9	450.64	275	125
449.60	275	11	450.66	275	128
449.62	275	13	450.68	275	130
449.64	275	15	450.70	275	132
449.66	275	18	450.72	275	134
449.68	275	20	450.74	275	136
449.70	275	22	450.76	275	139
449.72	275	24	450.78	275	141
449.74	275	26	450.80	275	143
449.76	275	29	450.82	275	145
449.78	275	31	450.84	275	147
449.80	275	33	450.86	275	150
449.82	275	35	450.88	275	152
449.84	275	37	450.90	275	154
449.86	275	40	450.92	275	156
449.88	275	42	450.94	275	158
449.90	275	44	450.96	275	161
449.92	275	46	450.98	275	163
449.94	275	48	451.00	275	165
449.96	275	51			
449.98	275	53			
450.00	275	55			
450.02	275	57			
450.04	275	59			
450.06	275	62			
450.08	275	64			
450.10	275	66			
450.12	275	68			
450.14	275	70			
450.16	275	73			
450.18	275	75			
450.20	275	77			
450.22	275	79			
450.24	275	81			
450.26	275	84			
450.28	275	86			
450.30	275	88			
450.32	275	90			
450.34	275	92			
450.36	275	95			
450.38	275	97			
450.40	275	99			
450.42	275	101			
450.44	275	103			
450.46	275	106			
450.48	275	108			
450.50	275	110			
450.52	275	112			
450.54	275	114			

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Type III 24-hr 2-yr Rainfall=3.24"

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Summary for Pond FB: FOREBAY

Inflow Area = 39,437 sf, 26.68% Impervious, Inflow Depth = 1.32" for 2-yr event
 Inflow = 0.93 cfs @ 12.30 hrs, Volume= 4,345 cf
 Outflow = 0.93 cfs @ 12.30 hrs, Volume= 4,321 cf, Atten= 0%, Lag= 0.1 min
 Primary = 0.93 cfs @ 12.30 hrs, Volume= 4,321 cf

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 454.67' @ 12.30 hrs Surf.Area= 49 sf Storage= 31 cf

Plug-Flow detention time= 4.6 min calculated for 4,320 cf (99% of inflow)
 Center-of-Mass det. time= 1.4 min (865.1 - 863.7)

Volume	Invert	Avail.Storage	Storage Description			
#1	453.00'	51 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
453.00	5	6.0	0	0	5	
454.00	16	17.0	10	10	28	
455.00	72	36.0	41	51	113	

Device	Routing	Invert	Outlet Devices											
#1	Primary	454.50'	5.0' long x 2.0' breadth Broad-Crested Rectangular Weir											
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	
				2.50	3.00	3.50								
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88		
				2.85	3.07	3.20	3.32							

Primary OutFlow Max=0.93 cfs @ 12.30 hrs HW=454.67' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir** (Weir Controls 0.93 cfs @ 1.06 fps)

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Type III 24-hr 2-yr Rainfall=3.24"

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Stage-Area-Storage for Pond FB: FOREBAY

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
453.00	5	0	454.06	18	11
453.02	5	0	454.08	19	11
453.04	5	0	454.10	20	12
453.06	5	0	454.12	21	12
453.08	6	0	454.14	21	13
453.10	6	1	454.16	22	13
453.12	6	1	454.18	23	13
453.14	6	1	454.20	24	14
453.16	6	1	454.22	25	14
453.18	7	1	454.24	26	15
453.20	7	1	454.26	27	15
453.22	7	1	454.28	28	16
453.24	7	1	454.30	29	17
453.26	7	2	454.32	30	17
453.28	7	2	454.34	31	18
453.30	8	2	454.36	32	18
453.32	8	2	454.38	33	19
453.34	8	2	454.40	34	20
453.36	8	2	454.42	35	20
453.38	8	3	454.44	36	21
453.40	9	3	454.46	37	22
453.42	9	3	454.48	38	23
453.44	9	3	454.50	39	23
453.46	9	3	454.52	40	24
453.48	10	3	454.54	41	25
453.50	10	4	454.56	42	26
453.52	10	4	454.58	44	27
453.54	10	4	454.60	45	27
453.56	10	4	454.62	46	28
453.58	11	4	454.64	47	29
453.60	11	5	454.66	48	30
453.62	11	5	454.68	50	31
453.64	11	5	454.70	51	32
453.66	12	5	454.72	52	33
453.68	12	6	454.74	54	34
453.70	12	6	454.76	55	35
453.72	12	6	454.78	56	37
453.74	13	6	454.80	58	38
453.76	13	7	454.82	59	39
453.78	13	7	454.84	60	40
453.80	13	7	454.86	62	41
453.82	14	7	454.88	63	43
453.84	14	8	454.90	65	44
453.86	14	8	454.92	66	45
453.88	14	8	454.94	68	46
453.90	15	8	454.96	69	48
453.92	15	9	454.98	70	49
453.94	15	9	455.00	72	51
453.96	15	9			
453.98	16	10			
454.00	16	10			
454.02	17	10			
454.04	17	11			

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Summary for Subcatchment N1: STA 16+25 to STA 19+40

Runoff = 0.97 cfs @ 12.28 hrs, Volume= 4,426 cf, Depth= 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.01"

	Area (sf)	CN	Description		
*	5,670	98	Impervious		
	8,713	70	Woods, Good, HSG C		
	900	89	Gravel roads, HSG C		
	1,957	74	>75% Grass cover, Good, HSG C		
	500	98	Unconnected roofs, HSG C		
	17,740	81	Weighted Average		
	11,570		65.22% Pervious Area		
	6,170		34.78% Impervious Area		
	500		8.10% Unconnected		
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.9	50	0.0300	0.04		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.00"
0.8	210	0.0670	4.17		
					Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
19.7	260	Total			

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Type III 24-hr 10-yr Rainfall=5.01"

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Summary for Subcatchment N2: STA 14+00 to STA 16+25

Runoff = 1.05 cfs @ 12.25 hrs, Volume= 4,599 cf, Depth= 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.01"

Area (sf)	CN	Description			
4,050	98	Impervious			
16,894	70	Woods, Good, HSG C			
303	98	Unconnected roofs, HSG C			
450	89	Gravel roads, HSG C			
21,697	76	Weighted Average			
17,344		79.94% Pervious Area			
4,353		20.06% Impervious Area			
303		6.96% Unconnected			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0420	0.05		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.00"
1.2	393	0.1100	5.34		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.7	443	Total			

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Type III 24-hr 10-yr Rainfall=5.01"

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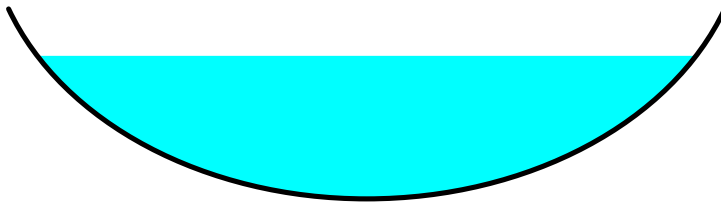
Summary for Reach SW-N1: N ROCK LINED SWALE 1

Inflow Area = 17,740 sf, 34.78% Impervious, Inflow Depth = 2.99" for 10-yr event
Inflow = 0.97 cfs @ 12.28 hrs, Volume= 4,426 cf
Outflow = 0.96 cfs @ 12.30 hrs, Volume= 4,426 cf, Atten= 1%, Lag= 1.3 min

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.21 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 0.78 fps, Avg. Travel Time= 6.4 min

Peak Storage= 130 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.38'
Bank-Full Depth= 0.50' Flow Area= 0.7 sf, Capacity= 1.74 cfs

2.00' x 0.50' deep Parabolic Channel, n= 0.069 Riprap, 6-inch
Length= 300.0' Slope= 0.0767 '/'
Inlet Invert= 503.00', Outlet Invert= 480.00'



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Stage-Area-Storage for Reach SW-N1: N ROCK LINED SWALE 1

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
503.00	0.0	0
503.01	0.0	1
503.02	0.0	2
503.03	0.0	3
503.04	0.0	5
503.05	0.0	6
503.06	0.0	8
503.07	0.0	10
503.08	0.0	13
503.09	0.1	15
503.10	0.1	18
503.11	0.1	21
503.12	0.1	24
503.13	0.1	27
503.14	0.1	30
503.15	0.1	33
503.16	0.1	36
503.17	0.1	40
503.18	0.1	43
503.19	0.2	47
503.20	0.2	51
503.21	0.2	54
503.22	0.2	58
503.23	0.2	62
503.24	0.2	67
503.25	0.2	71
503.26	0.2	75
503.27	0.3	79
503.28	0.3	84
503.29	0.3	88
503.30	0.3	93
503.31	0.3	98
503.32	0.3	102
503.33	0.4	107
503.34	0.4	112
503.35	0.4	117
503.36	0.4	122
503.37	0.4	127
503.38	0.4	133
503.39	0.5	138
503.40	0.5	143
503.41	0.5	149
503.42	0.5	154
503.43	0.5	160
503.44	0.6	165
503.45	0.6	171
503.46	0.6	176
503.47	0.6	182
503.48	0.6	188
503.49	0.6	194
503.50	0.7	200

