526 & 528 Boston Post Road Redevelopment Sudbury, MA

PREPARED FOR

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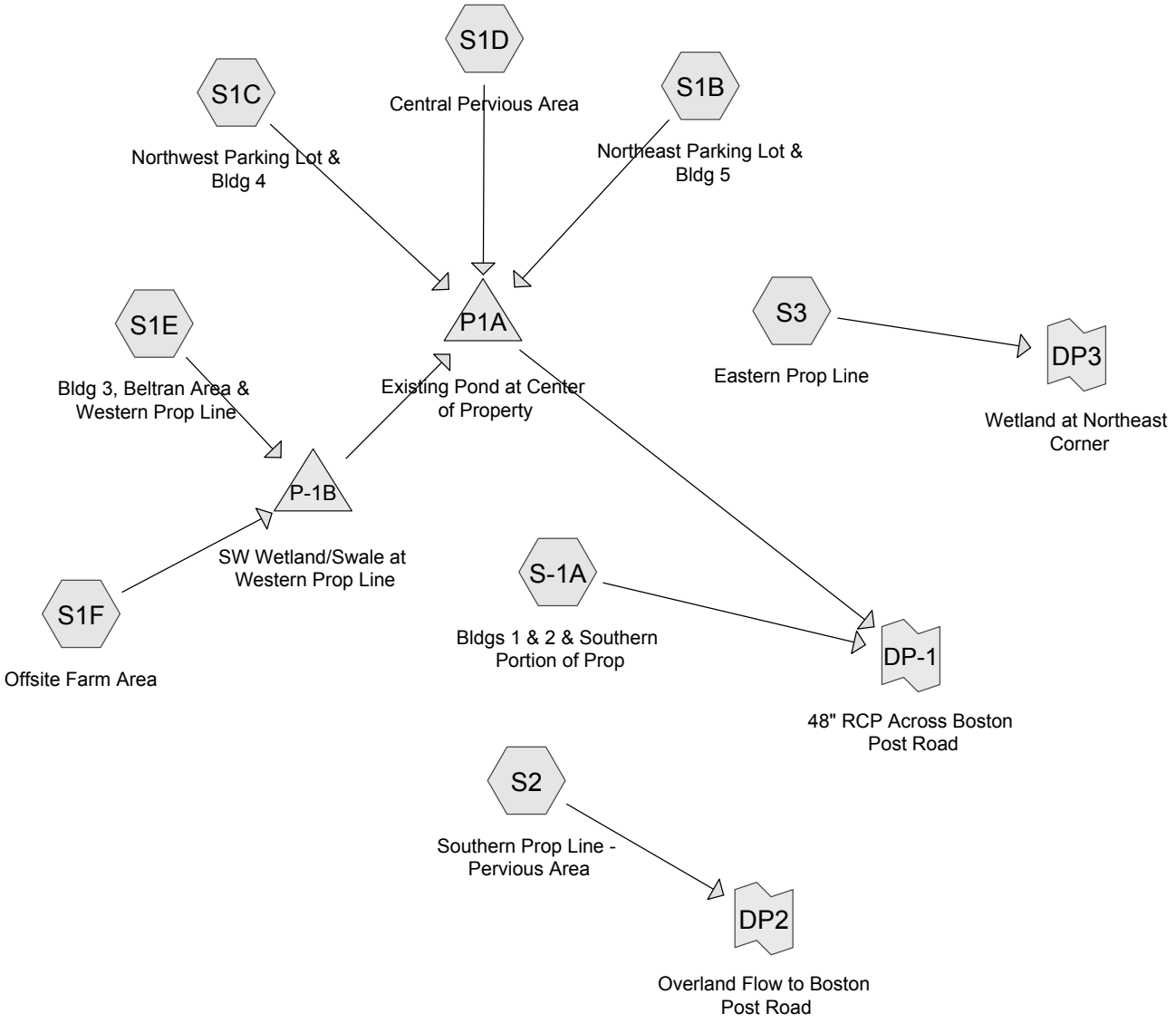
Appendix A
Standard 2 Computations and Supporting Information

Rainfall volumes used for this analysis were based on the Stormwater Management Bylaw Regulations for the Town of Sudbury. Runoff coefficients for the existing and proposed conditions, as previously shown in Tables 1 and 2 respectively, were determined using NRCS Technical Release 55 (TR-55) methodology as provided in HydroCAD. The HydroCAD model is based on the NRCS Technical Release 20 (TR-20) Model for Project Formulation Hydrology.

- Existing Hydrologic Calculations
  - Node Diagram
  - 1-inch Storm Event
  - 2-Year Storm Event
  - 10-Year Storm Event
  - 25-Year Storm Event
  - 100-Year Storm Event

- Proposed Hydrologic Calculations
  - Node Diagram
  - 1-inch Storm Event
  - 2-Year Storm Event
  - 10-Year Storm Event
  - 25-Year Storm Event
  - 100-Year Storm Event

HydroCAD Analysis: Existing Conditions



Subcat Reach Pond Link

Routing Diagram for 13125-EX HydroCAD
Prepared by VHB, Printed 11/24/2015

1-inch Storm Event – Existing

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentS-1A: Bldgs 1 & 2 & Runoff Area=482,099 sf 64.58% Impervious Runoff Depth=0.17"
Flow Length=1,239' Tc=5.1 min CN=85 Runoff=1.7 cfs 0.2 af

SubcatchmentS1B: Northeast Parking Runoff Area=362,836 sf 79.83% Impervious Runoff Depth=0.36"
Flow Length=375' Tc=5.0 min CN=91 Runoff=3.5 cfs 0.2 af

SubcatchmentS1C: Northwest Parking Runoff Area=696,274 sf 70.96% Impervious Runoff Depth=0.22"
Flow Length=1,845' Tc=12.2 min CN=87 Runoff=2.9 cfs 0.3 af

SubcatchmentS1D: Central Pervious Runoff Area=340,318 sf 20.22% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=68 Runoff=0.0 cfs 0.0 af

SubcatchmentS1E: Bldg 3, Beltran Area Runoff Area=311,033 sf 48.01% Impervious Runoff Depth=0.02"
Flow Length=533' Tc=7.7 min CN=74 Runoff=0.0 cfs 0.0 af

SubcatchmentS1F: Offsite Farm Area Runoff Area=1,470,921 sf 29.23% Impervious Runoff Depth=0.00"
Flow Length=1,734' Tc=17.0 min UI Adjusted CN=51 Runoff=0.0 cfs 0.0 af

SubcatchmentS2: Southern Prop Line - Runoff Area=39,780 sf 4.56% Impervious Runoff Depth=0.00"
Flow Length=285' Slope=0.0280 '/' Tc=5.0 min CN=63 Runoff=0.0 cfs 0.0 af

SubcatchmentS3: Eastern Prop Line Runoff Area=28,484 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=20' Slope=0.0810 '/' Tc=5.0 min CN=61 Runoff=0.0 cfs 0.0 af

Pond P-1B: SW Wetland/Swale at Western Prop Peak Elev=151.00' Storage=0 cf Inflow=0.0 cfs 0.0 af
24.0" Round Culvert n=0.011 L=300.0' S=0.0093 '/' Outflow=0.0 cfs 0.0 af

Pond P1A: Existing Pond at Center of Property Peak Elev=145.00' Storage=47,837 cf Inflow=5.5 cfs 0.6 af
Outflow=0.3 cfs 0.4 af

Link DP-1: 48" RCP Across Boston Post Road Inflow=1.8 cfs 0.6 af
Primary=1.8 cfs 0.6 af

Link DP2: Overland Flow to Boston Post Road Inflow=0.0 cfs 0.0 af
Primary=0.0 cfs 0.0 af

Link DP3: Wetland at Northeast Corner Inflow=0.0 cfs 0.0 af
Primary=0.0 cfs 0.0 af

Total Runoff Area = 85.7 ac Runoff Volume = 0.7 af Average Runoff Depth = 0.10"
53.24% Pervious = 45.6 ac 46.76% Impervious = 40.1 ac

Summary for Subcatchment S-1A: Bldgs 1 & 2 & Southern Portion of Prop

Runoff = 1.7 cfs @ 12.10 hrs, Volume= 0.2 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

	Area (sf)	CN	Description
*	170,769	61	>75% Grass cover, Good, HSG B
*	99,171	98	Road & Sidewalk
*	212,159	98	Roofs
	482,099	85	Weighted Average
	170,769		35.42% Pervious Area
	311,330		64.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
3.5	537	0.0160	2.57		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	652	0.0130	12.71	89.87	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011 Concrete pipe, straight & clean
5.1	1,239	Total			

Summary for Subcatchment S1B: Northeast Parking Lot & Bldg 5

Runoff = 3.5 cfs @ 12.08 hrs, Volume= 0.2 af, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

	Area (sf)	CN	Description
*	62,603	98	Roofs
*	227,035	98	Road & Sidewalk
*	73,198	61	>75% Grass cover, Good, HSG B
	362,836	91	Weighted Average
	73,198		20.17% Pervious Area
	289,638		79.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
1.2	175	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	150	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean

2.3 375 Total, Increased to minimum Tc = 5.0 min

Summary for Subcatchment S1C: Northwest Parking Lot & Bldg 4

Runoff = 2.9 cfs @ 12.19 hrs, Volume= 0.3 af, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

	Area (sf)	CN	Description
*	44,716	98	Roofs
*	449,394	98	Road & Sidewalk
*	202,164	61	>75% Grass cover, Good, HSG B
	696,274	87	Weighted Average
	202,164		29.04% Pervious Area
	494,110		70.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
3.9	500	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.2	471	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.3	141	0.0150	8.60	15.20	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.3	188	0.0150	10.42	32.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.9	495	0.0070	9.33	65.95	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011 Concrete pipe, straight & clean
12.2	1,845	Total			

Summary for Subcatchment S1D: Central Pervious Area

Runoff = 0.0 cfs @ 24.00 hrs, Volume= 0.0 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

	Area (sf)	CN	Description
*	961	98	Roofs
*	16,841	98	Road & Sidewalk
*	271,522	61	>75% Grass cover, Good, HSG B
	50,994	98	Water Surface, HSG B
	340,318	68	Weighted Average
	271,522		79.78% Pervious Area
	68,796		20.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S1E: Bldg 3, Beltran Area & Western Prop Line

Runoff = 0.0 cfs @ 14.81 hrs, Volume= 0.0 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

	Area (sf)	CN	Description
*	68,971	98	Roofs
*	98,296	61	>75% Grass cover, Good, HSG B
*	63,425	39	>75% Grass cover, Good, HSG A
*	80,341	98	Road & Sidewalk
	311,033	74	Weighted Average
	161,721		51.99% Pervious Area
	149,312		48.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.2	178	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	305	0.0100	5.36	4.21	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
7.7	533	Total			

Summary for Subcatchment S1F: Offsite Farm Area

Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0.0 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Adj	Description
10,003	98		Water Surface, HSG B
181,224	61		>75% Grass cover, Good, HSG B
859,788	30		Meadow, non-grazed, HSG A
301,859	98		Roofs, HSG B
118,047	98		Unconnected pavement, HSG B
1,470,921	54	51	Weighted Average, UI Adjusted
1,041,012			70.77% Pervious Area
429,909			29.23% Impervious Area
118,047			27.46% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0210	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.6	264	0.1900	7.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	100	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.9	610	0.0050	2.08	1.64	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.020 Corrugated PE, corrugated interior
0.6	307	0.0100	8.51	26.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.3	140	0.0200	8.87	70.94	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
4.1	172	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	91	0.0100	6.27	50.16	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
17.0	1,734	Total			

Summary for Subcatchment S2: Southern Prop Line - Pervious Area

Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0.0 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

	Area (sf)	CN	Description
*	37,965	61	>75% Grass cover, Good, HSG B
*	1,815	98	Road & Sidewalk
	39,780	63	Weighted Average
	37,965		95.44% Pervious Area
	1,815		4.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	25	0.0280	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.6	260	0.0280	2.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
4.4	285	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment S3: Eastern Prop Line

Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0.0 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

	Area (sf)	CN	Description
*	28,484	61	>75% Grass cover, Good, HSG B
	28,484		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	20	0.0810	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.5	20	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond P-1B: SW Wetland/Swale at Western Prop Line

Inflow Area = 40.9 ac, 32.50% Impervious, Inflow Depth = 0.00" for 1-Inch event
Inflow = 0.0 cfs @ 14.81 hrs, Volume= 0.0 af
Outflow = 0.0 cfs @ 14.81 hrs, Volume= 0.0 af, Atten= 0%, Lag= 0.0 min
Primary = 0.0 cfs @ 14.81 hrs, Volume= 0.0 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 151.00' @ 14.81 hrs Surf.Area= 498 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.0 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (1,060.7 - 1,060.7)

Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	126,119 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)
151.00	498	198.0	0	0	498
152.00	1,368	715.0	897	897	38,063
153.00	8,822	6,900.0	4,555	5,452	3,786,066
154.00	25,925	1,559.0	16,623	22,075	7,381,341
155.00	50,627	1,626.0	37,594	59,669	7,398,397
156.00	83,648	1,717.0	66,450	126,119	7,422,663

Device	Routing	Invert	Outlet Devices
#1	Primary	149.70'	**24.0" Round Culvert** L= 300.0' Ke= 0.500 Inlet / Outlet Invert= 149.70' / 146.90' S= 0.0093 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=8.4 cfs @ 14.81 hrs HW=151.00' (Free Discharge)
↑**1=Culvert** (Inlet Controls 8.4 cfs @ 3.88 fps)

Summary for Pond P1A: Existing Pond at Center of Property

Inflow Area = 73.0 ac, 45.00% Impervious, Inflow Depth = 0.09" for 1-Inch event
Inflow = 5.5 cfs @ 12.11 hrs, Volume= 0.6 af
Outflow = 0.3 cfs @ 16.64 hrs, Volume= 0.4 af, Atten= 94%, Lag= 271.3 min
Primary = 0.3 cfs @ 16.64 hrs, Volume= 0.4 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 144.70' Surf.Area= 48,178 sf Storage= 33,047 cf
Peak Elev= 145.00' @ 16.64 hrs Surf.Area= 49,030 sf Storage= 47,837 cf (14,791 cf above start)
Flood Elev= 152.00' Surf.Area= 267,018 sf Storage= 658,354 cf (625,307 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 420.9 min (1,300.0 - 879.1)

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	658,354 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)
144.00	46,247	909.0	0	0	46,247
145.00	49,018	939.0	47,626	47,626	50,754
146.00	51,879	966.0	50,442	98,068	54,957
147.00	56,154	1,148.0	54,002	152,070	85,592
148.00	59,900	1,538.0	58,017	210,087	168,964
149.00	68,930	2,169.0	64,362	274,449	355,114
150.00	80,674	2,330.0	74,725	349,174	412,799
151.00	140,074	3,581.0	109,017	458,191	1,001,255
152.00	267,018	4,717.0	200,163	658,354	1,751,406

Device	Routing	Invert	Outlet Devices
#1	Device 4	144.70'	**12.0" Round Culvert** L= 382.0' Ke= 0.500 Inlet / Outlet Invert= 144.70' / 142.80' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 3	147.00'	**36.0" W x 18.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 4	144.00'	**24.0" Round Culvert** L= 372.0' Ke= 0.500 Inlet / Outlet Invert= 144.00' / 142.80' S= 0.0032 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#4	Primary	142.60'	**36.0" Round Culvert** L= 1,295.0' Ke= 0.500 Inlet / Outlet Invert= 142.60' / 140.90' S= 0.0013 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=0.3 cfs @ 16.64 hrs HW=145.00' (Free Discharge)
└**4=Culvert** (Passes 0.3 cfs of 19.9 cfs potential flow)
  ├**1=Culvert** (Barrel Controls 0.3 cfs @ 2.47 fps)
  └**3=Culvert** (Passes 0.0 cfs of 4.3 cfs potential flow)
    └**2=Orifice/Grate** (Controls 0.0 cfs)

Summary for Link DP-1: 48" RCP Across Boston Post Road

Inflow Area = 84.1 ac, 47.58% Impervious, Inflow Depth > 0.08" for 1-Inch event
Inflow = 1.8 cfs @ 12.10 hrs, Volume= 0.6 af
Primary = 1.8 cfs @ 12.10 hrs, Volume= 0.6 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP2: Overland Flow to Boston Post Road

Inflow Area = 0.9 ac, 4.56% Impervious, Inflow Depth = 0.00" for 1-Inch event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.0 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.0 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP3: Wetland at Northeast Corner

Inflow Area = 0.7 ac, 0.00% Impervious, Inflow Depth = 0.00" for 1-Inch event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.0 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.0 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

2-Year Storm Event – Existing

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentS-1A: Bldgs 1 & 2 & Runoff Area=482,099 sf 64.58% Impervious Runoff Depth=1.76"
Flow Length=1,239' Tc=5.1 min CN=85 Runoff=23.6 cfs 1.6 af

SubcatchmentS1B: Northeast Parking Runoff Area=362,836 sf 79.83% Impervious Runoff Depth=2.26"
Flow Length=375' Tc=5.0 min CN=91 Runoff=22.5 cfs 1.6 af

SubcatchmentS1C: Northwest Parking Runoff Area=696,274 sf 70.96% Impervious Runoff Depth=1.91"
Flow Length=1,845' Tc=12.2 min CN=87 Runoff=29.3 cfs 2.6 af

SubcatchmentS1D: Central Pervious Runoff Area=340,318 sf 20.22% Impervious Runoff Depth=0.73"
Tc=5.0 min CN=68 Runoff=6.0 cfs 0.5 af

SubcatchmentS1E: Bldg 3, Beltran Area Runoff Area=311,033 sf 48.01% Impervious Runoff Depth=1.04"
Flow Length=533' Tc=7.7 min CN=74 Runoff=7.7 cfs 0.6 af

SubcatchmentS1F: Offsite Farm Area Runoff Area=1,470,921 sf 29.23% Impervious Runoff Depth=0.15"
Flow Length=1,734' Tc=17.0 min UI Adjusted CN=51 Runoff=1.0 cfs 0.4 af