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Type III 24-hr 10-yr Rainfall=5.01"

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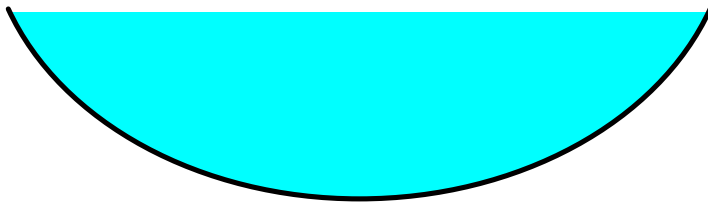
Summary for Reach SW-N2: N ROCK LINED SWALE 2

Inflow Area = 39,437 sf, 26.68% Impervious, Inflow Depth = 2.74" for 10-yr event
Inflow = 1.98 cfs @ 12.27 hrs, Volume= 9,019 cf
Outflow = 1.98 cfs @ 12.29 hrs, Volume= 9,019 cf, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.99 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.08 fps, Avg. Travel Time= 2.4 min

Peak Storage= 103 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.50'
Bank-Full Depth= 0.51' Flow Area= 0.7 sf, Capacity= 2.05 cfs

2.00' x 0.51' deep Parabolic Channel, n= 0.069 Riprap, 6-inch
Length= 155.0' Slope= 0.1000 '/
Inlet Invert= 470.50', Outlet Invert= 455.00'



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Stage-Area-Storage for Reach SW-N2: N ROCK LINED SWALE 2

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
470.50	0.0	0
470.51	0.0	0
470.52	0.0	1
470.53	0.0	2
470.54	0.0	2
470.55	0.0	3
470.56	0.0	4
470.57	0.0	5
470.58	0.0	7
470.59	0.1	8
470.60	0.1	9
470.61	0.1	11
470.62	0.1	12
470.63	0.1	14
470.64	0.1	15
470.65	0.1	17
470.66	0.1	19
470.67	0.1	20
470.68	0.1	22
470.69	0.2	24
470.70	0.2	26
470.71	0.2	28
470.72	0.2	30
470.73	0.2	32
470.74	0.2	34
470.75	0.2	36
470.76	0.2	38
470.77	0.3	41
470.78	0.3	43
470.79	0.3	45
470.80	0.3	48
470.81	0.3	50
470.82	0.3	52
470.83	0.4	55
470.84	0.4	57
470.85	0.4	60
470.86	0.4	63
470.87	0.4	65
470.88	0.4	68
470.89	0.5	70
470.90	0.5	73
470.91	0.5	76
470.92	0.5	79
470.93	0.5	82
470.94	0.5	84
470.95	0.6	87
470.96	0.6	90
470.97	0.6	93
470.98	0.6	96
470.99	0.6	99
471.00	0.7	102
471.01	0.7	105

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Type III 24-hr 10-yr Rainfall=5.01"

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Summary for Pond #3: Settling Area #3

Inflow Area = 17,740 sf, 34.78% Impervious, Inflow Depth = 2.99" for 10-yr event
 Inflow = 0.96 cfs @ 12.30 hrs, Volume= 4,426 cf
 Outflow = 0.96 cfs @ 12.30 hrs, Volume= 4,419 cf, Atten= 0%, Lag= 0.4 min
 Primary = 0.96 cfs @ 12.30 hrs, Volume= 4,419 cf

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 477.08' @ 12.30 hrs Surf.Area= 33 sf Storage= 22 cf

Plug-Flow detention time= 2.1 min calculated for 4,419 cf (100% of inflow)
 Center-of-Mass det. time= 1.0 min (836.8 - 835.8)

Volume	Invert	Avail.Storage	Storage Description		
#1	476.00'	65 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
476.00	10	23.0	0	0	10
477.00	31	26.0	20	20	37
478.00	61	33.0	45	65	81

Device	Routing	Invert	Outlet Devices
#1	Primary	476.50'	6.0" Round Culvert X 2.00 L= 50.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 476.50' / 471.00' S= 0.1100 ' S Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.96 cfs @ 12.30 hrs HW=477.08' (Free Discharge)
 ↑1=Culvert (Inlet Controls 0.96 cfs @ 2.44 fps)

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Type III 24-hr 10-yr Rainfall=5.01"

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Stage-Area-Storage for Pond #3: Settling Area #3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
476.00	10	0	477.06	33	21
476.02	10	0	477.08	33	22
476.04	11	0	477.10	34	23
476.06	11	1	477.12	34	23
476.08	11	1	477.14	35	24
476.10	12	1	477.16	35	25
476.12	12	1	477.18	36	26
476.14	12	2	477.20	36	26
476.16	13	2	477.22	37	27
476.18	13	2	477.24	37	28
476.20	13	2	477.26	38	28
476.22	14	3	477.28	38	29
476.24	14	3	477.30	39	30
476.26	14	3	477.32	40	31
476.28	15	3	477.34	40	32
476.30	15	4	477.36	41	32
476.32	15	4	477.38	41	33
476.34	16	4	477.40	42	34
476.36	16	5	477.42	42	35
476.38	17	5	477.44	43	36
476.40	17	5	477.46	44	37
476.42	17	6	477.48	44	37
476.44	18	6	477.50	45	38
476.46	18	6	477.52	45	39
476.48	19	7	477.54	46	40
476.50	19	7	477.56	47	41
476.52	19	8	477.58	47	42
476.54	20	8	477.60	48	43
476.56	20	8	477.62	48	44
476.58	21	9	477.64	49	45
476.60	21	9	477.66	50	46
476.62	22	10	477.68	50	47
476.64	22	10	477.70	51	48
476.66	23	10	477.72	52	49
476.68	23	11	477.74	52	50
476.70	23	11	477.76	53	51
476.72	24	12	477.78	54	52
476.74	24	12	477.80	54	53
476.76	25	13	477.82	55	54
476.78	25	13	477.84	56	55
476.80	26	14	477.86	56	56
476.82	26	14	477.88	57	58
476.84	27	15	477.90	58	59
476.86	27	15	477.92	58	60
476.88	28	16	477.94	59	61
476.90	28	17	477.96	60	62
476.92	29	17	477.98	60	63
476.94	29	18	478.00	61	65
476.96	30	18			
476.98	30	19			
477.00	31	20			
477.02	32	20			
477.04	32	21			

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Summary for Pond 4P: INFILTRATION TRENCH

Inflow Area = 39,437 sf, 26.68% Impervious, Inflow Depth = 2.74" for 10-yr event
 Inflow = 1.98 cfs @ 12.29 hrs, Volume= 8,995 cf
 Outflow = 1.98 cfs @ 12.29 hrs, Volume= 8,879 cf, Atten= 0%, Lag= 0.2 min
 Primary = 1.98 cfs @ 12.29 hrs, Volume= 8,879 cf

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 450.85' @ 12.29 hrs Surf.Area= 275 sf Storage= 148 cf

Plug-Flow detention time= 11.7 min calculated for 8,879 cf (99% of inflow)
 Center-of-Mass det. time= 3.8 min (846.3 - 842.5)

Volume	Invert	Avail.Storage	Storage Description												
#1	449.50'	165 cf	Custom Stage Data (Irregular) Listed below (Recalc)												
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)				Cum.Store (cubic-feet)				Wet.Area (sq-ft)			
449.50	275	106.0	0.0	0				0				275			
451.00	275	111.0	40.0	165				165				459			
Device	Routing	Invert	Outlet Devices												
#1	Primary	450.56'	5.0' long x 2.0' breadth Broad-Crested Rectangular Weir												
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00		
			2.50	3.00	3.50										
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88			
			2.85	3.07	3.20	3.32									

Primary OutFlow Max=1.98 cfs @ 12.29 hrs HW=450.85' (Free Discharge)
 ↑1=**Broad-Crested Rectangular Weir** (Weir Controls 1.98 cfs @ 1.38 fps)

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Type III 24-hr 10-yr Rainfall=5.01"

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Stage-Area-Storage for Pond 4P: INFILTRATION TRENCH

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
449.50	275	0	450.56	275	117
449.52	275	2	450.58	275	119
449.54	275	4	450.60	275	121
449.56	275	7	450.62	275	123
449.58	275	9	450.64	275	125
449.60	275	11	450.66	275	128
449.62	275	13	450.68	275	130
449.64	275	15	450.70	275	132
449.66	275	18	450.72	275	134
449.68	275	20	450.74	275	136
449.70	275	22	450.76	275	139
449.72	275	24	450.78	275	141
449.74	275	26	450.80	275	143
449.76	275	29	450.82	275	145
449.78	275	31	450.84	275	147
449.80	275	33	450.86	275	150
449.82	275	35	450.88	275	152
449.84	275	37	450.90	275	154
449.86	275	40	450.92	275	156
449.88	275	42	450.94	275	158
449.90	275	44	450.96	275	161
449.92	275	46	450.98	275	163
449.94	275	48	451.00	275	165
449.96	275	51			
449.98	275	53			
450.00	275	55			
450.02	275	57			
450.04	275	59			
450.06	275	62			
450.08	275	64			
450.10	275	66			
450.12	275	68			
450.14	275	70			
450.16	275	73			
450.18	275	75			
450.20	275	77			
450.22	275	79			
450.24	275	81			
450.26	275	84			
450.28	275	86			
450.30	275	88			
450.32	275	90			
450.34	275	92			
450.36	275	95			
450.38	275	97			
450.40	275	99			
450.42	275	101			
450.44	275	103			
450.46	275	106			
450.48	275	108			
450.50	275	110			
450.52	275	112			
450.54	275	114			

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Type III 24-hr 10-yr Rainfall=5.01"

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Summary for Pond FB: FOREBAY

Inflow Area = 39,437 sf, 26.68% Impervious, Inflow Depth = 2.74" for 10-yr event
 Inflow = 1.98 cfs @ 12.29 hrs, Volume= 9,019 cf
 Outflow = 1.98 cfs @ 12.29 hrs, Volume= 8,995 cf, Atten= 0%, Lag= 0.1 min
 Primary = 1.98 cfs @ 12.29 hrs, Volume= 8,995 cf

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 454.79' @ 12.29 hrs Surf.Area= 57 sf Storage= 37 cf

Plug-Flow detention time= 2.6 min calculated for 8,993 cf (100% of inflow)
 Center-of-Mass det. time= 1.0 min (842.5 - 841.5)

Volume	Invert	Avail.Storage	Storage Description			
#1	453.00'	51 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
453.00	5	6.0	0	0	5	
454.00	16	17.0	10	10	28	
455.00	72	36.0	41	51	113	

Device	Routing	Invert	Outlet Devices										
#1	Primary	454.50'	5.0' long x 2.0' breadth Broad-Crested Rectangular Weir										
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00
				2.50	3.00	3.50							
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88	
				2.85	3.07	3.20	3.32						

Primary OutFlow Max=1.98 cfs @ 12.29 hrs HW=454.79' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir** (Weir Controls 1.98 cfs @ 1.38 fps)

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Type III 24-hr 10-yr Rainfall=5.01"

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Stage-Area-Storage for Pond FB: FOREBAY

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
453.00	5	0	454.06	18	11
453.02	5	0	454.08	19	11
453.04	5	0	454.10	20	12
453.06	5	0	454.12	21	12
453.08	6	0	454.14	21	13
453.10	6	1	454.16	22	13
453.12	6	1	454.18	23	13
453.14	6	1	454.20	24	14
453.16	6	1	454.22	25	14
453.18	7	1	454.24	26	15
453.20	7	1	454.26	27	15
453.22	7	1	454.28	28	16
453.24	7	1	454.30	29	17
453.26	7	2	454.32	30	17
453.28	7	2	454.34	31	18
453.30	8	2	454.36	32	18
453.32	8	2	454.38	33	19
453.34	8	2	454.40	34	20
453.36	8	2	454.42	35	20
453.38	8	3	454.44	36	21
453.40	9	3	454.46	37	22
453.42	9	3	454.48	38	23
453.44	9	3	454.50	39	23
453.46	9	3	454.52	40	24
453.48	10	3	454.54	41	25
453.50	10	4	454.56	42	26
453.52	10	4	454.58	44	27
453.54	10	4	454.60	45	27
453.56	10	4	454.62	46	28
453.58	11	4	454.64	47	29
453.60	11	5	454.66	48	30
453.62	11	5	454.68	50	31
453.64	11	5	454.70	51	32
453.66	12	5	454.72	52	33
453.68	12	6	454.74	54	34
453.70	12	6	454.76	55	35
453.72	12	6	454.78	56	37
453.74	13	6	454.80	58	38
453.76	13	7	454.82	59	39
453.78	13	7	454.84	60	40
453.80	13	7	454.86	62	41
453.82	14	7	454.88	63	43
453.84	14	8	454.90	65	44
453.86	14	8	454.92	66	45
453.88	14	8	454.94	68	46
453.90	15	8	454.96	69	48
453.92	15	9	454.98	70	49
453.94	15	9	455.00	72	51
453.96	15	9			
453.98	16	10			
454.00	16	10			
454.02	17	10			
454.04	17	11			

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Summary for Subcatchment N1: STA 16+25 to STA 19+40

Runoff = 1.29 cfs @ 12.27 hrs, Volume= 5,903 cf, Depth= 3.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.12"

	Area (sf)	CN	Description
*	5,670	98	Impervious
	8,713	70	Woods, Good, HSG C
	900	89	Gravel roads, HSG C
	1,957	74	>75% Grass cover, Good, HSG C
	500	98	Unconnected roofs, HSG C
	17,740	81	Weighted Average
	11,570		65.22% Pervious Area
	6,170		34.78% Impervious Area
	500		8.10% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.9	50	0.0300	0.04		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.00"
0.8	210	0.0670	4.17		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
19.7	260	Total			

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Summary for Subcatchment N2: STA 14+00 to STA 16+25

Runoff = 1.44 cfs @ 12.25 hrs, Volume= 6,299 cf, Depth= 3.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-yr Rainfall=6.12"

Area (sf)	CN	Description
4,050	98	Impervious
16,894	70	Woods, Good, HSG C
303	98	Unconnected roofs, HSG C
450	89	Gravel roads, HSG C
21,697	76	Weighted Average
17,344		79.94% Pervious Area
4,353		20.06% Impervious Area
303		6.96% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0420	0.05		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.00"
1.2	393	0.1100	5.34		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.7	443	Total			

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Summary for Pond #3: Settling Area #3

Inflow Area = 17,740 sf, 34.78% Impervious, Inflow Depth = 3.99" for 25-yr event
 Inflow = 1.28 cfs @ 12.29 hrs, Volume= 5,903 cf
 Outflow = 1.27 cfs @ 12.30 hrs, Volume= 5,896 cf, Atten= 0%, Lag= 0.6 min
 Primary = 1.27 cfs @ 12.30 hrs, Volume= 5,896 cf

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 477.33' @ 12.30 hrs Surf.Area= 40 sf Storage= 31 cf

Plug-Flow detention time= 1.8 min calculated for 5,896 cf (100% of inflow)
 Center-of-Mass det. time= 0.9 min (828.2 - 827.3)

Volume	Invert	Avail.Storage	Storage Description		
#1	476.00'	65 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
476.00	10	23.0	0	0	10
477.00	31	26.0	20	20	37
478.00	61	33.0	45	65	81

Device	Routing	Invert	Outlet Devices
#1	Primary	476.50'	6.0" Round Culvert X 2.00 L= 50.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 476.50' / 471.00' S= 0.1100 ' S Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=1.27 cfs @ 12.30 hrs HW=477.33' (Free Discharge)
 ↑1=Culvert (Inlet Controls 1.27 cfs @ 3.24 fps)

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Type III 24-hr 25-yr Rainfall=6.12"