SubcatchmentS2: Southern Prop Line - Runoff Area=39,780 sf 4.56% Impervious Runoff Depth=0.52"
Flow Length=285' Slope=0.0280 '/' Tc=5.0 min CN=63 Runoff=0.4 cfs 0.0 af

SubcatchmentS3: Eastern Prop Line Runoff Area=28,484 sf 0.00% Impervious Runoff Depth=0.44"
Flow Length=20' Slope=0.0810 '/' Tc=5.0 min CN=61 Runoff=0.2 cfs 0.0 af

Pond P-1B: SW Wetland/Swale at Western Prop Peak Elev=151.04' Storage=22 cf Inflow=7.7 cfs 1.0 af
24.0" Round Culvert n=0.011 L=300.0' S=0.0093 '/' Outflow=7.7 cfs 1.0 af

Pond P1A: Existing Pond at Center of Peak Elev=147.25' Storage=166,253 cf Inflow=59.4 cfs 5.6 af
Outflow=4.9 cfs 5.3 af

Link DP-1: 48" RCP Across Boston Post Road Inflow=26.4 cfs 6.9 af
Primary=26.4 cfs 6.9 af

Link DP2: Overland Flow to Boston Post Road Inflow=0.4 cfs 0.0 af
Primary=0.4 cfs 0.0 af

Link DP3: Wetland at Northeast Corner Inflow=0.2 cfs 0.0 af
Primary=0.2 cfs 0.0 af

Total Runoff Area = 85.7 ac Runoff Volume = 7.3 af Average Runoff Depth = 1.03"
53.24% Pervious = 45.6 ac 46.76% Impervious = 40.1 ac

Summary for Subcatchment S-1A: Bldgs 1 & 2 & Southern Portion of Prop

Runoff = 23.6 cfs @ 12.08 hrs, Volume= 1.6 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	170,769	61	>75% Grass cover, Good, HSG B
*	99,171	98	Road & Sidewalk
*	212,159	98	Roofs
	482,099	85	Weighted Average
	170,769		35.42% Pervious Area
	311,330		64.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
3.5	537	0.0160	2.57		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	652	0.0130	12.71	89.87	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011 Concrete pipe, straight & clean
5.1	1,239	Total			

Summary for Subcatchment S1B: Northeast Parking Lot & Bldg 5

Runoff = 22.5 cfs @ 12.07 hrs, Volume= 1.6 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	62,603	98	Roofs
*	227,035	98	Road & Sidewalk
*	73,198	61	>75% Grass cover, Good, HSG B
	362,836	91	Weighted Average
	73,198		20.17% Pervious Area
	289,638		79.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
1.2	175	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	150	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean

2.3 375 Total, Increased to minimum Tc = 5.0 min

Summary for Subcatchment S1C: Northwest Parking Lot & Bldg 4

Runoff = 29.3 cfs @ 12.17 hrs, Volume= 2.6 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	44,716	98	Roofs
*	449,394	98	Road & Sidewalk
*	202,164	61	>75% Grass cover, Good, HSG B
	696,274	87	Weighted Average
	202,164		29.04% Pervious Area
	494,110		70.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
3.9	500	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.2	471	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.3	141	0.0150	8.60	15.20	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.3	188	0.0150	10.42	32.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.9	495	0.0070	9.33	65.95	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011 Concrete pipe, straight & clean
12.2	1,845	Total			

Summary for Subcatchment S1D: Central Pervious Area

Runoff = 6.0 cfs @ 12.09 hrs, Volume= 0.5 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	961	98	Roofs
*	16,841	98	Road & Sidewalk
*	271,522	61	>75% Grass cover, Good, HSG B
	50,994	98	Water Surface, HSG B
	340,318	68	Weighted Average
	271,522		79.78% Pervious Area
	68,796		20.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S1E: Bldg 3, Beltran Area & Western Prop Line

Runoff = 7.7 cfs @ 12.12 hrs, Volume= 0.6 af, Depth= 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	68,971	98	Roofs
*	98,296	61	>75% Grass cover, Good, HSG B
*	63,425	39	>75% Grass cover, Good, HSG A
*	80,341	98	Road & Sidewalk
	311,033	74	Weighted Average
	161,721		51.99% Pervious Area
	149,312		48.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.2	178	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	305	0.0100	5.36	4.21	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
7.7	533	Total			

Summary for Subcatchment S1F: Offsite Farm Area

Runoff = 1.0 cfs @ 12.60 hrs, Volume= 0.4 af, Depth= 0.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Adj	Description
10,003	98		Water Surface, HSG B
181,224	61		>75% Grass cover, Good, HSG B
859,788	30		Meadow, non-grazed, HSG A
301,859	98		Roofs, HSG B
118,047	98		Unconnected pavement, HSG B
1,470,921	54	51	Weighted Average, UI Adjusted
1,041,012			70.77% Pervious Area
429,909			29.23% Impervious Area
118,047			27.46% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0210	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.6	264	0.1900	7.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	100	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.9	610	0.0050	2.08	1.64	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.020 Corrugated PE, corrugated interior
0.6	307	0.0100	8.51	26.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.3	140	0.0200	8.87	70.94	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
4.1	172	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	91	0.0100	6.27	50.16	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
17.0	1,734	Total			

Summary for Subcatchment S2: Southern Prop Line - Pervious Area

Runoff = 0.4 cfs @ 12.10 hrs, Volume= 0.0 af, Depth= 0.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	37,965	61	>75% Grass cover, Good, HSG B
*	1,815	98	Road & Sidewalk
	39,780	63	Weighted Average
	37,965		95.44% Pervious Area
	1,815		4.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	25	0.0280	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.6	260	0.0280	2.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
4.4	285	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment S3: Eastern Prop Line

Runoff = 0.2 cfs @ 12.11 hrs, Volume= 0.0 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	28,484	61	>75% Grass cover, Good, HSG B
	28,484		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	20	0.0810	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.5	20	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond P-1B: SW Wetland/Swale at Western Prop Line

Inflow Area = 40.9 ac, 32.50% Impervious, Inflow Depth = 0.31" for 2-Year event
Inflow = 7.7 cfs @ 12.12 hrs, Volume= 1.0 af
Outflow = 7.7 cfs @ 12.12 hrs, Volume= 1.0 af, Atten= 0%, Lag= 0.0 min
Primary = 7.7 cfs @ 12.12 hrs, Volume= 1.0 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 151.04' @ 12.12 hrs Surf.Area= 527 sf Storage= 22 cf

Plug-Flow detention time= 0.0 min calculated for 1.0 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (921.9 - 921.8)

Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	126,119 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)
151.00	498	198.0	0	0	498
152.00	1,368	715.0	897	897	38,063
153.00	8,822	6,900.0	4,555	5,452	3,786,066
154.00	25,925	1,559.0	16,623	22,075	7,381,341
155.00	50,627	1,626.0	37,594	59,669	7,398,397
156.00	83,648	1,717.0	66,450	126,119	7,422,663

Device	Routing	Invert	Outlet Devices
#1	Primary	149.70'	**24.0" Round Culvert** L= 300.0' Ke= 0.500 Inlet / Outlet Invert= 149.70' / 146.90' S= 0.0093 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=8.9 cfs @ 12.12 hrs HW=151.04' (Free Discharge)
↑**1=Culvert** (Inlet Controls 8.9 cfs @ 3.95 fps)

Summary for Pond P1A: Existing Pond at Center of Property

Inflow Area = 73.0 ac, 45.00% Impervious, Inflow Depth = 0.93" for 2-Year event
Inflow = 59.4 cfs @ 12.11 hrs, Volume= 5.6 af
Outflow = 4.9 cfs @ 14.46 hrs, Volume= 5.3 af, Atten= 92%, Lag= 141.1 min
Primary = 4.9 cfs @ 14.46 hrs, Volume= 5.3 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 144.70' Surf.Area= 48,178 sf Storage= 33,047 cf
Peak Elev= 147.25' @ 14.46 hrs Surf.Area= 57,081 sf Storage= 166,253 cf (133,206 cf above start)
Flood Elev= 152.00' Surf.Area= 267,018 sf Storage= 658,354 cf (625,307 cf above start)

Plug-Flow detention time= 537.6 min calculated for 4.5 af (80% of inflow)
Center-of-Mass det. time= 382.4 min (1,223.5 - 841.0)

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	658,354 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)
144.00	46,247	909.0	0	0	46,247
145.00	49,018	939.0	47,626	47,626	50,754
146.00	51,879	966.0	50,442	98,068	54,957
147.00	56,154	1,148.0	54,002	152,070	85,592
148.00	59,900	1,538.0	58,017	210,087	168,964
149.00	68,930	2,169.0	64,362	274,449	355,114
150.00	80,674	2,330.0	74,725	349,174	412,799
151.00	140,074	3,581.0	109,017	458,191	1,001,255
152.00	267,018	4,717.0	200,163	658,354	1,751,406

Device	Routing	Invert	Outlet Devices
#1	Device 4	144.70'	**12.0" Round Culvert** L= 382.0' Ke= 0.500 Inlet / Outlet Invert= 144.70' / 142.80' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 3	147.00'	**36.0" W x 18.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 4	144.00'	**24.0" Round Culvert** L= 372.0' Ke= 0.500 Inlet / Outlet Invert= 144.00' / 142.80' S= 0.0032 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#4	Primary	142.60'	**36.0" Round Culvert** L= 1,295.0' Ke= 0.500 Inlet / Outlet Invert= 142.60' / 140.90' S= 0.0013 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=4.9 cfs @ 14.46 hrs HW=147.25' (Free Discharge)
└**4=Culvert** (Passes 4.9 cfs of 36.2 cfs potential flow)
  ├**1=Culvert** (Barrel Controls 3.7 cfs @ 4.69 fps)
  └**3=Culvert** (Passes 1.2 cfs of 18.0 cfs potential flow)
    └**2=Orifice/Grate** (Orifice Controls 1.2 cfs @ 1.61 fps)

Summary for Link DP-1: 48" RCP Across Boston Post Road

Inflow Area = 84.1 ac, 47.58% Impervious, Inflow Depth > 0.99" for 2-Year event
Inflow = 26.4 cfs @ 12.08 hrs, Volume= 6.9 af
Primary = 26.4 cfs @ 12.08 hrs, Volume= 6.9 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP2: Overland Flow to Boston Post Road

Inflow Area = 0.9 ac, 4.56% Impervious, Inflow Depth = 0.52" for 2-Year event
Inflow = 0.4 cfs @ 12.10 hrs, Volume= 0.0 af
Primary = 0.4 cfs @ 12.10 hrs, Volume= 0.0 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP3: Wetland at Northeast Corner

Inflow Area = 0.7 ac, 0.00% Impervious, Inflow Depth = 0.44" for 2-Year event
Inflow = 0.2 cfs @ 12.11 hrs, Volume= 0.0 af
Primary = 0.2 cfs @ 12.11 hrs, Volume= 0.0 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

10-Year Storm Event – Existing

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentS-1A: Bldgs 1 & 2 & Runoff Area=482,099 sf 64.58% Impervious Runoff Depth=3.18"
Flow Length=1,239' Tc=5.1 min CN=85 Runoff=42.3 cfs 2.9 af

SubcatchmentS1B: Northeast Parking Runoff Area=362,836 sf 79.83% Impervious Runoff Depth=3.79"
Flow Length=375' Tc=5.0 min CN=91 Runoff=36.8 cfs 2.6 af

SubcatchmentS1C: Northwest Parking Runoff Area=696,274 sf 70.96% Impervious Runoff Depth=3.38"
Flow Length=1,845' Tc=12.2 min CN=87 Runoff=51.1 cfs 4.5 af

SubcatchmentS1D: Central Pervious Runoff Area=340,318 sf 20.22% Impervious Runoff Depth=1.74"
Tc=5.0 min CN=68 Runoff=16.0 cfs 1.1 af

SubcatchmentS1E: Bldg 3, Beltran Area Runoff Area=311,033 sf 48.01% Impervious Runoff Depth=2.21"
Flow Length=533' Tc=7.7 min CN=74 Runoff=17.3 cfs 1.3 af

SubcatchmentS1F: Offsite Farm Area Runoff Area=1,470,921 sf 29.23% Impervious Runoff Depth=0.66"
Flow Length=1,734' Tc=17.0 min UI Adjusted CN=51 Runoff=12.1 cfs 1.9 af

SubcatchmentS2: Southern Prop Line - Runoff Area=39,780 sf 4.56% Impervious Runoff Depth=1.38"
Flow Length=285' Slope=0.0280 '/' Tc=5.0 min CN=63 Runoff=1.4 cfs 0.1 af

SubcatchmentS3: Eastern Prop Line Runoff Area=28,484 sf 0.00% Impervious Runoff Depth=1.25"
Flow Length=20' Slope=0.0810 '/' Tc=5.0 min CN=61 Runoff=0.9 cfs 0.1 af

Pond P-1B: SW Wetland/Swale at Western Peak Elev=152.51' Storage=2,308 cf Inflow=21.8 cfs 3.2 af
24.0" Round Culvert n=0.011 L=300.0' S=0.0093 '/' Outflow=20.4 cfs 3.2 af

Pond P1A: Existing Pond at Center of Peak Elev=148.69' Storage=253,736 cf Inflow=110.3 cfs 11.4 af
Outflow=24.8 cfs 11.0 af

Link DP-1: 48" RCP Across Boston Post Road Inflow=45.7 cfs 13.9 af
Primary=45.7 cfs 13.9 af

Link DP2: Overland Flow to Boston Post Road Inflow=1.4 cfs 0.1 af
Primary=1.4 cfs 0.1 af

Link DP3: Wetland at Northeast Corner Inflow=0.9 cfs 0.1 af
Primary=0.9 cfs 0.1 af

Total Runoff Area = 85.7 ac Runoff Volume = 14.6 af Average Runoff Depth = 2.04"
53.24% Pervious = 45.6 ac 46.76% Impervious = 40.1 ac

Summary for Subcatchment S-1A: Bldgs 1 & 2 & Southern Portion of Prop

Runoff = 42.3 cfs @ 12.07 hrs, Volume= 2.9 af, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
*	170,769	61	>75% Grass cover, Good, HSG B
*	99,171	98	Road & Sidewalk
*	212,159	98	Roofs
	482,099	85	Weighted Average
	170,769		35.42% Pervious Area
	311,330		64.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
3.5	537	0.0160	2.57		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	652	0.0130	12.71	89.87	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011 Concrete pipe, straight & clean
5.1	1,239	Total			

Summary for Subcatchment S1B: Northeast Parking Lot & Bldg 5

Runoff = 36.8 cfs @ 12.07 hrs, Volume= 2.6 af, Depth= 3.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
*	62,603	98	Roofs
*	227,035	98	Road & Sidewalk
*	73,198	61	>75% Grass cover, Good, HSG B
	362,836	91	Weighted Average
	73,198		20.17% Pervious Area
	289,638		79.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
1.2	175	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	150	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean

2.3 375 Total, Increased to minimum Tc = 5.0 min

Summary for Subcatchment S1C: Northwest Parking Lot & Bldg 4

Runoff = 51.1 cfs @ 12.16 hrs, Volume= 4.5 af, Depth= 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
*	44,716	98	Roofs
*	449,394	98	Road & Sidewalk
*	202,164	61	>75% Grass cover, Good, HSG B
	696,274	87	Weighted Average
	202,164		29.04% Pervious Area
	494,110		70.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
3.9	500	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.2	471	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.3	141	0.0150	8.60	15.20	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.3	188	0.0150	10.42	32.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.9	495	0.0070	9.33	65.95	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011 Concrete pipe, straight & clean
12.2	1,845	Total			

Summary for Subcatchment S1D: Central Pervious Area

Runoff = 16.0 cfs @ 12.08 hrs, Volume= 1.1 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
*	961	98	Roofs
*	16,841	98	Road & Sidewalk
*	271,522	61	>75% Grass cover, Good, HSG B
	50,994	98	Water Surface, HSG B
	340,318	68	Weighted Average
	271,522		79.78% Pervious Area
	68,796		20.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S1E: Bldg 3, Beltran Area & Western Prop Line

Runoff = 17.3 cfs @ 12.11 hrs, Volume= 1.3 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
*	68,971	98	Roofs
*	98,296	61	>75% Grass cover, Good, HSG B
*	63,425	39	>75% Grass cover, Good, HSG A
*	80,341	98	Road & Sidewalk
	311,033	74	Weighted Average
	161,721		51.99% Pervious Area
	149,312		48.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.2	178	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	305	0.0100	5.36	4.21	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
7.7	533	Total			

Summary for Subcatchment S1F: Offsite Farm Area

Runoff = 12.1 cfs @ 12.34 hrs, Volume= 1.9 af, Depth= 0.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Adj	Description
10,003	98		Water Surface, HSG B
181,224	61		>75% Grass cover, Good, HSG B
859,788	30		Meadow, non-grazed, HSG A
301,859	98		Roofs, HSG B
118,047	98		Unconnected pavement, HSG B
1,470,921	54	51	Weighted Average, UI Adjusted
1,041,012			70.77% Pervious Area
429,909			29.23% Impervious Area
118,047			27.46% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0210	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.6	264	0.1900	7.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	100	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.9	610	0.0050	2.08	1.64	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.020 Corrugated PE, corrugated interior
0.6	307	0.0100	8.51	26.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.3	140	0.0200	8.87	70.94	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
4.1	172	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	91	0.0100	6.27	50.16	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
17.0	1,734	Total			

Summary for Subcatchment S2: Southern Prop Line - Pervious Area

Runoff = 1.4 cfs @ 12.08 hrs, Volume= 0.1 af, Depth= 1.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
*	37,965	61	>75% Grass cover, Good, HSG B
*	1,815	98	Road & Sidewalk
	39,780	63	Weighted Average
	37,965		95.44% Pervious Area
	1,815		4.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	25	0.0280	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.6	260	0.0280	2.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
4.4	285	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment S3: Eastern Prop Line

Runoff = 0.9 cfs @ 12.09 hrs, Volume= 0.1 af, Depth= 1.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
*	28,484	61	>75% Grass cover, Good, HSG B
	28,484		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	20	0.0810	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.5	20	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond P-1B: SW Wetland/Swale at Western Prop Line

Inflow Area = 40.9 ac, 32.50% Impervious, Inflow Depth = 0.93" for 10-Year event
Inflow = 21.8 cfs @ 12.16 hrs, Volume= 3.2 af
Outflow = 20.4 cfs @ 12.34 hrs, Volume= 3.2 af, Atten= 7%, Lag= 10.8 min
Primary = 20.4 cfs @ 12.34 hrs, Volume= 3.2 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 152.51' @ 12.34 hrs Surf.Area= 4,397 sf Storage= 2,308 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.4 min (890.9 - 890.5)

Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	126,119 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)
151.00	498	198.0	0	0	498
152.00	1,368	715.0	897	897	38,063
153.00	8,822	6,900.0	4,555	5,452	3,786,066
154.00	25,925	1,559.0	16,623	22,075	7,381,341
155.00	50,627	1,626.0	37,594	59,669	7,398,397
156.00	83,648	1,717.0	66,450	126,119	7,422,663

Device	Routing	Invert	Outlet Devices
#1	Primary	149.70'	**24.0" Round Culvert** L= 300.0' Ke= 0.500 Inlet / Outlet Invert= 149.70' / 146.90' S= 0.0093 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=20.4 cfs @ 12.34 hrs HW=152.51' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 20.4 cfs @ 6.49 fps)

Summary for Pond P1A: Existing Pond at Center of Property

Inflow Area = 73.0 ac, 45.00% Impervious, Inflow Depth = 1.88" for 10-Year event
Inflow = 110.3 cfs @ 12.11 hrs, Volume= 11.4 af
Outflow = 24.8 cfs @ 12.73 hrs, Volume= 11.0 af, Atten= 78%, Lag= 37.0 min
Primary = 24.8 cfs @ 12.73 hrs, Volume= 11.0 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 144.70' Surf.Area= 48,178 sf Storage= 33,047 cf
Peak Elev= 148.69' @ 12.73 hrs Surf.Area= 66,092 sf Storage= 253,736 cf (220,690 cf above start)
Flood Elev= 152.00' Surf.Area= 267,018 sf Storage= 658,354 cf (625,307 cf above start)

Plug-Flow detention time= 341.0 min calculated for 10.2 af (89% of inflow)
Center-of-Mass det. time= 261.2 min (1,092.2 - 831.0)

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	658,354 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)
144.00	46,247	909.0	0	0	46,247
145.00	49,018	939.0	47,626	47,626	50,754
146.00	51,879	966.0	50,442	98,068	54,957
147.00	56,154	1,148.0	54,002	152,070	85,592
148.00	59,900	1,538.0	58,017	210,087	168,964
149.00	68,930	2,169.0	64,362	274,449	355,114
150.00	80,674	2,330.0	74,725	349,174	412,799
151.00	140,074	3,581.0	109,017	458,191	1,001,255
152.00	267,018	4,717.0	200,163	658,354	1,751,406

Device	Routing	Invert	Outlet Devices
#1	Device 4	144.70'	**12.0" Round Culvert** L= 382.0' Ke= 0.500 Inlet / Outlet Invert= 144.70' / 142.80' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 3	147.00'	**36.0" W x 18.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 4	144.00'	**24.0" Round Culvert** L= 372.0' Ke= 0.500 Inlet / Outlet Invert= 144.00' / 142.80' S= 0.0032 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#4	Primary	142.60'	**36.0" Round Culvert** L= 1,295.0' Ke= 0.500 Inlet / Outlet Invert= 142.60' / 140.90' S= 0.0013 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=24.8 cfs @ 12.73 hrs HW=148.69' (Free Discharge)
└**4=Culvert** (Passes 24.8 cfs of 43.3 cfs potential flow)
  ├**1=Culvert** (Barrel Controls 4.4 cfs @ 5.59 fps)
  └**3=Culvert** (Passes 20.4 cfs of 22.7 cfs potential flow)
    └**2=Orifice/Grate** (Orifice Controls 20.4 cfs @ 4.53 fps)

Summary for Link DP-1: 48" RCP Across Boston Post Road

Inflow Area = 84.1 ac, 47.58% Impervious, Inflow Depth > 1.99" for 10-Year event
Inflow = 45.7 cfs @ 12.07 hrs, Volume= 13.9 af
Primary = 45.7 cfs @ 12.07 hrs, Volume= 13.9 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP2: Overland Flow to Boston Post Road

Inflow Area = 0.9 ac, 4.56% Impervious, Inflow Depth = 1.38" for 10-Year event
Inflow = 1.4 cfs @ 12.08 hrs, Volume= 0.1 af
Primary = 1.4 cfs @ 12.08 hrs, Volume= 0.1 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP3: Wetland at Northeast Corner

Inflow Area = 0.7 ac, 0.00% Impervious, Inflow Depth = 1.25" for 10-Year event
Inflow = 0.9 cfs @ 12.09 hrs, Volume= 0.1 af
Primary = 0.9 cfs @ 12.09 hrs, Volume= 0.1 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

25-Year Storm Event- Existing

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentS-1A: Bldgs 1 & 2 & Runoff Area=482,099 sf 64.58% Impervious Runoff Depth=4.30"
Flow Length=1,239' Tc=5.1 min CN=85 Runoff=56.5 cfs 4.0 af

SubcatchmentS1B: Northeast Parking Runoff Area=362,836 sf 79.83% Impervious Runoff Depth=4.96"
Flow Length=375' Tc=5.0 min CN=91 Runoff=47.4 cfs 3.4 af

SubcatchmentS1C: Northwest Parking Runoff Area=696,274 sf 70.96% Impervious Runoff Depth=4.52"
Flow Length=1,845' Tc=12.2 min CN=87 Runoff=67.5 cfs 6.0 af

SubcatchmentS1D: Central Pervious Runoff Area=340,318 sf 20.22% Impervious Runoff Depth=2.62"
Tc=5.0 min CN=68 Runoff=24.6 cfs 1.7 af

SubcatchmentS1E: Bldg 3, Beltran Area Runoff Area=311,033 sf 48.01% Impervious Runoff Depth=3.18"
Flow Length=533' Tc=7.7 min CN=74 Runoff=25.1 cfs 1.9 af

SubcatchmentS1F: Offsite Farm Area Runoff Area=1,470,921 sf 29.23% Impervious Runoff Depth=1.22"
Flow Length=1,734' Tc=17.0 min UI Adjusted CN=51 Runoff=27.8 cfs 3.4 af

SubcatchmentS2: Southern Prop Line - Runoff Area=39,780 sf 4.56% Impervious Runoff Depth=2.18"
Flow Length=285' Slope=0.0280 '/' Tc=5.0 min CN=63 Runoff=2.3 cfs 0.2 af

SubcatchmentS3: Eastern Prop Line Runoff Area=28,484 sf 0.00% Impervious Runoff Depth=2.01"
Flow Length=20' Slope=0.0810 '/' Tc=5.0 min CN=61 Runoff=1.5 cfs 0.1 af

Pond P-1B: SW Wetland/Swale at Western Peak Elev=153.97' Storage=21,385 cf Inflow=42.8 cfs 5.3 af
24.0" Round Culvert n=0.011 L=300.0' S=0.0093 '/' Outflow=27.4 cfs 5.3 af

Pond P1A: Existing Pond at Center of Peak Elev=149.99' Storage=348,204 cf Inflow=147.6 cfs 16.5 af
Outflow=31.1 cfs 16.0 af

Link DP-1: 48" RCP Across Boston Post Road Inflow=66.0 cfs 20.0 af
Primary=66.0 cfs 20.0 af

Link DP2: Overland Flow to Boston Post Road Inflow=2.3 cfs 0.2 af
Primary=2.3 cfs 0.2 af

Link DP3: Wetland at Northeast Corner Inflow=1.5 cfs 0.1 af
Primary=1.5 cfs 0.1 af

Total Runoff Area = 85.7 ac Runoff Volume = 20.7 af Average Runoff Depth = 2.90"
53.24% Pervious = 45.6 ac 46.76% Impervious = 40.1 ac

Summary for Subcatchment S-1A: Bldgs 1 & 2 & Southern Portion of Prop

Runoff = 56.5 cfs @ 12.07 hrs, Volume= 4.0 af, Depth= 4.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
*	170,769	61	>75% Grass cover, Good, HSG B
*	99,171	98	Road & Sidewalk
*	212,159	98	Roofs
	482,099	85	Weighted Average
	170,769		35.42% Pervious Area
	311,330		64.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
3.5	537	0.0160	2.57		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	652	0.0130	12.71	89.87	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011 Concrete pipe, straight & clean
5.1	1,239	Total			

Summary for Subcatchment S1B: Northeast Parking Lot & Bldg 5

Runoff = 47.4 cfs @ 12.07 hrs, Volume= 3.4 af, Depth= 4.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
*	62,603	98	Roofs
*	227,035	98	Road & Sidewalk
*	73,198	61	>75% Grass cover, Good, HSG B
	362,836	91	Weighted Average
	73,198		20.17% Pervious Area
	289,638		79.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
1.2	175	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	150	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean

2.3	375	Total, Increased to minimum Tc = 5.0 min

Summary for Subcatchment S1C: Northwest Parking Lot & Bldg 4

Runoff = 67.5 cfs @ 12.16 hrs, Volume= 6.0 af, Depth= 4.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
*	44,716	98	Roofs
*	449,394	98	Road & Sidewalk
*	202,164	61	>75% Grass cover, Good, HSG B
	696,274	87	Weighted Average
	202,164		29.04% Pervious Area
	494,110		70.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
3.9	500	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.2	471	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.3	141	0.0150	8.60	15.20	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.3	188	0.0150	10.42	32.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.9	495	0.0070	9.33	65.95	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011 Concrete pipe, straight & clean
12.2	1,845	Total			

Summary for Subcatchment S1D: Central Pervious Area

Runoff = 24.6 cfs @ 12.08 hrs, Volume= 1.7 af, Depth= 2.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
*	961	98	Roofs
*	16,841	98	Road & Sidewalk
*	271,522	61	>75% Grass cover, Good, HSG B
	50,994	98	Water Surface, HSG B
	340,318	68	Weighted Average
	271,522		79.78% Pervious Area
	68,796		20.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S1E: Bldg 3, Beltran Area & Western Prop Line

Runoff = 25.1 cfs @ 12.11 hrs, Volume= 1.9 af, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
*	68,971	98	Roofs
*	98,296	61	>75% Grass cover, Good, HSG B
*	63,425	39	>75% Grass cover, Good, HSG A
*	80,341	98	Road & Sidewalk
	311,033	74	Weighted Average
	161,721		51.99% Pervious Area
	149,312		48.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.2	178	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	305	0.0100	5.36	4.21	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
7.7	533	Total			

Summary for Subcatchment S1F: Offsite Farm Area

Runoff = 27.8 cfs @ 12.28 hrs, Volume= 3.4 af, Depth= 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Adj	Description
10,003	98		Water Surface, HSG B
181,224	61		>75% Grass cover, Good, HSG B
859,788	30		Meadow, non-grazed, HSG A
301,859	98		Roofs, HSG B
118,047	98		Unconnected pavement, HSG B
1,470,921	54	51	Weighted Average, UI Adjusted
1,041,012			70.77% Pervious Area
429,909			29.23% Impervious Area
118,047			27.46% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0210	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.6	264	0.1900	7.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	100	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.9	610	0.0050	2.08	1.64	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.020 Corrugated PE, corrugated interior
0.6	307	0.0100	8.51	26.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.3	140	0.0200	8.87	70.94	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
4.1	172	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	91	0.0100	6.27	50.16	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
17.0	1,734	Total			

Summary for Subcatchment S2: Southern Prop Line - Pervious Area

Runoff = 2.3 cfs @ 12.08 hrs, Volume= 0.2 af, Depth= 2.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
*	37,965	61	>75% Grass cover, Good, HSG B
*	1,815	98	Road & Sidewalk
	39,780	63	Weighted Average
	37,965		95.44% Pervious Area
	1,815		4.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	25	0.0280	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.6	260	0.0280	2.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
4.4	285	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment S3: Eastern Prop Line

Runoff = 1.5 cfs @ 12.08 hrs, Volume= 0.1 af, Depth= 2.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
*	28,484	61	>75% Grass cover, Good, HSG B
	28,484		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	20	0.0810	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.5	20	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond P-1B: SW Wetland/Swale at Western Prop Line

Inflow Area = 40.9 ac, 32.50% Impervious, Inflow Depth = 1.56" for 25-Year event
Inflow = 42.8 cfs @ 12.19 hrs, Volume= 5.3 af
Outflow = 27.4 cfs @ 12.52 hrs, Volume= 5.3 af, Atten= 36%, Lag= 19.2 min
Primary = 27.4 cfs @ 12.52 hrs, Volume= 5.3 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 153.97' @ 12.52 hrs Surf.Area= 25,346 sf Storage= 21,385 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 3.6 min (879.3 - 875.7)

Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	126,119 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)
151.00	498	198.0	0	0	498
152.00	1,368	715.0	897	897	38,063
153.00	8,822	6,900.0	4,555	5,452	3,786,066
154.00	25,925	1,559.0	16,623	22,075	7,381,341
155.00	50,627	1,626.0	37,594	59,669	7,398,397
156.00	83,648	1,717.0	66,450	126,119	7,422,663

Device	Routing	Invert	Outlet Devices
#1	Primary	149.70'	**24.0" Round Culvert** L= 300.0' Ke= 0.500 Inlet / Outlet Invert= 149.70' / 146.90' S= 0.0093 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=27.4 cfs @ 12.52 hrs HW=153.97' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 27.4 cfs @ 8.71 fps)

Summary for Pond P1A: Existing Pond at Center of Property

Inflow Area = 73.0 ac, 45.00% Impervious, Inflow Depth = 2.71" for 25-Year event
Inflow = 147.6 cfs @ 12.10 hrs, Volume= 16.5 af
Outflow = 31.1 cfs @ 13.09 hrs, Volume= 16.0 af, Atten= 79%, Lag= 58.8 min
Primary = 31.1 cfs @ 13.09 hrs, Volume= 16.0 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 144.70' Surf.Area= 48,178 sf Storage= 33,047 cf
Peak Elev= 149.99' @ 13.09 hrs Surf.Area= 80,527 sf Storage= 348,204 cf (315,158 cf above start)
Flood Elev= 152.00' Surf.Area= 267,018 sf Storage= 658,354 cf (625,307 cf above start)

Plug-Flow detention time= 277.8 min calculated for 15.2 af (92% of inflow)
Center-of-Mass det. time= 220.1 min (1,046.0 - 825.9)

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	658,354 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)
144.00	46,247	909.0	0	0	46,247
145.00	49,018	939.0	47,626	47,626	50,754
146.00	51,879	966.0	50,442	98,068	54,957
147.00	56,154	1,148.0	54,002	152,070	85,592
148.00	59,900	1,538.0	58,017	210,087	168,964
149.00	68,930	2,169.0	64,362	274,449	355,114
150.00	80,674	2,330.0	74,725	349,174	412,799
151.00	140,074	3,581.0	109,017	458,191	1,001,255
152.00	267,018	4,717.0	200,163	658,354	1,751,406

Device	Routing	Invert	Outlet Devices
#1	Device 4	144.70'	**12.0" Round Culvert** L= 382.0' Ke= 0.500 Inlet / Outlet Invert= 144.70' / 142.80' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 3	147.00'	**36.0" W x 18.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 4	144.00'	**24.0" Round Culvert** L= 372.0' Ke= 0.500 Inlet / Outlet Invert= 144.00' / 142.80' S= 0.0032 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#4	Primary	142.60'	**36.0" Round Culvert** L= 1,295.0' Ke= 0.500 Inlet / Outlet Invert= 142.60' / 140.90' S= 0.0013 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=31.1 cfs @ 13.09 hrs HW=149.99' (Free Discharge)
└**4=Culvert** (Passes 31.1 cfs of 48.8 cfs potential flow)
  ├**1=Culvert** (Barrel Controls 4.9 cfs @ 6.29 fps)
  └**3=Culvert** (Barrel Controls 26.2 cfs @ 8.33 fps)
    └**2=Orifice/Grate** (Passes 26.2 cfs of 32.3 cfs potential flow)

Summary for Link DP-1: 48" RCP Across Boston Post Road

Inflow Area = 84.1 ac, 47.58% Impervious, Inflow Depth > 2.85" for 25-Year event
Inflow = 66.0 cfs @ 12.09 hrs, Volume= 20.0 af
Primary = 66.0 cfs @ 12.09 hrs, Volume= 20.0 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP2: Overland Flow to Boston Post Road

Inflow Area = 0.9 ac, 4.56% Impervious, Inflow Depth = 2.18" for 25-Year event
Inflow = 2.3 cfs @ 12.08 hrs, Volume= 0.2 af
Primary = 2.3 cfs @ 12.08 hrs, Volume= 0.2 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP3: Wetland at Northeast Corner

Inflow Area = 0.7 ac, 0.00% Impervious, Inflow Depth = 2.01" for 25-Year event
Inflow = 1.5 cfs @ 12.08 hrs, Volume= 0.1 af
Primary = 1.5 cfs @ 12.08 hrs, Volume= 0.1 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

100-Year Storm Event – Existing

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentS-1A: Bldgs 1 & 2 & Runoff Area=482,099 sf 64.58% Impervious Runoff Depth=6.79"
Flow Length=1,239' Tc=5.1 min CN=85 Runoff=87.3 cfs 6.3 af

SubcatchmentS1B: Northeast Parking Runoff Area=362,836 sf 79.83% Impervious Runoff Depth=7.52"
Flow Length=375' Tc=5.0 min CN=91 Runoff=70.2 cfs 5.2 af