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Stage-Area-Storage for Pond #3: Settling Area #3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
476.00	10	0	477.06	33	21
476.02	10	0	477.08	33	22
476.04	11	0	477.10	34	23
476.06	11	1	477.12	34	23
476.08	11	1	477.14	35	24
476.10	12	1	477.16	35	25
476.12	12	1	477.18	36	26
476.14	12	2	477.20	36	26
476.16	13	2	477.22	37	27
476.18	13	2	477.24	37	28
476.20	13	2	477.26	38	28
476.22	14	3	477.28	38	29
476.24	14	3	477.30	39	30
476.26	14	3	477.32	40	31
476.28	15	3	477.34	40	32
476.30	15	4	477.36	41	32
476.32	15	4	477.38	41	33
476.34	16	4	477.40	42	34
476.36	16	5	477.42	42	35
476.38	17	5	477.44	43	36
476.40	17	5	477.46	44	37
476.42	17	6	477.48	44	37
476.44	18	6	477.50	45	38
476.46	18	6	477.52	45	39
476.48	19	7	477.54	46	40
476.50	19	7	477.56	47	41
476.52	19	8	477.58	47	42
476.54	20	8	477.60	48	43
476.56	20	8	477.62	48	44
476.58	21	9	477.64	49	45
476.60	21	9	477.66	50	46
476.62	22	10	477.68	50	47
476.64	22	10	477.70	51	48
476.66	23	10	477.72	52	49
476.68	23	11	477.74	52	50
476.70	23	11	477.76	53	51
476.72	24	12	477.78	54	52
476.74	24	12	477.80	54	53
476.76	25	13	477.82	55	54
476.78	25	13	477.84	56	55
476.80	26	14	477.86	56	56
476.82	26	14	477.88	57	58
476.84	27	15	477.90	58	59
476.86	27	15	477.92	58	60
476.88	28	16	477.94	59	61
476.90	28	17	477.96	60	62
476.92	29	17	477.98	60	63
476.94	29	18	478.00	61	65
476.96	30	18			
476.98	30	19			
477.00	31	20			
477.02	32	20			
477.04	32	21			

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Type III 24-hr 25-yr Rainfall=6.12"

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Summary for Pond 4P: INFILTRATION TRENCH

Inflow Area = 39,437 sf, 26.68% Impervious, Inflow Depth = 3.70" for 25-yr event
 Inflow = 2.67 cfs @ 12.28 hrs, Volume= 12,172 cf
 Outflow = 2.67 cfs @ 12.28 hrs, Volume= 12,055 cf, Atten= 0%, Lag= 0.1 min
 Primary = 2.67 cfs @ 12.28 hrs, Volume= 12,055 cf

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 450.91' @ 12.28 hrs Surf.Area= 275 sf Storage= 155 cf

Plug-Flow detention time= 9.2 min calculated for 12,055 cf (99% of inflow)
 Center-of-Mass det. time= 3.3 min (836.7 - 833.4)

Volume	Invert	Avail.Storage	Storage Description												
#1	449.50'	165 cf	Custom Stage Data (Irregular) Listed below (Recalc)												
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)				Cum.Store (cubic-feet)				Wet.Area (sq-ft)			
449.50	275	106.0	0.0	0				0				275			
451.00	275	111.0	40.0	165				165				459			
Device	Routing	Invert	Outlet Devices												
#1	Primary	450.56'	5.0' long x 2.0' breadth Broad-Crested Rectangular Weir												
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00		
			2.50	3.00	3.50										
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88			
			2.85	3.07	3.20	3.32									

Primary OutFlow Max=2.67 cfs @ 12.28 hrs HW=450.91' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir** (Weir Controls 2.67 cfs @ 1.53 fps)

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Type III 24-hr 25-yr Rainfall=6.12"

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Stage-Area-Storage for Pond 4P: INFILTRATION TRENCH

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
449.50	275	0	450.56	275	117
449.52	275	2	450.58	275	119
449.54	275	4	450.60	275	121
449.56	275	7	450.62	275	123
449.58	275	9	450.64	275	125
449.60	275	11	450.66	275	128
449.62	275	13	450.68	275	130
449.64	275	15	450.70	275	132
449.66	275	18	450.72	275	134
449.68	275	20	450.74	275	136
449.70	275	22	450.76	275	139
449.72	275	24	450.78	275	141
449.74	275	26	450.80	275	143
449.76	275	29	450.82	275	145
449.78	275	31	450.84	275	147
449.80	275	33	450.86	275	150
449.82	275	35	450.88	275	152
449.84	275	37	450.90	275	154
449.86	275	40	450.92	275	156
449.88	275	42	450.94	275	158
449.90	275	44	450.96	275	161
449.92	275	46	450.98	275	163
449.94	275	48	451.00	275	165
449.96	275	51			
449.98	275	53			
450.00	275	55			
450.02	275	57			
450.04	275	59			
450.06	275	62			
450.08	275	64			
450.10	275	66			
450.12	275	68			
450.14	275	70			
450.16	275	73			
450.18	275	75			
450.20	275	77			
450.22	275	79			
450.24	275	81			
450.26	275	84			
450.28	275	86			
450.30	275	88			
450.32	275	90			
450.34	275	92			
450.36	275	95			
450.38	275	97			
450.40	275	99			
450.42	275	101			
450.44	275	103			
450.46	275	106			
450.48	275	108			
450.50	275	110			
450.52	275	112			
450.54	275	114			

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Type III 24-hr 25-yr Rainfall=6.12"

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Summary for Pond FB: FOREBAY

Inflow Area = 39,437 sf, 26.68% Impervious, Inflow Depth = 3.71" for 25-yr event
 Inflow = 2.67 cfs @ 12.28 hrs, Volume= 12,195 cf
 Outflow = 2.67 cfs @ 12.28 hrs, Volume= 12,172 cf, Atten= 0%, Lag= 0.1 min
 Primary = 2.67 cfs @ 12.28 hrs, Volume= 12,172 cf

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 454.85' @ 12.28 hrs Surf.Area= 61 sf Storage= 41 cf

Plug-Flow detention time= 2.0 min calculated for 12,169 cf (100% of inflow)
 Center-of-Mass det. time= 0.8 min (833.4 - 832.6)

Volume	Invert	Avail.Storage	Storage Description			
#1	453.00'	51 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
453.00	5	6.0	0	0	5	
454.00	16	17.0	10	10	28	
455.00	72	36.0	41	51	113	

Device	Routing	Invert	Outlet Devices											
#1	Primary	454.50'	5.0' long x 2.0' breadth Broad-Crested Rectangular Weir											
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	
				2.50	3.00	3.50								
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88		
				2.85	3.07	3.20	3.32							

Primary OutFlow Max=2.67 cfs @ 12.28 hrs HW=454.85' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir** (Weir Controls 2.67 cfs @ 1.53 fps)

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Type III 24-hr 25-yr Rainfall=6.12"

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Stage-Area-Storage for Pond FB: FOREBAY

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
453.00	5	0	454.06	18	11
453.02	5	0	454.08	19	11
453.04	5	0	454.10	20	12
453.06	5	0	454.12	21	12
453.08	6	0	454.14	21	13
453.10	6	1	454.16	22	13
453.12	6	1	454.18	23	13
453.14	6	1	454.20	24	14
453.16	6	1	454.22	25	14
453.18	7	1	454.24	26	15
453.20	7	1	454.26	27	15
453.22	7	1	454.28	28	16
453.24	7	1	454.30	29	17
453.26	7	2	454.32	30	17
453.28	7	2	454.34	31	18
453.30	8	2	454.36	32	18
453.32	8	2	454.38	33	19
453.34	8	2	454.40	34	20
453.36	8	2	454.42	35	20
453.38	8	3	454.44	36	21
453.40	9	3	454.46	37	22
453.42	9	3	454.48	38	23
453.44	9	3	454.50	39	23
453.46	9	3	454.52	40	24
453.48	10	3	454.54	41	25
453.50	10	4	454.56	42	26
453.52	10	4	454.58	44	27
453.54	10	4	454.60	45	27
453.56	10	4	454.62	46	28
453.58	11	4	454.64	47	29
453.60	11	5	454.66	48	30
453.62	11	5	454.68	50	31
453.64	11	5	454.70	51	32
453.66	12	5	454.72	52	33
453.68	12	6	454.74	54	34
453.70	12	6	454.76	55	35
453.72	12	6	454.78	56	37
453.74	13	6	454.80	58	38
453.76	13	7	454.82	59	39
453.78	13	7	454.84	60	40
453.80	13	7	454.86	62	41
453.82	14	7	454.88	63	43
453.84	14	8	454.90	65	44
453.86	14	8	454.92	66	45
453.88	14	8	454.94	68	46
453.90	15	8	454.96	69	48
453.92	15	9	454.98	70	49
453.94	15	9	455.00	72	51
453.96	15	9			
453.98	16	10			
454.00	16	10			
454.02	17	10			
454.04	17	11			

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Type III 24-hr 100-yr Rainfall=7.82"

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Summary for Subcatchment N1: STA 16+25 to STA 19+40

Runoff = 1.78 cfs @ 12.26 hrs, Volume= 8,238 cf, Depth= 5.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.82"