SubcatchmentS1C: Northwest Parking Runoff Area=696,274 sf 70.96% Impervious Runoff Depth=7.03"
Flow Length=1,845' Tc=12.2 min CN=87 Runoff=102.9 cfs 9.4 af

SubcatchmentS1D: Central Pervious Runoff Area=340,318 sf 20.22% Impervious Runoff Depth=4.74"
Tc=5.0 min CN=68 Runoff=45.1 cfs 3.1 af

SubcatchmentS1E: Bldg 3, Beltran Area Runoff Area=311,033 sf 48.01% Impervious Runoff Depth=5.47"
Flow Length=533' Tc=7.7 min CN=74 Runoff=43.0 cfs 3.3 af

SubcatchmentS1F: Offsite Farm Area Runoff Area=1,470,921 sf 29.23% Impervious Runoff Depth=2.74"
Flow Length=1,734' Tc=17.0 min UI Adjusted CN=51 Runoff=73.1 cfs 7.7 af

SubcatchmentS2: Southern Prop Line - Runoff Area=39,780 sf 4.56% Impervious Runoff Depth=4.15"
Flow Length=285' Slope=0.0280 '/' Tc=5.0 min CN=63 Runoff=4.6 cfs 0.3 af

SubcatchmentS3: Eastern Prop Line Runoff Area=28,484 sf 0.00% Impervious Runoff Depth=3.91"
Flow Length=20' Slope=0.0810 '/' Tc=5.0 min CN=61 Runoff=3.1 cfs 0.2 af

Pond P-1B: SW Wetland/Swale at Western Peak Elev=155.80' Storage=109,941 cf Inflow=99.6 cfs 11.0 af
24.0" Round Culvert n=0.011 L=300.0' S=0.0093 '/' Outflow=32.4 cfs 11.0 af

Pond P1A: Existing Pond at Center of Peak Elev=151.75' Storage=595,639 cf Inflow=224.4 cfs 28.6 af
Outflow=35.9 cfs 28.1 af

Link DP-1: 48" RCP Across Boston Post Road Inflow=116.4 cfs 34.3 af
Primary=116.4 cfs 34.3 af

Link DP2: Overland Flow to Boston Post Road Inflow=4.6 cfs 0.3 af
Primary=4.6 cfs 0.3 af

Link DP3: Wetland at Northeast Corner Inflow=3.1 cfs 0.2 af
Primary=3.1 cfs 0.2 af

Total Runoff Area = 85.7 ac Runoff Volume = 35.4 af Average Runoff Depth = 4.96"
53.24% Pervious = 45.6 ac 46.76% Impervious = 40.1 ac

Summary for Subcatchment S-1A: Bldgs 1 & 2 & Southern Portion of Prop

Runoff = 87.3 cfs @ 12.07 hrs, Volume= 6.3 af, Depth= 6.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	170,769	61	>75% Grass cover, Good, HSG B
*	99,171	98	Road & Sidewalk
*	212,159	98	Roofs
	482,099	85	Weighted Average
	170,769		35.42% Pervious Area
	311,330		64.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
3.5	537	0.0160	2.57		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	652	0.0130	12.71	89.87	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011 Concrete pipe, straight & clean
5.1	1,239	Total			

Summary for Subcatchment S1B: Northeast Parking Lot & Bldg 5

Runoff = 70.2 cfs @ 12.07 hrs, Volume= 5.2 af, Depth= 7.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	62,603	98	Roofs
*	227,035	98	Road & Sidewalk
*	73,198	61	>75% Grass cover, Good, HSG B
	362,836	91	Weighted Average
	73,198		20.17% Pervious Area
	289,638		79.83% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
1.2	175	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	150	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean

2.3 375 Total, Increased to minimum Tc = 5.0 min

Summary for Subcatchment S1C: Northwest Parking Lot & Bldg 4

Runoff = 102.9 cfs @ 12.16 hrs, Volume= 9.4 af, Depth= 7.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	44,716	98	Roofs
*	449,394	98	Road & Sidewalk
*	202,164	61	>75% Grass cover, Good, HSG B
	696,274	87	Weighted Average
	202,164		29.04% Pervious Area
	494,110		70.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
3.9	500	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.2	471	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.3	141	0.0150	8.60	15.20	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.3	188	0.0150	10.42	32.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.9	495	0.0070	9.33	65.95	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011 Concrete pipe, straight & clean
12.2	1,845	Total			

Summary for Subcatchment S1D: Central Pervious Area

Runoff = 45.1 cfs @ 12.07 hrs, Volume= 3.1 af, Depth= 4.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	961	98	Roofs
*	16,841	98	Road & Sidewalk
*	271,522	61	>75% Grass cover, Good, HSG B
	50,994	98	Water Surface, HSG B
	340,318	68	Weighted Average
	271,522		79.78% Pervious Area
	68,796		20.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S1E: Bldg 3, Beltran Area & Western Prop Line

Runoff = 43.0 cfs @ 12.11 hrs, Volume= 3.3 af, Depth= 5.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	68,971	98	Roofs
*	98,296	61	>75% Grass cover, Good, HSG B
*	63,425	39	>75% Grass cover, Good, HSG A
*	80,341	98	Road & Sidewalk
	311,033	74	Weighted Average
	161,721		51.99% Pervious Area
	149,312		48.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.2	178	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	305	0.0100	5.36	4.21	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
7.7	533	Total			

Summary for Subcatchment S1F: Offsite Farm Area

Runoff = 73.1 cfs @ 12.26 hrs, Volume= 7.7 af, Depth= 2.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Adj	Description
10,003	98		Water Surface, HSG B
181,224	61		>75% Grass cover, Good, HSG B
859,788	30		Meadow, non-grazed, HSG A
301,859	98		Roofs, HSG B
118,047	98		Unconnected pavement, HSG B
1,470,921	54	51	Weighted Average, UI Adjusted
1,041,012			70.77% Pervious Area
429,909			29.23% Impervious Area
118,047			27.46% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0210	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.6	264	0.1900	7.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	100	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.9	610	0.0050	2.08	1.64	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.020 Corrugated PE, corrugated interior
0.6	307	0.0100	8.51	26.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.3	140	0.0200	8.87	70.94	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
4.1	172	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	91	0.0100	6.27	50.16	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
17.0	1,734	Total			

Summary for Subcatchment S2: Southern Prop Line - Pervious Area

Runoff = 4.6 cfs @ 12.08 hrs, Volume= 0.3 af, Depth= 4.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	37,965	61	>75% Grass cover, Good, HSG B
*	1,815	98	Road & Sidewalk
	39,780	63	Weighted Average
	37,965		95.44% Pervious Area
	1,815		4.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	25	0.0280	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.6	260	0.0280	2.69		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
4.4	285	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment S3: Eastern Prop Line

Runoff = 3.1 cfs @ 12.08 hrs, Volume= 0.2 af, Depth= 3.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	28,484	61	>75% Grass cover, Good, HSG B
	28,484		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	20	0.0810	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.5	20	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond P-1B: SW Wetland/Swale at Western Prop Line

Inflow Area = 40.9 ac, 32.50% Impervious, Inflow Depth = 3.21" for 100-Year event
Inflow = 99.6 cfs @ 12.20 hrs, Volume= 11.0 af
Outflow = 32.4 cfs @ 12.71 hrs, Volume= 11.0 af, Atten= 67%, Lag= 30.6 min
Primary = 32.4 cfs @ 12.71 hrs, Volume= 11.0 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 155.80' @ 12.71 hrs Surf.Area= 76,300 sf Storage= 109,941 cf

Plug-Flow detention time= 21.5 min calculated for 11.0 af (100% of inflow)
Center-of-Mass det. time= 21.5 min (877.5 - 856.0)

Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	126,119 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)
151.00	498	198.0	0	0	498
152.00	1,368	715.0	897	897	38,063
153.00	8,822	6,900.0	4,555	5,452	3,786,066
154.00	25,925	1,559.0	16,623	22,075	7,381,341
155.00	50,627	1,626.0	37,594	59,669	7,398,397
156.00	83,648	1,717.0	66,450	126,119	7,422,663

Device	Routing	Invert	Outlet Devices
#1	Primary	149.70'	**24.0" Round Culvert** L= 300.0' Ke= 0.500 Inlet / Outlet Invert= 149.70' / 146.90' S= 0.0093 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=32.4 cfs @ 12.71 hrs HW=155.80' (Free Discharge)
1=Culvert (Barrel Controls 32.4 cfs @ 10.31 fps)

Summary for Pond P1A: Existing Pond at Center of Property

Inflow Area = 73.0 ac, 45.00% Impervious, Inflow Depth = 4.71" for 100-Year event
Inflow = 224.4 cfs @ 12.10 hrs, Volume= 28.6 af
Outflow = 35.9 cfs @ 14.57 hrs, Volume= 28.1 af, Atten= 84%, Lag= 148.2 min
Primary = 35.9 cfs @ 14.57 hrs, Volume= 28.1 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 144.70' Surf.Area= 48,178 sf Storage= 33,047 cf
Peak Elev= 151.75' @ 14.57 hrs Surf.Area= 231,206 sf Storage= 595,639 cf (562,592 cf above start)
Flood Elev= 152.00' Surf.Area= 267,018 sf Storage= 658,354 cf (625,307 cf above start)

Plug-Flow detention time= 260.3 min calculated for 27.3 af (95% of inflow)
Center-of-Mass det. time= 222.6 min (1,045.6 - 823.0)

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	658,354 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)
144.00	46,247	909.0	0	0	46,247
145.00	49,018	939.0	47,626	47,626	50,754
146.00	51,879	966.0	50,442	98,068	54,957
147.00	56,154	1,148.0	54,002	152,070	85,592
148.00	59,900	1,538.0	58,017	210,087	168,964
149.00	68,930	2,169.0	64,362	274,449	355,114
150.00	80,674	2,330.0	74,725	349,174	412,799
151.00	140,074	3,581.0	109,017	458,191	1,001,255
152.00	267,018	4,717.0	200,163	658,354	1,751,406

Device	Routing	Invert	Outlet Devices
#1	Device 4	144.70'	**12.0" Round Culvert** L= 382.0' Ke= 0.500 Inlet / Outlet Invert= 144.70' / 142.80' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 3	147.00'	**36.0" W x 18.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 4	144.00'	**24.0" Round Culvert** L= 372.0' Ke= 0.500 Inlet / Outlet Invert= 144.00' / 142.80' S= 0.0032 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#4	Primary	142.60'	**36.0" Round Culvert** L= 1,295.0' Ke= 0.500 Inlet / Outlet Invert= 142.60' / 140.90' S= 0.0013 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=35.9 cfs @ 14.57 hrs HW=151.75' (Free Discharge)
└**4=Culvert** (Passes 35.9 cfs of 55.4 cfs potential flow)
  ├**1=Culvert** (Barrel Controls 5.6 cfs @ 7.12 fps)
  └**3=Culvert** (Barrel Controls 30.3 cfs @ 9.64 fps)
    └**2=Orifice/Grate** (Passes 30.3 cfs of 43.3 cfs potential flow)

Summary for Link DP-1: 48" RCP Across Boston Post Road

Inflow Area = 84.1 ac, 47.58% Impervious, Inflow Depth > 4.90" for 100-Year event
Inflow = 116.4 cfs @ 12.07 hrs, Volume= 34.3 af
Primary = 116.4 cfs @ 12.07 hrs, Volume= 34.3 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP2: Overland Flow to Boston Post Road

Inflow Area = 0.9 ac, 4.56% Impervious, Inflow Depth = 4.15" for 100-Year event
Inflow = 4.6 cfs @ 12.08 hrs, Volume= 0.3 af
Primary = 4.6 cfs @ 12.08 hrs, Volume= 0.3 af, Atten= 0%, Lag= 0.0 min

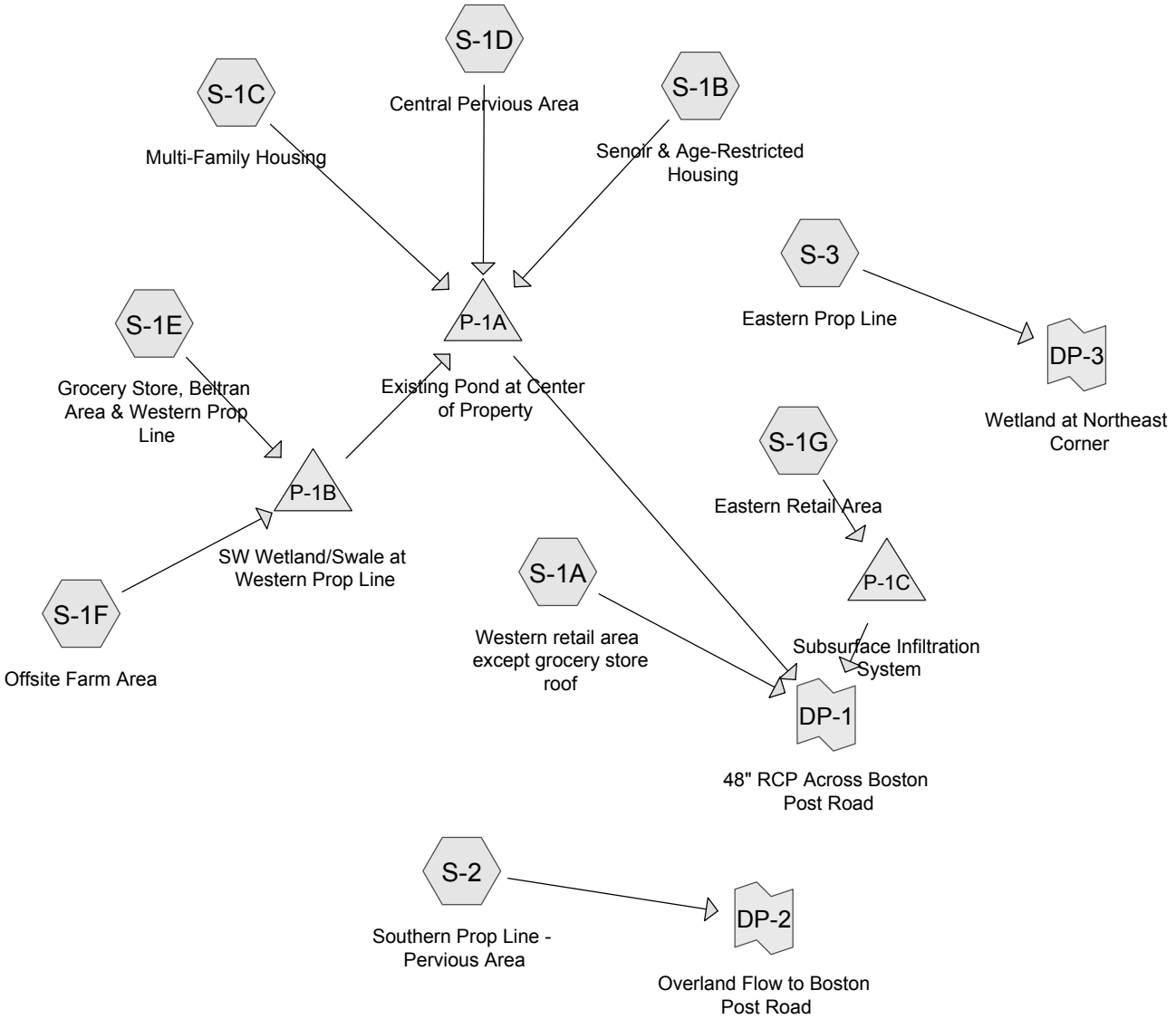
Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP3: Wetland at Northeast Corner

Inflow Area = 0.7 ac, 0.00% Impervious, Inflow Depth = 3.91" for 100-Year event
Inflow = 3.1 cfs @ 12.08 hrs, Volume= 0.2 af
Primary = 3.1 cfs @ 12.08 hrs, Volume= 0.2 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

HydroCAD Analysis: Proposed Conditions



Subcat Reach Pond Link

Routing Diagram for 13125-PR HydroCAD
Prepared by VHB, Printed 11/23/2015

1-inch Storm Event – Proposed

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentS-1A: Western retail area Runoff Area=323,637 sf 71.20% Impervious Runoff Depth=0.22"
Tc=5.0 min CN=87 Runoff=1.7 cfs 0.1 af

SubcatchmentS-1B: Senoir & Runoff Area=409,397 sf 60.08% Impervious Runoff Depth=0.13"
Flow Length=375' Tc=5.0 min CN=83 Runoff=0.9 cfs 0.1 af

SubcatchmentS-1C: Multi-Family Runoff Area=810,445 sf 58.16% Impervious Runoff Depth=0.08"
Flow Length=1,845' Tc=12.2 min CN=80 Runoff=0.6 cfs 0.1 af

SubcatchmentS-1D: Central Pervious Runoff Area=362,515 sf 16.84% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=67 Runoff=0.0 cfs 0.0 af

SubcatchmentS-1E: Grocery Store, Runoff Area=210,610 sf 48.42% Impervious Runoff Depth=0.02"
Flow Length=533' Tc=7.7 min CN=73 Runoff=0.0 cfs 0.0 af

SubcatchmentS-1F: Offsite Farm Area Runoff Area=1,470,921 sf 29.23% Impervious Runoff Depth=0.00"
Flow Length=1,734' Tc=17.0 min UI Adjusted CN=51 Runoff=0.0 cfs 0.0 af

SubcatchmentS-1G: Eastern Retail Area Runoff Area=109,664 sf 90.46% Impervious Runoff Depth=0.50"
Tc=5.0 min CN=94 Runoff=1.5 cfs 0.1 af

SubcatchmentS-2: Southern Prop Line - Runoff Area=5,752 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=61 Runoff=0.0 cfs 0.0 af

SubcatchmentS-3: Eastern Prop Line Runoff Area=28,587 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=20' Slope=0.0810 '/' Tc=5.0 min CN=61 Runoff=0.0 cfs 0.0 af

Pond P-1A: Existing Pond at Center of Peak Elev=144.86' Storage=40,621 cf Inflow=1.2 cfs 0.2 af
Outflow=0.1 cfs 0.1 af