	Area (sf)	CN	Description		
*	5,670	98	Impervious		
	8,713	70	Woods, Good, HSG C		
	900	89	Gravel roads, HSG C		
	1,957	74	>75% Grass cover, Good, HSG C		
	500	98	Unconnected roofs, HSG C		
	17,740	81	Weighted Average		
	11,570		65.22% Pervious Area		
	6,170		34.78% Impervious Area		
	500		8.10% Unconnected		
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.9	50	0.0300	0.04		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.00"
0.8	210	0.0670	4.17		
					Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
19.7	260	Total			

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Summary for Subcatchment N2: STA 14+00 to STA 16+25

Runoff = 2.06 cfs @ 12.24 hrs, Volume= 9,030 cf, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.82"

Area (sf)	CN	Description
4,050	98	Impervious
16,894	70	Woods, Good, HSG C
303	98	Unconnected roofs, HSG C
450	89	Gravel roads, HSG C
21,697	76	Weighted Average
17,344		79.94% Pervious Area
4,353		20.06% Impervious Area
303		6.96% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0420	0.05		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.00"
1.2	393	0.1100	5.34		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.7	443	Total			

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Summary for Pond #3: Settling Area #3

Inflow Area = 17,740 sf, 34.78% Impervious, Inflow Depth = 5.57" for 100-yr event
 Inflow = 1.77 cfs @ 12.29 hrs, Volume= 8,238 cf
 Outflow = 1.76 cfs @ 12.31 hrs, Volume= 8,231 cf, Atten= 1%, Lag= 1.1 min
 Primary = 1.76 cfs @ 12.31 hrs, Volume= 8,231 cf

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 477.86' @ 12.31 hrs Surf.Area= 56 sf Storage= 57 cf

Plug-Flow detention time= 1.4 min calculated for 8,229 cf (100% of inflow)
 Center-of-Mass det. time= 0.8 min (818.3 - 817.5)

Volume	Invert	Avail.Storage	Storage Description		
#1	476.00'	65 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
476.00	10	23.0	0	0	10
477.00	31	26.0	20	20	37
478.00	61	33.0	45	65	81

Device	Routing	Invert	Outlet Devices
#1	Primary	476.50'	6.0" Round Culvert X 2.00 L= 50.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 476.50' / 471.00' S= 0.1100 ' S= 0.1100 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=1.76 cfs @ 12.31 hrs HW=477.86' (Free Discharge)

↑1=Culvert (Inlet Controls 1.76 cfs @ 4.48 fps)

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Stage-Area-Storage for Pond #3: Settling Area #3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
476.00	10	0	477.06	33	21
476.02	10	0	477.08	33	22
476.04	11	0	477.10	34	23
476.06	11	1	477.12	34	23
476.08	11	1	477.14	35	24
476.10	12	1	477.16	35	25
476.12	12	1	477.18	36	26
476.14	12	2	477.20	36	26
476.16	13	2	477.22	37	27
476.18	13	2	477.24	37	28
476.20	13	2	477.26	38	28
476.22	14	3	477.28	38	29
476.24	14	3	477.30	39	30
476.26	14	3	477.32	40	31
476.28	15	3	477.34	40	32
476.30	15	4	477.36	41	32
476.32	15	4	477.38	41	33
476.34	16	4	477.40	42	34
476.36	16	5	477.42	42	35
476.38	17	5	477.44	43	36
476.40	17	5	477.46	44	37
476.42	17	6	477.48	44	37
476.44	18	6	477.50	45	38
476.46	18	6	477.52	45	39
476.48	19	7	477.54	46	40
476.50	19	7	477.56	47	41
476.52	19	8	477.58	47	42
476.54	20	8	477.60	48	43
476.56	20	8	477.62	48	44
476.58	21	9	477.64	49	45
476.60	21	9	477.66	50	46
476.62	22	10	477.68	50	47
476.64	22	10	477.70	51	48
476.66	23	10	477.72	52	49
476.68	23	11	477.74	52	50
476.70	23	11	477.76	53	51
476.72	24	12	477.78	54	52
476.74	24	12	477.80	54	53
476.76	25	13	477.82	55	54
476.78	25	13	477.84	56	55
476.80	26	14	477.86	56	56
476.82	26	14	477.88	57	58
476.84	27	15	477.90	58	59
476.86	27	15	477.92	58	60
476.88	28	16	477.94	59	61
476.90	28	17	477.96	60	62
476.92	29	17	477.98	60	63
476.94	29	18	478.00	61	65
476.96	30	18			
476.98	30	19			
477.00	31	20			
477.02	32	20			
477.04	32	21			

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Type III 24-hr 100-yr Rainfall=7.82"

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Summary for Pond 4P: INFILTRATION TRENCH

Inflow Area = 39,437 sf, 26.68% Impervious, Inflow Depth = 5.25" for 100-yr event
 Inflow = 3.75 cfs @ 12.28 hrs, Volume= 17,238 cf
 Outflow = 3.75 cfs @ 12.28 hrs, Volume= 17,121 cf, Atten= 0%, Lag= 0.1 min
 Primary = 3.75 cfs @ 12.28 hrs, Volume= 17,121 cf

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 451.00' @ 12.28 hrs Surf.Area= 275 sf Storage= 164 cf

Plug-Flow detention time= 7.0 min calculated for 17,118 cf (99% of inflow)
 Center-of-Mass det. time= 2.7 min (825.9 - 823.2)

Volume	Invert	Avail.Storage	Storage Description			
#1	449.50'	165 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
449.50	275	106.0	0.0	0	0	275
451.00	275	111.0	40.0	165	165	459

Device	Routing	Invert	Outlet Devices											
#1	Primary	450.56'	5.0' long x 2.0' breadth Broad-Crested Rectangular Weir											
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	
				2.50	3.00	3.50								
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88		
				2.85	3.07	3.20	3.32							

Primary OutFlow Max=3.75 cfs @ 12.28 hrs HW=451.00' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir** (Weir Controls 3.75 cfs @ 1.72 fps)

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Stage-Area-Storage for Pond 4P: INFILTRATION TRENCH

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
449.50	275	0	450.56	275	117
449.52	275	2	450.58	275	119
449.54	275	4	450.60	275	121
449.56	275	7	450.62	275	123
449.58	275	9	450.64	275	125
449.60	275	11	450.66	275	128
449.62	275	13	450.68	275	130
449.64	275	15	450.70	275	132
449.66	275	18	450.72	275	134
449.68	275	20	450.74	275	136
449.70	275	22	450.76	275	139
449.72	275	24	450.78	275	141
449.74	275	26	450.80	275	143
449.76	275	29	450.82	275	145
449.78	275	31	450.84	275	147
449.80	275	33	450.86	275	150
449.82	275	35	450.88	275	152
449.84	275	37	450.90	275	154
449.86	275	40	450.92	275	156
449.88	275	42	450.94	275	158
449.90	275	44	450.96	275	161
449.92	275	46	450.98	275	163
449.94	275	48	451.00	275	165
449.96	275	51			
449.98	275	53			
450.00	275	55			
450.02	275	57			
450.04	275	59			
450.06	275	62			
450.08	275	64			
450.10	275	66			
450.12	275	68			
450.14	275	70			
450.16	275	73			
450.18	275	75			
450.20	275	77			
450.22	275	79			
450.24	275	81			
450.26	275	84			
450.28	275	86			
450.30	275	88			
450.32	275	90			
450.34	275	92			
450.36	275	95			
450.38	275	97			
450.40	275	99			
450.42	275	101			
450.44	275	103			
450.46	275	106			
450.48	275	108			
450.50	275	110			
450.52	275	112			
450.54	275	114			

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Summary for Pond FB: FOREBAY

Inflow Area = 39,437 sf, 26.68% Impervious, Inflow Depth = 5.25" for 100-yr event
 Inflow = 3.75 cfs @ 12.28 hrs, Volume= 17,261 cf
 Outflow = 3.75 cfs @ 12.28 hrs, Volume= 17,238 cf, Atten= 0%, Lag= 0.1 min
 Primary = 3.75 cfs @ 12.28 hrs, Volume= 17,238 cf

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 454.94' @ 12.28 hrs Surf.Area= 67 sf Storage= 46 cf

Plug-Flow detention time= 1.7 min calculated for 17,238 cf (100% of inflow)
 Center-of-Mass det. time= 0.7 min (823.2 - 822.5)

Volume	Invert	Avail.Storage	Storage Description											
#1	453.00'	51 cf	Custom Stage Data (Irregular) Listed below (Recalc)											
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)				Cum.Store (cubic-feet)				Wet.Area (sq-ft)			
453.00	5	6.0	0				0				5			
454.00	16	17.0	10				10				28			
455.00	72	36.0	41				51				113			
Device	Routing	Invert	Outlet Devices											
#1	Primary	454.50'	5.0' long x 2.0' breadth Broad-Crested Rectangular Weir											
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	
			2.50	3.00	3.50									
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88		
			2.85	3.07	3.20	3.32								

Primary OutFlow Max=3.75 cfs @ 12.28 hrs HW=454.94' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir** (Weir Controls 3.75 cfs @ 1.72 fps)

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Type III 24-hr 100-yr Rainfall=7.82"

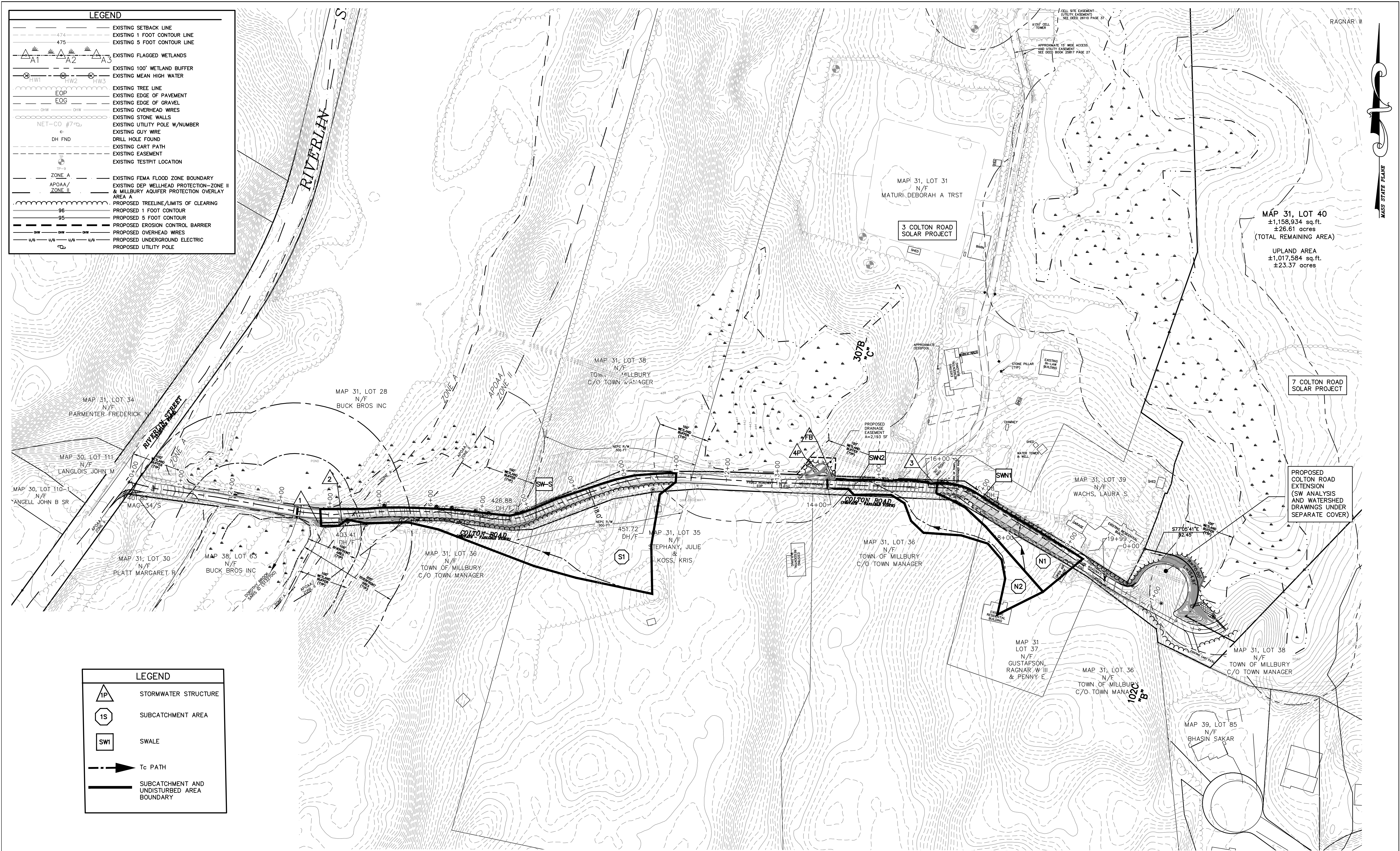
Printed 8/28/2020

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Stage-Area-Storage for Pond FB: FOREBAY

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
453.00	5	0	454.06	18	11
453.02	5	0	454.08	19	11
453.04	5	0	454.10	20	12
453.06	5	0	454.12	21	12
453.08	6	0	454.14	21	13
453.10	6	1	454.16	22	13
453.12	6	1	454.18	23	13
453.14	6	1	454.20	24	14
453.16	6	1	454.22	25	14
453.18	7	1	454.24	26	15
453.20	7	1	454.26	27	15
453.22	7	1	454.28	28	16
453.24	7	1	454.30	29	17
453.26	7	2	454.32	30	17
453.28	7	2	454.34	31	18
453.30	8	2	454.36	32	18
453.32	8	2	454.38	33	19
453.34	8	2	454.40	34	20
453.36	8	2	454.42	35	20
453.38	8	3	454.44	36	21
453.40	9	3	454.46	37	22
453.42	9	3	454.48	38	23
453.44	9	3	454.50	39	23
453.46	9	3	454.52	40	24
453.48	10	3	454.54	41	25
453.50	10	4	454.56	42	26
453.52	10	4	454.58	44	27
453.54	10	4	454.60	45	27
453.56	10	4	454.62	46	28
453.58	11	4	454.64	47	29
453.60	11	5	454.66	48	30
453.62	11	5	454.68	50	31
453.64	11	5	454.70	51	32
453.66	12	5	454.72	52	33
453.68	12	6	454.74	54	34
453.70	12	6	454.76	55	35
453.72	12	6	454.78	56	37
453.74	13	6	454.80	58	38
453.76	13	7	454.82	59	39
453.78	13	7	454.84	60	40
453.80	13	7	454.86	62	41
453.82	14	7	454.88	63	43
453.84	14	8	454.90	65	44
453.86	14	8	454.92	66	45
453.88	14	8	454.94	68	46
453.90	15	8	454.96	69	48
453.92	15	9	454.98	70	49
453.94	15	9	455.00	72	51
453.96	15	9			
453.98	16	10			
454.00	16	10			
454.02	17	10			
454.04	17	11			

APPENDIX B
BMP Watershed Plan



APPENDIX C

Miscellaneous Calculations (Water Quality, Recharge, TSS)

Required Recharge Volume

Design Engineer:	Atlantic Design Engineers, Inc.	Job No.:	3085.00
Project Name:	Colton Road Extension- Existing Portion	Calc'd By:	PMJ
Location:	Millbury, MA	Date:	8/27/2020

$R_v = (F) (A_{imp})$
 R_v = Required Recharge Volume
 A_{imp} = Impervious Area on site
 F = Target Depth Factor: See below

Subcatchments N1 and N2

5.5'X1' D X 50' LONG INFILTRATION TRENCH @ 40% VOID = 117 CF

Widening with Pavement Millings = 2,776 sf
 Required Recharge Volume (R_v) = 2,776 * 0.25" * (1/12) = 58 cf

Total Recharge Volume Provided 117 CF Standard Met

Subcatchment S1

	Infiltration Area 1=	16	cf
Widening with Pavement Millings=	4,122 sf		
Required Recharge Volume (R_v) =	4,122 * 0.6" * (1/12) =	206	cf
Total Recharge Volume Provided		16	cf

Total Required Recharge Volume on Site= 264 cf

Total Recharge Volume Provided on the Site= 133 cf

Water Quality Calculation Sheet

Design Engineer:	Atlantic Design Engineers, Inc	Job No.: 3085.00
Project Name:	Colton Road Extension	Calc'd By: PMJ
Location:	Millbury, MA	Date: 8/27/2020

The required water quality treatment volume is calculated as follows:

$$\begin{aligned}Vwq &= (Dwq) * (Aimp) \\Vwq &= \text{Required Water Quality Volume} \\Dwq &= \text{Water Quality Depth} = 0.5" \text{ \& } 1" \\Aimp &= \text{Area of New Impervious not including new roof area}\end{aligned}$$

SETTLING AREA 3 = 7

5.5'X1' D X 50' LONG TRENCH @ 40% VOID = 117 CF

Subcatchment N1, DWQ = 0.5"

Widening with Pavement Millings= 2,570 sf

Water Quality Volume Required (Vwq)= 2,570 * 0.5" * (1/12)= 107 cf

Water Quality Volume Provided= 124 cf

Sediment Forebay 1= 23

5.5'X1' D X 50' LONG TRENCH @ 40% VOID = 17 CF Remaining volume after N1

Subcatchment N2, DWQ = 0.5"