Pond P-1B: SW Wetland/Swale at Western Prop Peak Elev=151.00' Storage=0 cf Inflow=0.0 cfs 0.0 af
24.0" Round Culvert n=0.011 L=300.0' S=0.0093 '/' Outflow=0.0 cfs 0.0 af

Pond P-1C: Subsurface Infiltration System Peak Elev=145.92' Storage=0.0 af Inflow=1.5 cfs 0.1 af
Discarded=0.1 cfs 0.1 af Primary=0.0 cfs 0.0 af Outflow=0.1 cfs 0.1 af

Link DP-1: 48" RCP Across Boston Post Road Inflow=1.7 cfs 0.3 af
Primary=1.7 cfs 0.3 af

Link DP-2: Overland Flow to Boston Post Road Inflow=0.0 cfs 0.0 af
Primary=0.0 cfs 0.0 af

Link DP-3: Wetland at Northeast Corner Inflow=0.0 cfs 0.0 af
Primary=0.0 cfs 0.0 af

Total Runoff Area = 85.7 ac Runoff Volume = 0.5 af Average Runoff Depth = 0.07"
56.05% Pervious = 48.0 ac 43.95% Impervious = 37.6 ac

Summary for Subcatchment S-1A: Western retail area except grocery store roof

Runoff = 1.7 cfs @ 12.09 hrs, Volume= 0.1 af, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

	Area (sf)	CN	Description
*	93,216	61	>75% Grass cover, Good, HSG B
*	216,535	98	Road & Sidewalk
*	13,886	98	Roofs
	323,637	87	Weighted Average
	93,216		28.80% Pervious Area
	230,421		71.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-1B: Senoir & Age-Restricted Housing

Runoff = 0.9 cfs @ 12.11 hrs, Volume= 0.1 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

	Area (sf)	CN	Description
*	98,868	98	Roofs
*	147,114	98	Road & Sidewalk
*	163,415	61	>75% Grass cover, Good, HSG B
	409,397	83	Weighted Average
	163,415		39.92% Pervious Area
	245,982		60.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
1.2	175	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	150	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
2.3	375	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment S-1C: Multi-Family Housing

Runoff = 0.6 cfs @ 12.42 hrs, Volume= 0.1 af, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

	Area (sf)	CN	Description
*	175,858	98	Roofs
*	295,473	98	Road & Sidewalk
*	232,176	61	>75% Grass cover, Good, HSG B
	106,938	39	>75% Grass cover, Good, HSG A
	810,445	80	Weighted Average
	339,114		41.84% Pervious Area
	471,331		58.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
3.9	500	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.2	471	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.3	141	0.0150	8.60	15.20	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.3	188	0.0150	10.42	32.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.9	495	0.0070	9.33	65.95	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011 Concrete pipe, straight & clean
12.2	1,845	Total			

Summary for Subcatchment S-1D: Central Pervious Area

Runoff = 0.0 cfs @ 24.01 hrs, Volume= 0.0 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

	Area (sf)	CN	Description
*	10,063	98	Road & Sidewalk
	1,564	39	>75% Grass cover, Good, HSG A
*	299,894	61	>75% Grass cover, Good, HSG B
	50,994	98	Water Surface, HSG B
	362,515	67	Weighted Average
	301,458		83.16% Pervious Area
	61,057		16.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-1E: Grocery Store, Beltran Area & Western Prop Line

Runoff = 0.0 cfs @ 15.15 hrs, Volume= 0.0 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

	Area (sf)	CN	Description
*	54,726	98	Roofs
*	55,331	61	>75% Grass cover, Good, HSG B
*	53,292	39	>75% Grass cover, Good, HSG A
*	47,261	98	Road & Sidewalk
	210,610	73	Weighted Average
	108,623		51.58% Pervious Area
	101,987		48.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.2	178	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	305	0.0100	5.36	4.21	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
7.7	533	Total			

Summary for Subcatchment S-1F: Offsite Farm Area

Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0.0 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

Area (sf)	CN	Adj	Description
10,003	98		Water Surface, HSG B
181,224	61		>75% Grass cover, Good, HSG B
859,788	30		Meadow, non-grazed, HSG A
301,859	98		Roofs, HSG B
118,047	98		Unconnected pavement, HSG B
1,470,921	54	51	Weighted Average, UI Adjusted
1,041,012			70.77% Pervious Area
429,909			29.23% Impervious Area
118,047			27.46% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0210	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.6	264	0.1900	7.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	100	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.9	610	0.0050	2.08	1.64	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.020 Corrugated PE, corrugated interior
0.6	307	0.0100	8.51	26.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.3	140	0.0200	8.87	70.94	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
4.1	172	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	91	0.0100	6.27	50.16	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
17.0	1,734	Total			

Summary for Subcatchment S-1G: Eastern Retail Area

Runoff = 1.5 cfs @ 12.08 hrs, Volume= 0.1 af, Depth= 0.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

	Area (sf)	CN	Description
*	75,018	98	Road & Sidewalk
*	24,187	98	Roof
	10,459	61	>75% Grass cover, Good, HSG B
	109,664	94	Weighted Average
	10,459		9.54% Pervious Area
	99,205		90.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-2: Southern Prop Line - Pervious Area

Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0.0 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

	Area (sf)	CN	Description
*	5,752	61	>75% Grass cover, Good, HSG B
	5,752		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-3: Eastern Prop Line

Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0.0 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Inch Rainfall=1.00"

	Area (sf)	CN	Description
*	28,587	61	>75% Grass cover, Good, HSG B
	28,587		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	20	0.0810	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.5	20	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond P-1A: Existing Pond at Center of Property

Inflow Area = 74.9 ac, 40.14% Impervious, Inflow Depth = 0.04" for 1-Inch event
Inflow = 1.2 cfs @ 12.34 hrs, Volume= 0.2 af
Outflow = 0.1 cfs @ 23.68 hrs, Volume= 0.1 af, Atten= 92%, Lag= 680.6 min
Primary = 0.1 cfs @ 23.68 hrs, Volume= 0.1 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 144.70' Surf.Area= 48,178 sf Storage= 33,047 cf
Peak Elev= 144.86' @ 23.68 hrs Surf.Area= 48,615 sf Storage= 40,621 cf (7,574 cf above start)
Flood Elev= 152.00' Surf.Area= 267,018 sf Storage= 658,354 cf (625,307 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 500.2 min (1,443.5 - 943.4)

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	658,354 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)
144.00	46,247	909.0	0	0	46,247
145.00	49,018	939.0	47,626	47,626	50,754
146.00	51,879	966.0	50,442	98,068	54,957
147.00	56,154	1,148.0	54,002	152,070	85,592
148.00	59,900	1,538.0	58,017	210,087	168,964
149.00	68,930	2,169.0	64,362	274,449	355,114
150.00	80,674	2,330.0	74,725	349,174	412,799
151.00	140,074	3,581.0	109,017	458,191	1,001,255
152.00	267,018	4,717.0	200,163	658,354	1,751,406

Device	Routing	Invert	Outlet Devices
#1	Device 4	144.70'	**12.0" Round Culvert** L= 382.0' Ke= 0.500 Inlet / Outlet Invert= 144.70' / 142.80' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 3	147.00'	**36.0" W x 18.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 4	144.00'	**24.0" Round Culvert** L= 372.0' Ke= 0.500 Inlet / Outlet Invert= 144.00' / 142.80' S= 0.0032 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#4	Primary	142.60'	**36.0" Round Culvert** L= 1,295.0' Ke= 0.500 Inlet / Outlet Invert= 142.60' / 140.90' S= 0.0013 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=0.1 cfs @ 23.68 hrs HW=144.86' (Free Discharge)
↑└**4=Culvert** (Passes 0.1 cfs of 18.0 cfs potential flow)
  ↑├**1=Culvert** (Barrel Controls 0.1 cfs @ 1.66 fps)
  └**3=Culvert** (Passes 0.0 cfs of 3.2 cfs potential flow)
    ↑└**2=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond P-1B: SW Wetland/Swale at Western Prop Line

Inflow Area = 38.6 ac, 31.63% Impervious, Inflow Depth = 0.00" for 1-Inch event
Inflow = 0.0 cfs @ 15.15 hrs, Volume= 0.0 af
Outflow = 0.0 cfs @ 15.15 hrs, Volume= 0.0 af, Atten= 0%, Lag= 0.0 min
Primary = 0.0 cfs @ 15.15 hrs, Volume= 0.0 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 151.00' @ 15.15 hrs Surf.Area= 498 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.0 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (1,088.6 - 1,088.6)

Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	126,119 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)
151.00	498	198.0	0	0	498
152.00	1,368	715.0	897	897	38,063
153.00	8,822	6,900.0	4,555	5,452	3,786,066
154.00	25,925	1,559.0	16,623	22,075	7,381,341
155.00	50,627	1,626.0	37,594	59,669	7,398,397
156.00	83,648	1,717.0	66,450	126,119	7,422,663

Device	Routing	Invert	Outlet Devices
#1	Primary	149.70'	**24.0" Round Culvert** L= 300.0' Ke= 0.500 Inlet / Outlet Invert= 149.70' / 146.90' S= 0.0093 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=8.4 cfs @ 15.15 hrs HW=151.00' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 8.4 cfs @ 3.88 fps)

Summary for Pond P-1C: Subsurface Infiltration System

Inflow Area = 2.5 ac, 90.46% Impervious, Inflow Depth = 0.50" for 1-Inch event
Inflow = 1.5 cfs @ 12.08 hrs, Volume= 0.1 af
Outflow = 0.1 cfs @ 12.07 hrs, Volume= 0.1 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.1 cfs @ 12.07 hrs, Volume= 0.1 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.0 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 145.92' @ 14.20 hrs Surf.Area= 0.1 ac Storage= 0.0 af

Plug-Flow detention time= 234.6 min calculated for 0.1 af (100% of inflow)
Center-of-Mass det. time= 234.5 min (1,066.4 - 831.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	145.00'	0.1 af	**30.00'W x 130.60'L x 3.50'H Field A** 0.3 af Overall - 0.1 af Embedded = 0.2 af x 40.0% Voids
#2A	145.50'	0.1 af	**ADS_StormTech SC-740** x 108 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 6 rows
#3	145.50'	0.0 af	**4.00'D x 7.00'H Vertical Cone/Cylinder**
		0.2 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	145.00'	**15.0" Round Culvert** L= 50.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 145.00' / 144.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	148.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Discarded	145.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.1 cfs @ 12.07 hrs HW=145.52' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=145.00' (Free Discharge)
└**1=Culvert** (Controls 0.0 cfs)
└**2=Sharp-Crested Rectangular Weir**(Controls 0.0 cfs)

Summary for Link DP-1: 48" RCP Across Boston Post Road

Inflow Area = 84.9 ac, 44.36% Impervious, Inflow Depth > 0.04" for 1-Inch event
Inflow = 1.7 cfs @ 12.09 hrs, Volume= 0.3 af
Primary = 1.7 cfs @ 12.09 hrs, Volume= 0.3 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Overland Flow to Boston Post Road

Inflow Area = 0.1 ac, 0.00% Impervious, Inflow Depth = 0.00" for 1-Inch event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.0 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.0 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Wetland at Northeast Corner

Inflow Area = 0.7 ac, 0.00% Impervious, Inflow Depth = 0.00" for 1-Inch event
Inflow = 0.0 cfs @ 0.00 hrs, Volume= 0.0 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.0 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

2-Year Storm Event – Proposed

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentS-1A: Western retail area Runoff Area=323,637 sf 71.20% Impervious Runoff Depth=1.91"
Tc=5.0 min CN=87 Runoff=17.3 cfs 1.2 af

SubcatchmentS-1B: Senoir & Runoff Area=409,397 sf 60.08% Impervious Runoff Depth=1.61"
Flow Length=375' Tc=5.0 min CN=83 Runoff=18.4 cfs 1.3 af

SubcatchmentS-1C: Multi-Family Runoff Area=810,445 sf 58.16% Impervious Runoff Depth=1.40"
Flow Length=1,845' Tc=12.2 min CN=80 Runoff=24.6 cfs 2.2 af

SubcatchmentS-1D: Central Pervious Runoff Area=362,515 sf 16.84% Impervious Runoff Depth=0.69"
Tc=5.0 min CN=67 Runoff=5.8 cfs 0.5 af

SubcatchmentS-1E: Grocery Store, Runoff Area=210,610 sf 48.42% Impervious Runoff Depth=0.98"
Flow Length=533' Tc=7.7 min CN=73 Runoff=4.9 cfs 0.4 af

SubcatchmentS-1F: Offsite Farm Area Runoff Area=1,470,921 sf 29.23% Impervious Runoff Depth=0.15"
Flow Length=1,734' Tc=17.0 min UI Adjusted CN=51 Runoff=1.0 cfs 0.4 af

SubcatchmentS-1G: Eastern Retail Area Runoff Area=109,664 sf 90.46% Impervious Runoff Depth=2.54"
Tc=5.0 min CN=94 Runoff=7.5 cfs 0.5 af

SubcatchmentS-2: Southern Prop Line - Runoff Area=5,752 sf 0.00% Impervious Runoff Depth=0.44"
Tc=5.0 min CN=61 Runoff=0.0 cfs 0.0 af

SubcatchmentS-3: Eastern Prop Line Runoff Area=28,587 sf 0.00% Impervious Runoff Depth=0.44"
Flow Length=20' Slope=0.0810 '/' Tc=5.0 min CN=61 Runoff=0.2 cfs 0.0 af

Pond P-1A: Existing Pond at Center of Peak Elev=146.84' Storage=143,151 cf Inflow=48.4 cfs 4.7 af
Outflow=3.5 cfs 4.4 af

Pond P-1B: SW Wetland/Swale at Western Prop Peak Elev=151.03' Storage=14 cf Inflow=4.9 cfs 0.8 af
24.0" Round Culvert n=0.011 L=300.0' S=0.0093 '/' Outflow=4.9 cfs 0.8 af

Pond P-1C: Subsurface Infiltration System Peak Elev=148.56' Storage=0.2 af Inflow=7.5 cfs 0.5 af
Discarded=0.1 cfs 0.2 af Primary=5.3 cfs 0.2 af Outflow=5.4 cfs 0.5 af

Link DP-1: 48" RCP Across Boston Post Road Inflow=20.5 cfs 5.8 af
Primary=20.5 cfs 5.8 af

Link DP-2: Overland Flow to Boston Post Road Inflow=0.0 cfs 0.0 af
Primary=0.0 cfs 0.0 af

Link DP-3: Wetland at Northeast Corner Inflow=0.2 cfs 0.0 af
Primary=0.2 cfs 0.0 af

Total Runoff Area = 85.7 ac Runoff Volume = 6.5 af Average Runoff Depth = 0.91"
56.05% Pervious = 48.0 ac 43.95% Impervious = 37.6 ac

Summary for Subcatchment S-1A: Western retail area except grocery store roof

Runoff = 17.3 cfs @ 12.07 hrs, Volume= 1.2 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	93,216	61	>75% Grass cover, Good, HSG B
*	216,535	98	Road & Sidewalk
*	13,886	98	Roofs
	323,637	87	Weighted Average
	93,216		28.80% Pervious Area
	230,421		71.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-1B: Senoir & Age-Restricted Housing

Runoff = 18.4 cfs @ 12.08 hrs, Volume= 1.3 af, Depth= 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	98,868	98	Roofs
*	147,114	98	Road & Sidewalk
*	163,415	61	>75% Grass cover, Good, HSG B
	409,397	83	Weighted Average
	163,415		39.92% Pervious Area
	245,982		60.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
1.2	175	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	150	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
2.3	375	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment S-1C: Multi-Family Housing

Runoff = 24.6 cfs @ 12.17 hrs, Volume= 2.2 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	175,858	98	Roofs
*	295,473	98	Road & Sidewalk
*	232,176	61	>75% Grass cover, Good, HSG B
	106,938	39	>75% Grass cover, Good, HSG A
	810,445	80	Weighted Average
	339,114		41.84% Pervious Area
	471,331		58.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
3.9	500	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.2	471	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.3	141	0.0150	8.60	15.20	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.3	188	0.0150	10.42	32.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.9	495	0.0070	9.33	65.95	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011 Concrete pipe, straight & clean
12.2	1,845	Total			

Summary for Subcatchment S-1D: Central Pervious Area

Runoff = 5.8 cfs @ 12.09 hrs, Volume= 0.5 af, Depth= 0.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	10,063	98	Road & Sidewalk
	1,564	39	>75% Grass cover, Good, HSG A
*	299,894	61	>75% Grass cover, Good, HSG B
	50,994	98	Water Surface, HSG B
	362,515	67	Weighted Average
	301,458		83.16% Pervious Area
	61,057		16.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-1E: Grocery Store, Beltran Area & Western Prop Line

Runoff = 4.9 cfs @ 12.12 hrs, Volume= 0.4 af, Depth= 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	54,726	98	Roofs
*	55,331	61	>75% Grass cover, Good, HSG B
*	53,292	39	>75% Grass cover, Good, HSG A
*	47,261	98	Road & Sidewalk
	210,610	73	Weighted Average
	108,623		51.58% Pervious Area
	101,987		48.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.2	178	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	305	0.0100	5.36	4.21	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
7.7	533	Total			

Summary for Subcatchment S-1F: Offsite Farm Area

Runoff = 1.0 cfs @ 12.60 hrs, Volume= 0.4 af, Depth= 0.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Adj	Description
10,003	98		Water Surface, HSG B
181,224	61		>75% Grass cover, Good, HSG B
859,788	30		Meadow, non-grazed, HSG A
301,859	98		Roofs, HSG B
118,047	98		Unconnected pavement, HSG B
1,470,921	54	51	Weighted Average, UI Adjusted
1,041,012			70.77% Pervious Area
429,909			29.23% Impervious Area
118,047			27.46% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0210	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.6	264	0.1900	7.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	100	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.9	610	0.0050	2.08	1.64	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.020 Corrugated PE, corrugated interior
0.6	307	0.0100	8.51	26.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.3	140	0.0200	8.87	70.94	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
4.1	172	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	91	0.0100	6.27	50.16	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
17.0	1,734	Total			