Widening with Pavement Millings= 206 sf

Water Quality Volume Required (Vwq)= 206 * 0.5" * (1/12)= 9 cf

Water Quality Volume Provided= 40 cf

SETTLING AREAS 1 AND 2 = 16+11 27

Subcatchment S1, DWQ = 1"

Widening with Pavement Millings= 4,122 sf

Water Quality Volume Required (Vwq)= 4,122 * 1.0" * (1/12)= 344 cf

Water Quality Volume Provided= 27 cf

Total Volume Quality Required= 451 cf

Total Volume Provided= 151 cf

TSS REMOVAL CALCULATION SHEET

Design Engineer:	Atlantic Design Engineers, Inc.	Job No.:	3085.00
Project Name:	Colton Road Extension - Existing Road	Calc'd By:	PMJ
Location:	Millbury, Massachusetts	Date:	8/27/2020

S1

BMP	Removal Rate	Starting TSS Load	TSS Removed	Remaining Load
Settling Area/Forebay	25%	100%	25.0%	75.0%
Infiltration Area	80%	75.0%	60.0%	15.0%
Total Removed			85.0%	

TSS REMOVAL CALCULATION SHEET

Design Engineer:	Atlantic Design Engineers, Inc.	Job No.:	3085.00
Project Name:	Colton Road Extension - Existing Road	Calc'd By:	PMJ
Location:	Millbury, Massachusetts	Date:	8/26/2020

Subcatchment N1

BMP	Removal Rate	Starting TSS Load	TSS Removed	Remaining Load
Settling Area/Forebay	25%	100%	25.0%	75.0%
Infiltration Trench	80%	75.0%	60.0%	15.0%
Total Removed			85.0%	

TSS REMOVAL CALCULATION SHEET

Design Engineer:	Atlantic Design Engineers, Inc.	Job No.:	3085.00
Project Name:	Colton Road Extension - Existing Road	Calc'd By:	PMJ
Location:	Millbury, Massachusetts	Date:	8/26/2020

Subcatchment N2

BMP	Removal Rate	Starting TSS Load	TSS Removed	Remaining Load
Sediment Forebay	25%	100%	25.0%	75.0%
Infiltration Trench	80%	75.0%	60.0%	15.0%
Total Removed			85.0%	

APPENDIX D
NRCSS Soil Survey Map and Soil Group Descriptions



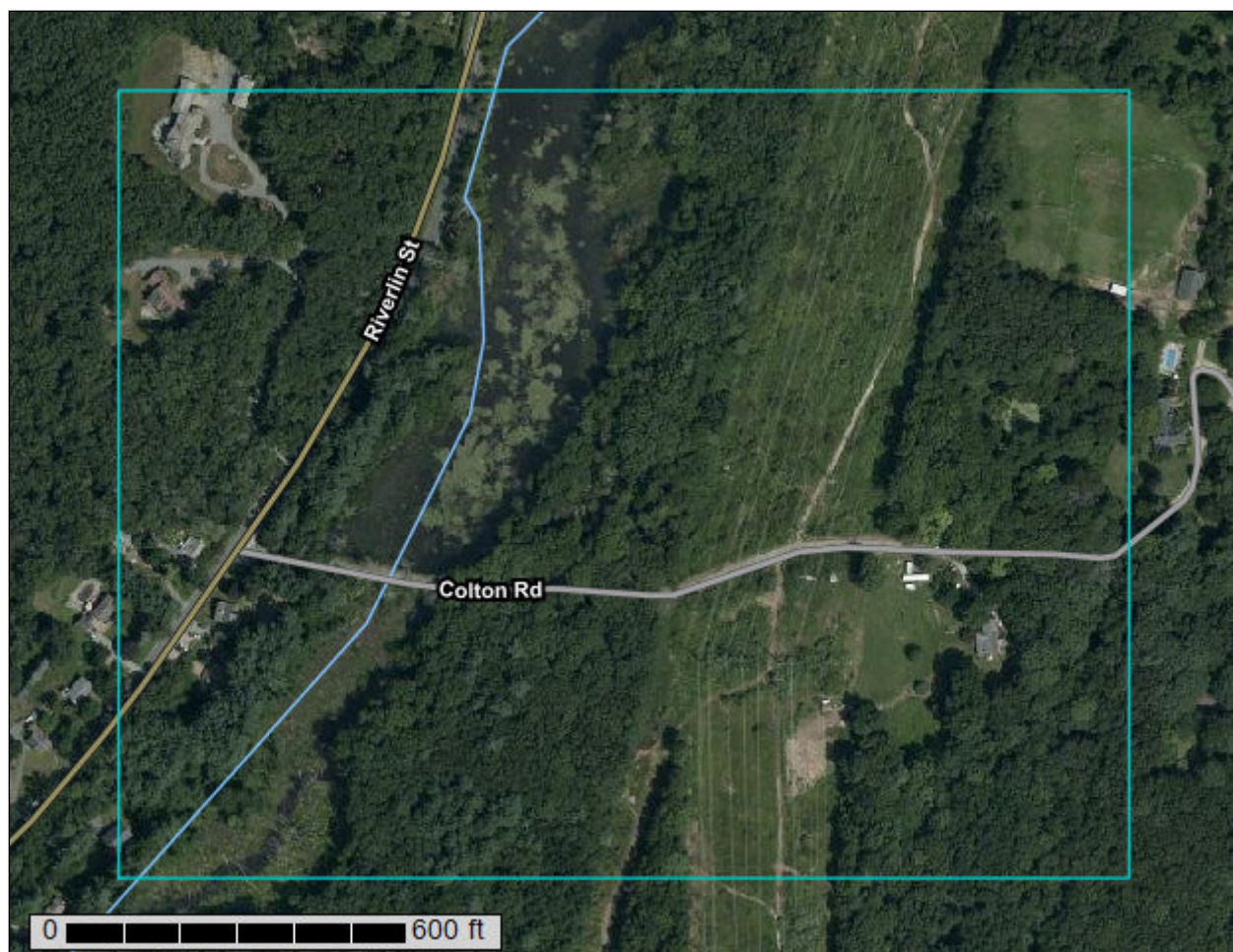
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Worcester County, Massachusetts, Southern Part



August 26, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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307B—Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony....	19
307C—Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony..	21
312B—Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony.....	23
422B—Canton fine sandy loam, 0 to 8 percent slopes, extremely stony....	24
422C—Canton fine sandy loam, 8 to 15 percent slopes, extremely stony..	26

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

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 1:25,000.

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:

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: Worcester County, Massachusetts, Southern Part

Survey Area Data: Version 13, Jun 11, 2020

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

Date(s) aerial images were photographed: Jul 26, 2019—Oct 5, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
52A	Freetown muck, 0 to 1 percent slopes	6.0	10.5%
245B	Hinckley loamy sand, 3 to 8 percent slopes	5.1	8.9%
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	3.7	6.4%
260A	Sudbury fine sandy loam, 0 to 3 percent slopes	9.5	16.6%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	3.3	5.8%
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	15.7	27.6%
307C	Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony	5.2	9.1%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	2.6	4.6%
422B	Canton fine sandy loam, 0 to 8 percent slopes, extremely stony	3.1	5.5%
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	2.8	5.0%
Totals for Area of Interest		57.0	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion

Custom Soil Resource Report

of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Worcester County, Massachusetts, Southern Part

52A—Freetown muck, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2t2q9

Elevation: 0 to 1,110 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Freetown and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Freetown

Setting

Landform: Marshes, kettles, swamps, depressions, depressions, bogs

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread, dip

Down-slope shape: Concave

Across-slope shape: Concave

Parent material: Highly decomposed organic material

Typical profile

Oe - 0 to 2 inches: mucky peat

Oa - 2 to 79 inches: muck

Properties and qualities

Slope: 0 to 1 percent

Surface area covered with cobbles, stones or boulders: 0.0 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Very poorly drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high
(0.14 to 14.17 in/hr)

Depth to water table: About 0 to 6 inches

Frequency of flooding: Rare

Frequency of ponding: Frequent

Available water capacity: Very high (about 19.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 5w

Hydrologic Soil Group: B/D

Ecological site: F144AY043MA - Acidic Organic Wetlands

Hydric soil rating: Yes

Minor Components

Whitman

Percent of map unit: 5 percent

Landform: Depressions, drainageways

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Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Swansea

Percent of map unit: 5 percent
Landform: Depressions, depressions, marshes, swamps, bogs, kettles
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