Summary for Subcatchment S-1G: Eastern Retail Area

Runoff = 7.5 cfs @ 12.07 hrs, Volume= 0.5 af, Depth= 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	75,018	98	Road & Sidewalk
*	24,187	98	Roof
	10,459	61	>75% Grass cover, Good, HSG B
	109,664	94	Weighted Average
	10,459		9.54% Pervious Area
	99,205		90.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-2: Southern Prop Line - Pervious Area

Runoff = 0.0 cfs @ 12.11 hrs, Volume= 0.0 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	5,752	61	>75% Grass cover, Good, HSG B
	5,752		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-3: Eastern Prop Line

Runoff = 0.2 cfs @ 12.11 hrs, Volume= 0.0 af, Depth= 0.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

	Area (sf)	CN	Description
*	28,587	61	>75% Grass cover, Good, HSG B
	28,587		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	20	0.0810	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.5	20	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond P-1A: Existing Pond at Center of Property

Inflow Area = 74.9 ac, 40.14% Impervious, Inflow Depth = 0.76" for 2-Year event
Inflow = 48.4 cfs @ 12.11 hrs, Volume= 4.7 af
Outflow = 3.5 cfs @ 15.58 hrs, Volume= 4.4 af, Atten= 93%, Lag= 207.9 min
Primary = 3.5 cfs @ 15.58 hrs, Volume= 4.4 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 144.70' Surf.Area= 48,178 sf Storage= 33,047 cf
Peak Elev= 146.84' @ 15.58 hrs Surf.Area= 55,459 sf Storage= 143,151 cf (110,104 cf above start)
Flood Elev= 152.00' Surf.Area= 267,018 sf Storage= 658,354 cf (625,307 cf above start)

Plug-Flow detention time= 543.3 min calculated for 3.7 af (77% of inflow)
Center-of-Mass det. time= 365.7 min (1,229.3 - 863.6)

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	658,354 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)
144.00	46,247	909.0	0	0	46,247
145.00	49,018	939.0	47,626	47,626	50,754
146.00	51,879	966.0	50,442	98,068	54,957
147.00	56,154	1,148.0	54,002	152,070	85,592
148.00	59,900	1,538.0	58,017	210,087	168,964
149.00	68,930	2,169.0	64,362	274,449	355,114
150.00	80,674	2,330.0	74,725	349,174	412,799
151.00	140,074	3,581.0	109,017	458,191	1,001,255
152.00	267,018	4,717.0	200,163	658,354	1,751,406

Device	Routing	Invert	Outlet Devices
#1	Device 4	144.70'	**12.0" Round Culvert** L= 382.0' Ke= 0.500 Inlet / Outlet Invert= 144.70' / 142.80' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 3	147.00'	**36.0" W x 18.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 4	144.00'	**24.0" Round Culvert** L= 372.0' Ke= 0.500 Inlet / Outlet Invert= 144.00' / 142.80' S= 0.0032 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#4	Primary	142.60'	**36.0" Round Culvert** L= 1,295.0' Ke= 0.500 Inlet / Outlet Invert= 142.60' / 140.90' S= 0.0013 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=3.5 cfs @ 15.58 hrs HW=146.84' (Free Discharge)
└**4=Culvert** (Passes 3.5 cfs of 33.9 cfs potential flow)
  ├**1=Culvert** (Barrel Controls 3.5 cfs @ 4.41 fps)
  └**3=Culvert** (Passes 0.0 cfs of 16.4 cfs potential flow)
    └**2=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond P-1B: SW Wetland/Swale at Western Prop Line

Inflow Area = 38.6 ac, 31.63% Impervious, Inflow Depth = 0.25" for 2-Year event
Inflow = 4.9 cfs @ 12.12 hrs, Volume= 0.8 af
Outflow = 4.9 cfs @ 12.12 hrs, Volume= 0.8 af, Atten= 0%, Lag= 0.0 min
Primary = 4.9 cfs @ 12.12 hrs, Volume= 0.8 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 151.03' @ 12.12 hrs Surf.Area= 516 sf Storage= 14 cf

Plug-Flow detention time= 0.0 min calculated for 0.8 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (939.2 - 939.2)

Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	126,119 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)
151.00	498	198.0	0	0	498
152.00	1,368	715.0	897	897	38,063
153.00	8,822	6,900.0	4,555	5,452	3,786,066
154.00	25,925	1,559.0	16,623	22,075	7,381,341
155.00	50,627	1,626.0	37,594	59,669	7,398,397
156.00	83,648	1,717.0	66,450	126,119	7,422,663

Device	Routing	Invert	Outlet Devices
#1	Primary	149.70'	**24.0" Round Culvert** L= 300.0' Ke= 0.500 Inlet / Outlet Invert= 149.70' / 146.90' S= 0.0093 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=8.7 cfs @ 12.12 hrs HW=151.03' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 8.7 cfs @ 3.92 fps)

Summary for Pond P-1C: Subsurface Infiltration System

Inflow Area = 2.5 ac, 90.46% Impervious, Inflow Depth = 2.54" for 2-Year event
Inflow = 7.5 cfs @ 12.07 hrs, Volume= 0.5 af
Outflow = 5.4 cfs @ 12.14 hrs, Volume= 0.5 af, Atten= 28%, Lag= 4.3 min
Discarded = 0.1 cfs @ 10.17 hrs, Volume= 0.2 af
Primary = 5.3 cfs @ 12.14 hrs, Volume= 0.2 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 148.56' @ 12.14 hrs Surf.Area= 0.1 ac Storage= 0.2 af

Plug-Flow detention time= 317.3 min calculated for 0.5 af (84% of inflow)
Center-of-Mass det. time= 252.6 min (1,038.8 - 786.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	145.00'	0.1 af	**30.00'W x 130.60'L x 3.50'H Field A** 0.3 af Overall - 0.1 af Embedded = 0.2 af x 40.0% Voids
#2A	145.50'	0.1 af	**ADS_StormTech SC-740** x 108 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 6 rows
#3	145.50'	0.0 af	**4.00'D x 7.00'H Vertical Cone/Cylinder**
		0.2 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	145.00'	**15.0" Round Culvert** L= 50.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 145.00' / 144.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	148.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Discarded	145.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.1 cfs @ 10.17 hrs HW=145.50' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=5.2 cfs @ 12.14 hrs HW=148.55' (Free Discharge)
└**1=Culvert** (Passes 5.2 cfs of 10.1 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 5.2 cfs @ 2.42 fps)

Summary for Link DP-1: 48" RCP Across Boston Post Road

Inflow Area = 84.9 ac, 44.36% Impervious, Inflow Depth > 0.82" for 2-Year event
Inflow = 20.5 cfs @ 12.12 hrs, Volume= 5.8 af
Primary = 20.5 cfs @ 12.12 hrs, Volume= 5.8 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Overland Flow to Boston Post Road

Inflow Area = 0.1 ac, 0.00% Impervious, Inflow Depth = 0.44" for 2-Year event
Inflow = 0.0 cfs @ 12.11 hrs, Volume= 0.0 af
Primary = 0.0 cfs @ 12.11 hrs, Volume= 0.0 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Wetland at Northeast Corner

Inflow Area = 0.7 ac, 0.00% Impervious, Inflow Depth = 0.44" for 2-Year event
Inflow = 0.2 cfs @ 12.11 hrs, Volume= 0.0 af
Primary = 0.2 cfs @ 12.11 hrs, Volume= 0.0 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

10-Year Storm Event- Proposed

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentS-1A: Western retail area Runoff Area=323,637 sf 71.20% Impervious Runoff Depth=3.38"
Tc=5.0 min CN=87 Runoff=30.0 cfs 2.1 af

SubcatchmentS-1B: Senoir & Runoff Area=409,397 sf 60.08% Impervious Runoff Depth=2.99"
Flow Length=375' Tc=5.0 min CN=83 Runoff=34.1 cfs 2.3 af

SubcatchmentS-1C: Multi-Family Runoff Area=810,445 sf 58.16% Impervious Runoff Depth=2.72"
Flow Length=1,845' Tc=12.2 min CN=80 Runoff=48.5 cfs 4.2 af

SubcatchmentS-1D: Central Pervious Runoff Area=362,515 sf 16.84% Impervious Runoff Depth=1.67"
Tc=5.0 min CN=67 Runoff=16.2 cfs 1.2 af

SubcatchmentS-1E: Grocery Store, Runoff Area=210,610 sf 48.42% Impervious Runoff Depth=2.12"
Flow Length=533' Tc=7.7 min CN=73 Runoff=11.2 cfs 0.9 af

SubcatchmentS-1F: Offsite Farm Area Runoff Area=1,470,921 sf 29.23% Impervious Runoff Depth=0.66"
Flow Length=1,734' Tc=17.0 min UI Adjusted CN=51 Runoff=12.1 cfs 1.9 af

SubcatchmentS-1G: Eastern Retail Area Runoff Area=109,664 sf 90.46% Impervious Runoff Depth=4.11"
Tc=5.0 min CN=94 Runoff=11.7 cfs 0.9 af

SubcatchmentS-2: Southern Prop Line - Runoff Area=5,752 sf 0.00% Impervious Runoff Depth=1.25"
Tc=5.0 min CN=61 Runoff=0.2 cfs 0.0 af

SubcatchmentS-3: Eastern Prop Line Runoff Area=28,587 sf 0.00% Impervious Runoff Depth=1.25"
Flow Length=20' Slope=0.0810 '/' Tc=5.0 min CN=61 Runoff=0.9 cfs 0.1 af

Pond P-1A: Existing Pond at Center of Peak Elev=148.37' Storage=233,098 cf Inflow=101.6 cfs 10.4 af
Outflow=19.8 cfs 10.0 af

Pond P-1B: SW Wetland/Swale at Western Prop Peak Elev=152.05' Storage=977 cf Inflow=17.9 cfs 2.7 af
24.0" Round Culvert n=0.011 L=300.0' S=0.0093 '/' Outflow=17.6 cfs 2.7 af

Pond P-1C: Subsurface Infiltration System Peak Elev=149.48' Storage=0.2 af Inflow=11.7 cfs 0.9 af
Discarded=0.1 cfs 0.2 af Primary=11.6 cfs 0.5 af Outflow=11.7 cfs 0.8 af

Link DP-1: 48" RCP Across Boston Post Road Inflow=44.8 cfs 12.6 af
Primary=44.8 cfs 12.6 af

Link DP-2: Overland Flow to Boston Post Road Inflow=0.2 cfs 0.0 af
Primary=0.2 cfs 0.0 af

Link DP-3: Wetland at Northeast Corner Inflow=0.9 cfs 0.1 af
Primary=0.9 cfs 0.1 af

Total Runoff Area = 85.7 ac Runoff Volume = 13.5 af Average Runoff Depth = 1.89"
56.05% Pervious = 48.0 ac 43.95% Impervious = 37.6 ac

Summary for Subcatchment S-1A: Western retail area except grocery store roof

Runoff = 30.0 cfs @ 12.07 hrs, Volume= 2.1 af, Depth= 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
*	93,216	61	>75% Grass cover, Good, HSG B
*	216,535	98	Road & Sidewalk
*	13,886	98	Roofs
	323,637	87	Weighted Average
	93,216		28.80% Pervious Area
	230,421		71.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-1B: Senoir & Age-Restricted Housing

Runoff = 34.1 cfs @ 12.07 hrs, Volume= 2.3 af, Depth= 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
*	98,868	98	Roofs
*	147,114	98	Road & Sidewalk
*	163,415	61	>75% Grass cover, Good, HSG B
	409,397	83	Weighted Average
	163,415		39.92% Pervious Area
	245,982		60.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
1.2	175	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	150	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
2.3	375	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment S-1C: Multi-Family Housing

Runoff = 48.5 cfs @ 12.17 hrs, Volume= 4.2 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
*	175,858	98	Roofs
*	295,473	98	Road & Sidewalk
*	232,176	61	>75% Grass cover, Good, HSG B
	106,938	39	>75% Grass cover, Good, HSG A
	810,445	80	Weighted Average
	339,114		41.84% Pervious Area
	471,331		58.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
3.9	500	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.2	471	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.3	141	0.0150	8.60	15.20	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.3	188	0.0150	10.42	32.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.9	495	0.0070	9.33	65.95	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011 Concrete pipe, straight & clean
12.2	1,845	Total			

Summary for Subcatchment S-1D: Central Pervious Area

Runoff = 16.2 cfs @ 12.08 hrs, Volume= 1.2 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
*	10,063	98	Road & Sidewalk
	1,564	39	>75% Grass cover, Good, HSG A
*	299,894	61	>75% Grass cover, Good, HSG B
	50,994	98	Water Surface, HSG B
	362,515	67	Weighted Average
	301,458		83.16% Pervious Area
	61,057		16.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-1E: Grocery Store, Beltran Area & Western Prop Line

Runoff = 11.2 cfs @ 12.11 hrs, Volume= 0.9 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
*	54,726	98	Roofs
*	55,331	61	>75% Grass cover, Good, HSG B
*	53,292	39	>75% Grass cover, Good, HSG A
*	47,261	98	Road & Sidewalk
	210,610	73	Weighted Average
	108,623		51.58% Pervious Area
	101,987		48.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.2	178	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	305	0.0100	5.36	4.21	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
7.7	533	Total			

Summary for Subcatchment S-1F: Offsite Farm Area

Runoff = 12.1 cfs @ 12.34 hrs, Volume= 1.9 af, Depth= 0.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

Area (sf)	CN	Adj	Description
10,003	98		Water Surface, HSG B
181,224	61		>75% Grass cover, Good, HSG B
859,788	30		Meadow, non-grazed, HSG A
301,859	98		Roofs, HSG B
118,047	98		Unconnected pavement, HSG B
1,470,921	54	51	Weighted Average, UI Adjusted
1,041,012			70.77% Pervious Area
429,909			29.23% Impervious Area
118,047			27.46% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0210	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.6	264	0.1900	7.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	100	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.9	610	0.0050	2.08	1.64	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.020 Corrugated PE, corrugated interior
0.6	307	0.0100	8.51	26.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.3	140	0.0200	8.87	70.94	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
4.1	172	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	91	0.0100	6.27	50.16	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
17.0	1,734	Total			

Summary for Subcatchment S-1G: Eastern Retail Area

Runoff = 11.7 cfs @ 12.07 hrs, Volume= 0.9 af, Depth= 4.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
*	75,018	98	Road & Sidewalk
*	24,187	98	Roof
	10,459	61	>75% Grass cover, Good, HSG B
	109,664	94	Weighted Average
	10,459		9.54% Pervious Area
	99,205		90.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-2: Southern Prop Line - Pervious Area

Runoff = 0.2 cfs @ 12.09 hrs, Volume= 0.0 af, Depth= 1.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
*	5,752	61	>75% Grass cover, Good, HSG B
	5,752		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-3: Eastern Prop Line

Runoff = 0.9 cfs @ 12.09 hrs, Volume= 0.1 af, Depth= 1.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.80"

	Area (sf)	CN	Description
*	28,587	61	>75% Grass cover, Good, HSG B
	28,587		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	20	0.0810	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.5	20	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond P-1A: Existing Pond at Center of Property

Inflow Area = 74.9 ac, 40.14% Impervious, Inflow Depth = 1.67" for 10-Year event
Inflow = 101.6 cfs @ 12.11 hrs, Volume= 10.4 af
Outflow = 19.8 cfs @ 12.86 hrs, Volume= 10.0 af, Atten= 81%, Lag= 44.8 min
Primary = 19.8 cfs @ 12.86 hrs, Volume= 10.0 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 144.70' Surf.Area= 48,178 sf Storage= 33,047 cf
Peak Elev= 148.37' @ 12.86 hrs Surf.Area= 63,202 sf Storage= 233,098 cf (200,052 cf above start)
Flood Elev= 152.00' Surf.Area= 267,018 sf Storage= 658,354 cf (625,307 cf above start)

Plug-Flow detention time= 361.7 min calculated for 9.2 af (88% of inflow)
Center-of-Mass det. time= 275.0 min (1,122.4 - 847.4)

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	658,354 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)
144.00	46,247	909.0	0	0	46,247
145.00	49,018	939.0	47,626	47,626	50,754
146.00	51,879	966.0	50,442	98,068	54,957
147.00	56,154	1,148.0	54,002	152,070	85,592
148.00	59,900	1,538.0	58,017	210,087	168,964
149.00	68,930	2,169.0	64,362	274,449	355,114
150.00	80,674	2,330.0	74,725	349,174	412,799
151.00	140,074	3,581.0	109,017	458,191	1,001,255
152.00	267,018	4,717.0	200,163	658,354	1,751,406

Device	Routing	Invert	Outlet Devices
#1	Device 4	144.70'	**12.0" Round Culvert** L= 382.0' Ke= 0.500 Inlet / Outlet Invert= 144.70' / 142.80' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 3	147.00'	**36.0" W x 18.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 4	144.00'	**24.0" Round Culvert** L= 372.0' Ke= 0.500 Inlet / Outlet Invert= 144.00' / 142.80' S= 0.0032 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#4	Primary	142.60'	**36.0" Round Culvert** L= 1,295.0' Ke= 0.500 Inlet / Outlet Invert= 142.60' / 140.90' S= 0.0013 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=19.8 cfs @ 12.86 hrs HW=148.37' (Free Discharge)
└**4=Culvert** (Passes 19.8 cfs of 41.8 cfs potential flow)
  ├**1=Culvert** (Barrel Controls 4.2 cfs @ 5.40 fps)
  └**3=Culvert** (Passes 15.5 cfs of 21.7 cfs potential flow)
    └**2=Orifice/Grate** (Orifice Controls 15.5 cfs @ 3.76 fps)

Summary for Pond P-1B: SW Wetland/Swale at Western Prop Line

Inflow Area = 38.6 ac, 31.63% Impervious, Inflow Depth = 0.85" for 10-Year event
Inflow = 17.9 cfs @ 12.28 hrs, Volume= 2.7 af
Outflow = 17.6 cfs @ 12.33 hrs, Volume= 2.7 af, Atten= 2%, Lag= 2.9 min
Primary = 17.6 cfs @ 12.33 hrs, Volume= 2.7 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 152.05' @ 12.33 hrs Surf.Area= 1,605 sf Storage= 977 cf

Plug-Flow detention time= 0.2 min calculated for 2.7 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (899.8 - 899.6)

Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	126,119 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)
151.00	498	198.0	0	0	498
152.00	1,368	715.0	897	897	38,063
153.00	8,822	6,900.0	4,555	5,452	3,786,066
154.00	25,925	1,559.0	16,623	22,075	7,381,341
155.00	50,627	1,626.0	37,594	59,669	7,398,397
156.00	83,648	1,717.0	66,450	126,119	7,422,663

Device	Routing	Invert	Outlet Devices
#1	Primary	149.70'	**24.0" Round Culvert** L= 300.0' Ke= 0.500 Inlet / Outlet Invert= 149.70' / 146.90' S= 0.0093 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=17.6 cfs @ 12.33 hrs HW=152.05' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 17.6 cfs @ 5.60 fps)

Summary for Pond P-1C: Subsurface Infiltration System

Inflow Area = 2.5 ac, 90.46% Impervious, Inflow Depth = 4.11" for 10-Year event
Inflow = 11.7 cfs @ 12.07 hrs, Volume= 0.9 af
Outflow = 11.7 cfs @ 12.07 hrs, Volume= 0.8 af, Atten= 0%, Lag= 0.2 min
Discarded = 0.1 cfs @ 8.70 hrs, Volume= 0.2 af
Primary = 11.6 cfs @ 12.07 hrs, Volume= 0.5 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 149.48' @ 12.07 hrs Surf.Area= 0.1 ac Storage= 0.2 af

Plug-Flow detention time= 204.6 min calculated for 0.8 af (90% of inflow)
Center-of-Mass det. time= 156.1 min (929.8 - 773.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	145.00'	0.1 af	**30.00'W x 130.60'L x 3.50'H Field A** 0.3 af Overall - 0.1 af Embedded = 0.2 af x 40.0% Voids
#2A	145.50'	0.1 af	**ADS_StormTech SC-740** x 108 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 6 rows
#3	145.50'	0.0 af	**4.00'D x 7.00'H Vertical Cone/Cylinder**
		0.2 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	145.00'	**15.0" Round Culvert** L= 50.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 145.00' / 144.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	148.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Discarded	145.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.1 cfs @ 8.70 hrs HW=145.50' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=11.6 cfs @ 12.07 hrs HW=149.47' (Free Discharge)
└**1=Culvert** (Inlet Controls 11.6 cfs @ 9.44 fps)
└**2=Sharp-Crested Rectangular Weir** (Passes 11.6 cfs of 21.7 cfs potential flow)

Summary for Link DP-1: 48" RCP Across Boston Post Road

Inflow Area = 84.9 ac, 44.36% Impervious, Inflow Depth > 1.79" for 10-Year event
Inflow = 44.8 cfs @ 12.07 hrs, Volume= 12.6 af
Primary = 44.8 cfs @ 12.07 hrs, Volume= 12.6 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Overland Flow to Boston Post Road

Inflow Area = 0.1 ac, 0.00% Impervious, Inflow Depth = 1.25" for 10-Year event
Inflow = 0.2 cfs @ 12.09 hrs, Volume= 0.0 af
Primary = 0.2 cfs @ 12.09 hrs, Volume= 0.0 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Wetland at Northeast Corner

Inflow Area = 0.7 ac, 0.00% Impervious, Inflow Depth = 1.25" for 10-Year event
Inflow = 0.9 cfs @ 12.09 hrs, Volume= 0.1 af
Primary = 0.9 cfs @ 12.09 hrs, Volume= 0.1 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

25-Year Storm Event- Proposed

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentS-1A: Western retail area Runoff Area=323,637 sf 71.20% Impervious Runoff Depth=4.52"
Tc=5.0 min CN=87 Runoff=39.6 cfs 2.8 af

SubcatchmentS-1B: Senoir & Runoff Area=409,397 sf 60.08% Impervious Runoff Depth=4.09"
Flow Length=375' Tc=5.0 min CN=83 Runoff=46.2 cfs 3.2 af

SubcatchmentS-1C: Multi-Family Runoff Area=810,445 sf 58.16% Impervious Runoff Depth=3.78"
Flow Length=1,845' Tc=12.2 min CN=80 Runoff=67.2 cfs 5.9 af

SubcatchmentS-1D: Central Pervious Runoff Area=362,515 sf 16.84% Impervious Runoff Depth=2.53"
Tc=5.0 min CN=67 Runoff=25.2 cfs 1.8 af

SubcatchmentS-1E: Grocery Store, Runoff Area=210,610 sf 48.42% Impervious Runoff Depth=3.09"
Flow Length=533' Tc=7.7 min CN=73 Runoff=16.5 cfs 1.2 af

SubcatchmentS-1F: Offsite Farm Area Runoff Area=1,470,921 sf 29.23% Impervious Runoff Depth=1.22"
Flow Length=1,734' Tc=17.0 min UI Adjusted CN=51 Runoff=27.8 cfs 3.4 af

SubcatchmentS-1G: Eastern Retail Area Runoff Area=109,664 sf 90.46% Impervious Runoff Depth=5.30"
Tc=5.0 min CN=94 Runoff=14.9 cfs 1.1 af

SubcatchmentS-2: Southern Prop Line - Runoff Area=5,752 sf 0.00% Impervious Runoff Depth=2.01"
Tc=5.0 min CN=61 Runoff=0.3 cfs 0.0 af

SubcatchmentS-3: Eastern Prop Line Runoff Area=28,587 sf 0.00% Impervious Runoff Depth=2.01"
Flow Length=20' Slope=0.0810 '/' Tc=5.0 min CN=61 Runoff=1.5 cfs 0.1 af

Pond P-1A: Existing Pond at Center of Peak Elev=149.69' Storage=324,395 cf Inflow=144.5 cfs 15.5 af
Outflow=30.2 cfs 15.0 af

Pond P-1B: SW Wetland/Swale at Western Peak Elev=153.67' Storage=14,652 cf Inflow=37.2 cfs 4.7 af
24.0" Round Culvert n=0.011 L=300.0' S=0.0093 '/' Outflow=26.1 cfs 4.7 af

Pond P-1C: Subsurface Infiltration System Peak Elev=151.88' Storage=0.2 af Inflow=14.9 cfs 1.1 af
Discarded=0.1 cfs 0.2 af Primary=14.8 cfs 0.8 af Outflow=14.9 cfs 1.0 af

Link DP-1: 48" RCP Across Boston Post Road Inflow=59.0 cfs 18.6 af
Primary=59.0 cfs 18.6 af

Link DP-2: Overland Flow to Boston Post Road Inflow=0.3 cfs 0.0 af
Primary=0.3 cfs 0.0 af

Link DP-3: Wetland at Northeast Corner Inflow=1.5 cfs 0.1 af
Primary=1.5 cfs 0.1 af

Total Runoff Area = 85.7 ac Runoff Volume = 19.5 af Average Runoff Depth = 2.74"
56.05% Pervious = 48.0 ac 43.95% Impervious = 37.6 ac

Summary for Subcatchment S-1A: Western retail area except grocery store roof

Runoff = 39.6 cfs @ 12.07 hrs, Volume= 2.8 af, Depth= 4.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
*	93,216	61	>75% Grass cover, Good, HSG B
*	216,535	98	Road & Sidewalk
*	13,886	98	Roofs
	323,637	87	Weighted Average
	93,216		28.80% Pervious Area
	230,421		71.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-1B: Senoir & Age-Restricted Housing

Runoff = 46.2 cfs @ 12.07 hrs, Volume= 3.2 af, Depth= 4.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
*	98,868	98	Roofs
*	147,114	98	Road & Sidewalk
*	163,415	61	>75% Grass cover, Good, HSG B
	409,397	83	Weighted Average
	163,415		39.92% Pervious Area
	245,982		60.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
1.2	175	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	150	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
2.3	375	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment S-1C: Multi-Family Housing

Runoff = 67.2 cfs @ 12.16 hrs, Volume= 5.9 af, Depth= 3.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
*	175,858	98	Roofs
*	295,473	98	Road & Sidewalk
*	232,176	61	>75% Grass cover, Good, HSG B
	106,938	39	>75% Grass cover, Good, HSG A
	810,445	80	Weighted Average
	339,114		41.84% Pervious Area
	471,331		58.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
3.9	500	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.2	471	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.3	141	0.0150	8.60	15.20	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.3	188	0.0150	10.42	32.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.9	495	0.0070	9.33	65.95	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011 Concrete pipe, straight & clean
12.2	1,845	Total			

Summary for Subcatchment S-1D: Central Pervious Area

Runoff = 25.2 cfs @ 12.08 hrs, Volume= 1.8 af, Depth= 2.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
*	10,063	98	Road & Sidewalk
	1,564	39	>75% Grass cover, Good, HSG A
*	299,894	61	>75% Grass cover, Good, HSG B
	50,994	98	Water Surface, HSG B
	362,515	67	Weighted Average
	301,458		83.16% Pervious Area
	61,057		16.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-1E: Grocery Store, Beltran Area & Western Prop Line

Runoff = 16.5 cfs @ 12.11 hrs, Volume= 1.2 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
*	54,726	98	Roofs
*	55,331	61	>75% Grass cover, Good, HSG B
*	53,292	39	>75% Grass cover, Good, HSG A
*	47,261	98	Road & Sidewalk
	210,610	73	Weighted Average
	108,623		51.58% Pervious Area
	101,987		48.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.2	178	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	305	0.0100	5.36	4.21	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
7.7	533	Total			

Summary for Subcatchment S-1F: Offsite Farm Area

Runoff = 27.8 cfs @ 12.28 hrs, Volume= 3.4 af, Depth= 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Adj	Description
10,003	98		Water Surface, HSG B
181,224	61		>75% Grass cover, Good, HSG B
859,788	30		Meadow, non-grazed, HSG A
301,859	98		Roofs, HSG B
118,047	98		Unconnected pavement, HSG B
1,470,921	54	51	Weighted Average, UI Adjusted
1,041,012			70.77% Pervious Area
429,909			29.23% Impervious Area
118,047			27.46% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0210	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.6	264	0.1900	7.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	100	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.9	610	0.0050	2.08	1.64	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.020 Corrugated PE, corrugated interior
0.6	307	0.0100	8.51	26.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.3	140	0.0200	8.87	70.94	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
4.1	172	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	91	0.0100	6.27	50.16	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
17.0	1,734	Total			

Summary for Subcatchment S-1G: Eastern Retail Area

Runoff = 14.9 cfs @ 12.07 hrs, Volume= 1.1 af, Depth= 5.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
*	75,018	98	Road & Sidewalk
*	24,187	98	Roof
	10,459	61	>75% Grass cover, Good, HSG B
	109,664	94	Weighted Average
	10,459		9.54% Pervious Area
	99,205		90.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-2: Southern Prop Line - Pervious Area

Runoff = 0.3 cfs @ 12.08 hrs, Volume= 0.0 af, Depth= 2.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
*	5,752	61	>75% Grass cover, Good, HSG B
	5,752		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-3: Eastern Prop Line

Runoff = 1.5 cfs @ 12.08 hrs, Volume= 0.1 af, Depth= 2.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.00"

	Area (sf)	CN	Description
*	28,587	61	>75% Grass cover, Good, HSG B
	28,587		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	20	0.0810	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.5	20	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond P-1A: Existing Pond at Center of Property

Inflow Area = 74.9 ac, 40.14% Impervious, Inflow Depth = 2.48" for 25-Year event
Inflow = 144.5 cfs @ 12.11 hrs, Volume= 15.5 af
Outflow = 30.2 cfs @ 12.98 hrs, Volume= 15.0 af, Atten= 79%, Lag= 52.1 min
Primary = 30.2 cfs @ 12.98 hrs, Volume= 15.0 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 144.70' Surf.Area= 48,178 sf Storage= 33,047 cf
Peak Elev= 149.69' @ 12.98 hrs Surf.Area= 76,880 sf Storage= 324,395 cf (291,348 cf above start)
Flood Elev= 152.00' Surf.Area= 267,018 sf Storage= 658,354 cf (625,307 cf above start)

Plug-Flow detention time= 281.2 min calculated for 14.2 af (92% of inflow)
Center-of-Mass det. time= 221.6 min (1,060.9 - 839.3)

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	658,354 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)
144.00	46,247	909.0	0	0	46,247
145.00	49,018	939.0	47,626	47,626	50,754
146.00	51,879	966.0	50,442	98,068	54,957
147.00	56,154	1,148.0	54,002	152,070	85,592
148.00	59,900	1,538.0	58,017	210,087	168,964
149.00	68,930	2,169.0	64,362	274,449	355,114
150.00	80,674	2,330.0	74,725	349,174	412,799
151.00	140,074	3,581.0	109,017	458,191	1,001,255
152.00	267,018	4,717.0	200,163	658,354	1,751,406

Device	Routing	Invert	Outlet Devices
#1	Device 4	144.70'	**12.0" Round Culvert** L= 382.0' Ke= 0.500 Inlet / Outlet Invert= 144.70' / 142.80' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 3	147.00'	**36.0" W x 18.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 4	144.00'	**24.0" Round Culvert** L= 372.0' Ke= 0.500 Inlet / Outlet Invert= 144.00' / 142.80' S= 0.0032 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#4	Primary	142.60'	**36.0" Round Culvert** L= 1,295.0' Ke= 0.500 Inlet / Outlet Invert= 142.60' / 140.90' S= 0.0013 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=30.2 cfs @ 12.98 hrs HW=149.69' (Free Discharge)
↑—**4=Culvert** (Passes 30.2 cfs of 47.6 cfs potential flow)
↑—**1=Culvert** (Barrel Controls 4.8 cfs @ 6.13 fps)
—**3=Culvert** (Barrel Controls 25.4 cfs @ 8.08 fps)
↑—**2=Orifice/Grate** (Passes 25.4 cfs of 29.9 cfs potential flow)

Summary for Pond P-1B: SW Wetland/Swale at Western Prop Line

Inflow Area = 38.6 ac, 31.63% Impervious, Inflow Depth = 1.45" for 25-Year event
Inflow = 37.2 cfs @ 12.24 hrs, Volume= 4.7 af
Outflow = 26.1 cfs @ 12.50 hrs, Volume= 4.7 af, Atten= 30%, Lag= 15.3 min
Primary = 26.1 cfs @ 12.50 hrs, Volume= 4.7 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 153.67' @ 12.50 hrs Surf.Area= 19,295 sf Storage= 14,652 cf

Plug-Flow detention time= 2.4 min calculated for 4.7 af (100% of inflow)
Center-of-Mass det. time= 2.4 min (885.1 - 882.7)

Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	126,119 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)
151.00	498	198.0	0	0	498
152.00	1,368	715.0	897	897	38,063
153.00	8,822	6,900.0	4,555	5,452	3,786,066
154.00	25,925	1,559.0	16,623	22,075	7,381,341
155.00	50,627	1,626.0	37,594	59,669	7,398,397
156.00	83,648	1,717.0	66,450	126,119	7,422,663

Device	Routing	Invert	Outlet Devices
#1	Primary	149.70'	**24.0" Round Culvert** L= 300.0' Ke= 0.500 Inlet / Outlet Invert= 149.70' / 146.90' S= 0.0093 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=26.1 cfs @ 12.50 hrs HW=153.67' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 26.1 cfs @ 8.30 fps)

Summary for Pond P-1C: Subsurface Infiltration System

Inflow Area = 2.5 ac, 90.46% Impervious, Inflow Depth = 5.30" for 25-Year event
Inflow = 14.9 cfs @ 12.07 hrs, Volume= 1.1 af
Outflow = 14.9 cfs @ 12.07 hrs, Volume= 1.0 af, Atten= 0%, Lag= 0.2 min
Discarded = 0.1 cfs @ 7.75 hrs, Volume= 0.2 af
Primary = 14.8 cfs @ 12.07 hrs, Volume= 0.8 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 151.88' @ 12.07 hrs Surf.Area= 0.1 ac Storage= 0.2 af

Plug-Flow detention time= 166.6 min calculated for 1.0 af (92% of inflow)
Center-of-Mass det. time= 125.8 min (893.4 - 767.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	145.00'	0.1 af	**30.00'W x 130.60'L x 3.50'H Field A** 0.3 af Overall - 0.1 af Embedded = 0.2 af x 40.0% Voids
#2A	145.50'	0.1 af	**ADS_StormTech SC-740** x 108 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 6 rows
#3	145.50'	0.0 af	**4.00'D x 7.00'H Vertical Cone/Cylinder**
		0.2 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	145.00'	**15.0" Round Culvert** L= 50.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 145.00' / 144.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	148.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Discarded	145.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.1 cfs @ 7.75 hrs HW=145.50' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=14.7 cfs @ 12.07 hrs HW=151.86' (Free Discharge)
└**1=Culvert** (Inlet Controls 14.7 cfs @ 12.02 fps)
└**2=Sharp-Crested Rectangular Weir** (Passes 14.7 cfs of 79.9 cfs potential flow)

Summary for Link DP-1: 48" RCP Across Boston Post Road

Inflow Area = 84.9 ac, 44.36% Impervious, Inflow Depth > 2.63" for 25-Year event
Inflow = 59.0 cfs @ 12.08 hrs, Volume= 18.6 af
Primary = 59.0 cfs @ 12.08 hrs, Volume= 18.6 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Overland Flow to Boston Post Road

Inflow Area = 0.1 ac, 0.00% Impervious, Inflow Depth = 2.01" for 25-Year event
Inflow = 0.3 cfs @ 12.08 hrs, Volume= 0.0 af
Primary = 0.3 cfs @ 12.08 hrs, Volume= 0.0 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Wetland at Northeast Corner