245B—Hinckley loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2svm8
Elevation: 0 to 1,430 feet
Mean annual precipitation: 36 to 53 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash deltas, outwash plains, eskers, moraines, kame terraces, kames, outwash terraces
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave

Custom Soil Resource Report

Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 8 percent
Landform: Outwash plains, kames, eskers, moraines, outwash terraces, outwash deltas, kame terraces
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, tread, riser
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Outwash plains, moraines, outwash terraces, outwash deltas, kame terraces
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope, base slope, head slope, tread
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

Agawam

Percent of map unit: 2 percent

Custom Soil Resource Report

Landform: Kames, eskers, moraines, outwash terraces, outwash deltas, kame terraces, outwash plains

Landform position (two-dimensional): Summit, shoulder, backslope, footslope

Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread

Down-slope shape: Linear, convex, concave

Across-slope shape: Convex, linear, concave

Hydric soil rating: No

254A—Merrimac fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tyqr

Elevation: 0 to 1,100 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Merrimac and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Moraines, outwash terraces, outwash plains, kames, eskers

Landform position (two-dimensional): Backslope, footslope, summit, shoulder

Landform position (three-dimensional): Side slope, crest, riser, tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam

Bw1 - 10 to 22 inches: fine sandy loam

Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand

2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)

Depth to water table: More than 80 inches

Custom Soil Resource Report

Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Hinckley

Percent of map unit: 5 percent
Landform: Outwash plains, eskers, kames, deltas
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Outwash plains, terraces, deltas
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Agawam

Percent of map unit: 3 percent
Landform: Moraines, outwash plains, outwash terraces, stream terraces, kames, eskers
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Windsor

Percent of map unit: 2 percent
Landform: Dunes, outwash plains, outwash terraces, deltas
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

260A—Sudbury fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9bbd
Elevation: 0 to 2,100 feet
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 145 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sudbury and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sudbury

Setting

Landform: Depressions, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Friable coarse-loamy eolian deposits over loose sandy glaciofluvial deposits derived from granite and gneiss

Typical profile

H1 - 0 to 2 inches: fine sandy loam
H2 - 2 to 8 inches: sandy loam
H3 - 8 to 20 inches: sandy loam
H4 - 20 to 65 inches: gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 0 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Ecological site: F144AY027MA - Moist Sandy Outwash
Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 20 percent

Hydric soil rating: No

Walpole

Percent of map unit: 5 percent

Landform: Terraces

Hydric soil rating: Yes

305B—Paxton fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t2qp

Elevation: 0 to 1,570 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Paxton and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton

Setting

Landform: Ground moraines, hills, drumlins

Landform position (two-dimensional): Backslope, summit, shoulder

Landform position (three-dimensional): Side slope, crest, nose slope

Down-slope shape: Linear, convex

Across-slope shape: Convex

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 8 inches: fine sandy loam

Bw1 - 8 to 15 inches: fine sandy loam

Bw2 - 15 to 26 inches: fine sandy loam

Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: 18 to 39 inches to densic material

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Custom Soil Resource Report

Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Woodbridge

Percent of map unit: 9 percent
Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury

Percent of map unit: 6 percent
Landform: Drainageways, hills, ground moraines, depressions
Landform position (two-dimensional): Backslope, footslope, toeslope
Landform position (three-dimensional): Head slope, base slope, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Charlton

Percent of map unit: 5 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

307B—Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w675
Elevation: 0 to 1,580 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Paxton, extremely stony, and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Extremely Stony

Setting

Landform: Drumlins, hills, ground moraines

Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Crest, side slope

Down-slope shape: Linear, convex

Across-slope shape: Convex, linear

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material

A - 2 to 10 inches: fine sandy loam

Bw1 - 10 to 17 inches: fine sandy loam

Bw2 - 17 to 28 inches: fine sandy loam

Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent

Surface area covered with cobbles, stones or boulders: 9.0 percent

Depth to restrictive feature: 20 to 43 inches to densic material

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: About 18 to 37 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: C

Ecological site: F144AY007CT - Well Drained Dense Till Uplands

Hydric soil rating: No

Minor Components

Woodbridge, extremely stony

Percent of map unit: 10 percent

Landform: Ground moraines, drumlins, hills

Landform position (two-dimensional): Backslope, footslope, summit

Landform position (three-dimensional): Side slope, crest

Down-slope shape: Concave

Across-slope shape: Linear

Hydric soil rating: No

Charlton, extremely stony

Percent of map unit: 5 percent

Landform: Hills

Landform position (two-dimensional): Shoulder, summit, backslope

Landform position (three-dimensional): Crest, side slope

Down-slope shape: Convex

Across-slope shape: Convex

Hydric soil rating: No

Ridgebury, extremely stony

Percent of map unit: 4 percent

Landform: Hills, ground moraines, depressions, drainageways, drumlins

Landform position (two-dimensional): Toeslope, footslope

Landform position (three-dimensional): Base slope, head slope

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Whitman, extremely stony

Percent of map unit: 1 percent

Landform: Depressions

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

307C—Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w676

Elevation: 0 to 1,490 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Paxton, extremely stony, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Extremely Stony

Setting

Landform: Ground moraines, drumlins, hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Linear, convex

Across-slope shape: Convex, linear

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Custom Soil Resource Report

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Charlton, extremely stony

Percent of map unit: 8 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Woodbridge, extremely stony

Percent of map unit: 6 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury, extremely stony

Percent of map unit: 1 percent
Landform: Drainageways, hills, ground moraines, depressions, drumlins
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

312B—Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2t2qs

Elevation: 0 to 1,580 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Woodbridge, extremely stony, and similar soils: 82 percent

Minor components: 18 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Extremely Stony

Setting

Landform: Drumlins, hills, ground moraines

Landform position (two-dimensional): Backslope, footslope, summit

Landform position (three-dimensional): Side slope

Down-slope shape: Concave

Across-slope shape: Linear

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material

A - 2 to 9 inches: fine sandy loam

Bw1 - 9 to 20 inches: fine sandy loam

Bw2 - 20 to 32 inches: fine sandy loam

Cd - 32 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent

Surface area covered with cobbles, stones or boulders: 9.0 percent

Depth to restrictive feature: 20 to 43 inches to densic material

Drainage class: Moderately well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: About 19 to 27 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water capacity: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Custom Soil Resource Report

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: C/D

Ecological site: F144AY037MA - Moist Dense Till Uplands

Hydric soil rating: No

Minor Components

Paxton, extremely stony

Percent of map unit: 10 percent

Landform: Drumlins, hills, ground moraines

Landform position (two-dimensional): Shoulder, backslope, summit

Landform position (three-dimensional): Crest, side slope

Down-slope shape: Linear, convex

Across-slope shape: Convex, linear

Hydric soil rating: No

Ridgebury, extremely stony

Percent of map unit: 8 percent

Landform: Ground moraines, depressions, drumlins, drainageways, hills

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Head slope, base slope

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

422B—Canton fine sandy loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w818

Elevation: 0 to 1,180 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 145 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Canton, extremely stony, and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Extremely Stony

Setting

Landform: Ridges, hills, moraines

Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Side slope, crest, nose slope

Down-slope shape: Convex, linear

Across-slope shape: Convex

Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Scituate, extremely stony

Percent of map unit: 6 percent
Landform: Drumlins, ground moraines, hills
Landform position (two-dimensional): Footslope, backslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Charlton, extremely stony

Percent of map unit: 6 percent
Landform: Ridges, hills, ground moraines
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Montauk, extremely stony

Percent of map unit: 4 percent
Landform: Ground moraines, recessional moraines, drumlins, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex

Hydric soil rating: No

Swansea

Percent of map unit: 4 percent

Landform: Swamps, bogs, depressions, marshes, kettles

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

422C—Canton fine sandy loam, 8 to 15 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w815

Elevation: 0 to 1,310 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 145 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Canton, extremely stony, and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Extremely Stony

Setting

Landform: Hills, moraines, ridges

Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Side slope, crest, nose slope

Down-slope shape: Linear, convex

Across-slope shape: Convex

Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material

A - 2 to 5 inches: fine sandy loam

Bw1 - 5 to 16 inches: fine sandy loam

Bw2 - 16 to 22 inches: gravelly fine sandy loam

2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 8 to 15 percent

Surface area covered with cobbles, stones or boulders: 9.0 percent

Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)

Custom Soil Resource Report

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Scituate, extremely stony

Percent of map unit: 6 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Charlton, extremely stony

Percent of map unit: 5 percent
Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Montauk, extremely stony

Percent of map unit: 5 percent
Landform: Ground moraines, recessional moraines, drumlins, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Hollis, extremely stony

Percent of map unit: 4 percent
Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No