Inflow Area = 0.7 ac, 0.00% Impervious, Inflow Depth = 2.01" for 25-Year event
Inflow = 1.5 cfs @ 12.08 hrs, Volume= 0.1 af
Primary = 1.5 cfs @ 12.08 hrs, Volume= 0.1 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

100-Year Storm Event – Proposed

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentS-1A: Western retail area Runoff Area=323,637 sf 71.20% Impervious Runoff Depth=7.03"
Tc=5.0 min CN=87 Runoff=60.3 cfs 4.4 af

SubcatchmentS-1B: Senoir & Runoff Area=409,397 sf 60.08% Impervious Runoff Depth=6.55"
Flow Length=375' Tc=5.0 min CN=83 Runoff=72.5 cfs 5.1 af

SubcatchmentS-1C: Multi-Family Runoff Area=810,445 sf 58.16% Impervious Runoff Depth=6.19"
Flow Length=1,845' Tc=12.2 min CN=80 Runoff=108.6 cfs 9.6 af

SubcatchmentS-1D: Central Pervious Runoff Area=362,515 sf 16.84% Impervious Runoff Depth=4.62"
Tc=5.0 min CN=67 Runoff=46.8 cfs 3.2 af

SubcatchmentS-1E: Grocery Store, Runoff Area=210,610 sf 48.42% Impervious Runoff Depth=5.35"
Flow Length=533' Tc=7.7 min CN=73 Runoff=28.5 cfs 2.2 af

SubcatchmentS-1F: Offsite Farm Area Runoff Area=1,470,921 sf 29.23% Impervious Runoff Depth=2.74"
Flow Length=1,734' Tc=17.0 min UI Adjusted CN=51 Runoff=73.1 cfs 7.7 af

SubcatchmentS-1G: Eastern Retail Area Runoff Area=109,664 sf 90.46% Impervious Runoff Depth=7.88"
Tc=5.0 min CN=94 Runoff=21.7 cfs 1.7 af

SubcatchmentS-2: Southern Prop Line - Runoff Area=5,752 sf 0.00% Impervious Runoff Depth=3.91"
Tc=5.0 min CN=61 Runoff=0.6 cfs 0.0 af

SubcatchmentS-3: Eastern Prop Line Runoff Area=28,587 sf 0.00% Impervious Runoff Depth=3.91"
Flow Length=20' Slope=0.0810 '/' Tc=5.0 min CN=61 Runoff=3.1 cfs 0.2 af

Pond P-1A: Existing Pond at Center of Peak Elev=151.71' Storage=587,879 cf Inflow=231.3 cfs 27.8 af
Outflow=35.8 cfs 27.2 af

Pond P-1B: SW Wetland/Swale at Western Peak Elev=155.54' Storage=91,695 cf Inflow=90.2 cfs 9.9 af
24.0" Round Culvert n=0.011 L=300.0' S=0.0093 '/' Outflow=31.8 cfs 9.9 af

Pond P-1C: Subsurface Infiltration System Peak Elev=159.20' Storage=0.2 af Inflow=21.7 cfs 1.7 af
Discarded=0.1 cfs 0.3 af Primary=21.8 cfs 1.3 af Outflow=21.9 cfs 1.6 af

Link DP-1: 48" RCP Across Boston Post Road Inflow=110.2 cfs 32.9 af
Primary=110.2 cfs 32.9 af

Link DP-2: Overland Flow to Boston Post Road Inflow=0.6 cfs 0.0 af
Primary=0.6 cfs 0.0 af

Link DP-3: Wetland at Northeast Corner Inflow=3.1 cfs 0.2 af
Primary=3.1 cfs 0.2 af

Total Runoff Area = 85.7 ac Runoff Volume = 34.1 af Average Runoff Depth = 4.77"
56.05% Pervious = 48.0 ac 43.95% Impervious = 37.6 ac

Summary for Subcatchment S-1A: Western retail area except grocery store roof

Runoff = 60.3 cfs @ 12.07 hrs, Volume= 4.4 af, Depth= 7.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	93,216	61	>75% Grass cover, Good, HSG B
*	216,535	98	Road & Sidewalk
*	13,886	98	Roofs
	323,637	87	Weighted Average
	93,216		28.80% Pervious Area
	230,421		71.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-1B: Senoir & Age-Restricted Housing

Runoff = 72.5 cfs @ 12.07 hrs, Volume= 5.1 af, Depth= 6.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	98,868	98	Roofs
*	147,114	98	Road & Sidewalk
*	163,415	61	>75% Grass cover, Good, HSG B
	409,397	83	Weighted Average
	163,415		39.92% Pervious Area
	245,982		60.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.20"
1.2	175	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.4	150	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
2.3	375	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment S-1C: Multi-Family Housing

Runoff = 108.6 cfs @ 12.16 hrs, Volume= 9.6 af, Depth= 6.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	175,858	98	Roofs
*	295,473	98	Road & Sidewalk
*	232,176	61	>75% Grass cover, Good, HSG B
	106,938	39	>75% Grass cover, Good, HSG A
	810,445	80	Weighted Average
	339,114		41.84% Pervious Area
	471,331		58.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
3.9	500	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.2	471	0.0150	6.57	5.16	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.3	141	0.0150	8.60	15.20	**Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011 Concrete pipe, straight & clean
0.3	188	0.0150	10.42	32.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.9	495	0.0070	9.33	65.95	**Pipe Channel,** 36.0" Round Area= 7.1 sf Perim= 9.4' r= 0.75' n= 0.011 Concrete pipe, straight & clean
12.2	1,845	Total			

Summary for Subcatchment S-1D: Central Pervious Area

Runoff = 46.8 cfs @ 12.08 hrs, Volume= 3.2 af, Depth= 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	10,063	98	Road & Sidewalk
	1,564	39	>75% Grass cover, Good, HSG A
*	299,894	61	>75% Grass cover, Good, HSG B
	50,994	98	Water Surface, HSG B
	362,515	67	Weighted Average
	301,458		83.16% Pervious Area
	61,057		16.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-1E: Grocery Store, Beltran Area & Western Prop Line

Runoff = 28.5 cfs @ 12.11 hrs, Volume= 2.2 af, Depth= 5.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	54,726	98	Roofs
*	55,331	61	>75% Grass cover, Good, HSG B
*	53,292	39	>75% Grass cover, Good, HSG A
*	47,261	98	Road & Sidewalk
	210,610	73	Weighted Average
	108,623		51.58% Pervious Area
	101,987		48.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.2	178	0.0220	2.39		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	305	0.0100	5.36	4.21	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
7.7	533	Total			

Summary for Subcatchment S-1F: Offsite Farm Area

Runoff = 73.1 cfs @ 12.26 hrs, Volume= 7.7 af, Depth= 2.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

Area (sf)	CN	Adj	Description
10,003	98		Water Surface, HSG B
181,224	61		>75% Grass cover, Good, HSG B
859,788	30		Meadow, non-grazed, HSG A
301,859	98		Roofs, HSG B
118,047	98		Unconnected pavement, HSG B
1,470,921	54	51	Weighted Average, UI Adjusted
1,041,012			70.77% Pervious Area
429,909			29.23% Impervious Area
118,047			27.46% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0210	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
0.6	264	0.1900	7.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.8	100	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.9	610	0.0050	2.08	1.64	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.020 Corrugated PE, corrugated interior
0.6	307	0.0100	8.51	26.74	**Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.011 Concrete pipe, straight & clean
0.3	140	0.0200	8.87	70.94	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
4.1	172	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	91	0.0100	6.27	50.16	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=2.00' Z= 2.0 '/' Top.W=8.00' n= 0.022 Earth, clean & straight
17.0	1,734	Total			

Summary for Subcatchment S-1G: Eastern Retail Area

Runoff = 21.7 cfs @ 12.07 hrs, Volume= 1.7 af, Depth= 7.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	75,018	98	Road & Sidewalk
*	24,187	98	Roof
	10,459	61	>75% Grass cover, Good, HSG B
	109,664	94	Weighted Average
	10,459		9.54% Pervious Area
	99,205		90.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-2: Southern Prop Line - Pervious Area

Runoff = 0.6 cfs @ 12.08 hrs, Volume= 0.0 af, Depth= 3.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	5,752	61	>75% Grass cover, Good, HSG B
	5,752		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment S-3: Eastern Prop Line

Runoff = 3.1 cfs @ 12.08 hrs, Volume= 0.2 af, Depth= 3.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	28,587	61	>75% Grass cover, Good, HSG B
	28,587		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	20	0.0810	0.22		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.20"
1.5	20	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond P-1A: Existing Pond at Center of Property

Inflow Area = 74.9 ac, 40.14% Impervious, Inflow Depth = 4.45" for 100-Year event
Inflow = 231.3 cfs @ 12.10 hrs, Volume= 27.8 af
Outflow = 35.8 cfs @ 14.34 hrs, Volume= 27.2 af, Atten= 85%, Lag= 134.2 min
Primary = 35.8 cfs @ 14.34 hrs, Volume= 27.2 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 144.70' Surf.Area= 48,178 sf Storage= 33,047 cf
Peak Elev= 151.71' @ 14.34 hrs Surf.Area= 226,584 sf Storage= 587,879 cf (554,832 cf above start)
Flood Elev= 152.00' Surf.Area= 267,018 sf Storage= 658,354 cf (625,307 cf above start)

Plug-Flow detention time= 256.4 min calculated for 26.5 af (95% of inflow)
Center-of-Mass det. time= 219.2 min (1,050.8 - 831.6)

Volume	Invert	Avail.Storage	Storage Description
#1	144.00'	658,354 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)
144.00	46,247	909.0	0	0	46,247
145.00	49,018	939.0	47,626	47,626	50,754
146.00	51,879	966.0	50,442	98,068	54,957
147.00	56,154	1,148.0	54,002	152,070	85,592
148.00	59,900	1,538.0	58,017	210,087	168,964
149.00	68,930	2,169.0	64,362	274,449	355,114
150.00	80,674	2,330.0	74,725	349,174	412,799
151.00	140,074	3,581.0	109,017	458,191	1,001,255
152.00	267,018	4,717.0	200,163	658,354	1,751,406

Device	Routing	Invert	Outlet Devices
#1	Device 4	144.70'	**12.0" Round Culvert** L= 382.0' Ke= 0.500 Inlet / Outlet Invert= 144.70' / 142.80' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 3	147.00'	**36.0" W x 18.0" H Vert. Orifice/Grate** C= 0.600
#3	Device 4	144.00'	**24.0" Round Culvert** L= 372.0' Ke= 0.500 Inlet / Outlet Invert= 144.00' / 142.80' S= 0.0032 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#4	Primary	142.60'	**36.0" Round Culvert** L= 1,295.0' Ke= 0.500 Inlet / Outlet Invert= 142.60' / 140.90' S= 0.0013 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=35.8 cfs @ 14.34 hrs HW=151.71' (Free Discharge)
↑└**4=Culvert** (Passes 35.8 cfs of 55.3 cfs potential flow)
  ↑┬**1=Culvert** (Barrel Controls 5.6 cfs @ 7.11 fps)
  └**3=Culvert** (Barrel Controls 30.2 cfs @ 9.61 fps)
    ↑└**2=Orifice/Grate** (Passes 30.2 cfs of 43.1 cfs potential flow)

Summary for Pond P-1B: SW Wetland/Swale at Western Prop Line

Inflow Area = 38.6 ac, 31.63% Impervious, Inflow Depth = 3.07" for 100-Year event
Inflow = 90.2 cfs @ 12.22 hrs, Volume= 9.9 af
Outflow = 31.8 cfs @ 12.70 hrs, Volume= 9.9 af, Atten= 65%, Lag= 28.4 min
Primary = 31.8 cfs @ 12.70 hrs, Volume= 9.9 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 155.54' @ 12.70 hrs Surf.Area= 67,562 sf Storage= 91,695 cf

Plug-Flow detention time= 17.6 min calculated for 9.9 af (100% of inflow)
Center-of-Mass det. time= 17.5 min (878.6 - 861.1)

Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	126,119 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)
151.00	498	198.0	0	0	498
152.00	1,368	715.0	897	897	38,063
153.00	8,822	6,900.0	4,555	5,452	3,786,066
154.00	25,925	1,559.0	16,623	22,075	7,381,341
155.00	50,627	1,626.0	37,594	59,669	7,398,397
156.00	83,648	1,717.0	66,450	126,119	7,422,663

Device	Routing	Invert	Outlet Devices
#1	Primary	149.70'	**24.0" Round Culvert** L= 300.0' Ke= 0.500 Inlet / Outlet Invert= 149.70' / 146.90' S= 0.0093 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=31.8 cfs @ 12.70 hrs HW=155.54' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 31.8 cfs @ 10.12 fps)

Summary for Pond P-1C: Subsurface Infiltration System

Inflow Area = 2.5 ac, 90.46% Impervious, Inflow Depth = 7.88" for 100-Year event
Inflow = 21.7 cfs @ 12.07 hrs, Volume= 1.7 af
Outflow = 21.9 cfs @ 12.08 hrs, Volume= 1.6 af, Atten= 0%, Lag= 0.6 min
Discarded = 0.1 cfs @ 5.96 hrs, Volume= 0.3 af
Primary = 21.8 cfs @ 12.08 hrs, Volume= 1.3 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 159.20' @ 12.08 hrs Surf.Area= 0.1 ac Storage= 0.2 af

Plug-Flow detention time= 122.6 min calculated for 1.6 af (95% of inflow)
Center-of-Mass det. time= 92.6 min (851.3 - 758.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	145.00'	0.1 af	**30.00'W x 130.60'L x 3.50'H Field A** 0.3 af Overall - 0.1 af Embedded = 0.2 af x 40.0% Voids
#2A	145.50'	0.1 af	**ADS_StormTech SC-740** x 108 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 6 rows
#3	145.50'	0.0 af	**4.00'D x 7.00'H Vertical Cone/Cylinder**
		0.2 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	145.00'	**15.0" Round Culvert** L= 50.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 145.00' / 144.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	148.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Discarded	145.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.1 cfs @ 5.96 hrs HW=145.50' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=21.8 cfs @ 12.08 hrs HW=159.20' (Free Discharge)
└**1=Culvert** (Inlet Controls 21.8 cfs @ 17.74 fps)
└**2=Sharp-Crested Rectangular Weir** (Passes 21.8 cfs of 245.1 cfs potential flow)

Summary for Link DP-1: 48" RCP Across Boston Post Road

Inflow Area = 84.9 ac, 44.36% Impervious, Inflow Depth > 4.65" for 100-Year event
Inflow = 110.2 cfs @ 12.08 hrs, Volume= 32.9 af
Primary = 110.2 cfs @ 12.08 hrs, Volume= 32.9 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Overland Flow to Boston Post Road

Inflow Area = 0.1 ac, 0.00% Impervious, Inflow Depth = 3.91" for 100-Year event
Inflow = 0.6 cfs @ 12.08 hrs, Volume= 0.0 af
Primary = 0.6 cfs @ 12.08 hrs, Volume= 0.0 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Wetland at Northeast Corner

Inflow Area = 0.7 ac, 0.00% Impervious, Inflow Depth = 3.91" for 100-Year event
Inflow = 3.1 cfs @ 12.08 hrs, Volume= 0.2 af
Primary = 3.1 cfs @ 12.08 hrs, Volume= 0.2 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Appendix B
Standard 3 Computations and Supporting Information

- Recharge Calculations
- NRCS Soil Evaluation and Analysis
- Supporting Geotechnical Information
  - Exploration Location Plan
  - Monitoring Well Logs
  - Groundwater Contour Plan

Recharge Calculations

Computations

Project:	Grocery Store at Meadow Walk	Project #	13125
Location:	Sudbury, MA	Sheet	1 of 1
Calculated by:	BMG	Date:	11/23/2015
Checked by:	KSS	Date:	11/23/2015
Title	Standard 3 - Required Recharge - Reduced Impervious Area		

EXISTING CONDITIONS AND REQUIRED RECHARGE

HSG Type A	Required Recharge =	0.6	in
	Pervious Area =	1.5	acres
	Recharge Existing/Required =	**3000**	**cubic feet**
HSG Type B	Required Recharge =	0.35	in
	Pervious Area =	24.4	acres
	Recharge Existing/Required =	**31000**	**cubic feet**
	Total Recharge Existing/Required =	**34000**	**cubic feet**

PROPOSED CONDITIONS

HSG Type A	Required Recharge =	0.6	in
	Proposed Pervious Area =	3.7	acres
	Proposed Recharge =	**8000**	**cubic feet**
HSG Type B	Required Recharge =	0.35	in
	Proposed Pervious Area =	24.6	acres
	Proposed Recharge =	**31000**	**cubic feet**
	Total Proposed Recharge =	**39000**	**cubic feet**

Total Recharge Existing/Required =	**34000**	**cubic feet**
Total Proposed Recharge =	**39000**	**cubic feet**
Total Increase in Recharge =	**5000**	**cubic feet**

Soil Evaluation and Analysis

Map Scale: 1:6,460 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 300 600 1200 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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: http://websoilsurvey.nrcs.usda.gov
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: Middlesex County, Massachusetts
Survey Area Data: Version 14, Sep 19, 2014

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

Date(s) aerial images were photographed: Sep 12, 2014—Sep 28, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Middlesex County, Massachusetts (MA017)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
30B	Raynham silt loam, 0 to 5 percent slopes	C/D	4.2	2.1%
32B	Wareham loamy fine sand, 0 to 5 percent slopes	A/D	5.0	2.5%
44A	Birdsall mucky silt loam, 0 to 1 percent slopes	C/D	8.5	4.2%
51A	Swansea muck, 0 to 1 percent slopes	B/D	1.5	0.8%
52A	Freetown muck, 0 to 1 percent slopes	A/D	12.5	6.2%
103B	Charlton-Hollis-Rock outcrop complex, 3 to 8 percent slopes	A	0.2	0.1%
253B	Hinckley loamy sand, 3 to 8 percent slopes	A	2.4	1.2%
255A	Windsor loamy sand, 0 to 3 percent slopes	A	60.8	30.3%
255B	Windsor loamy sand, 3 to 8 percent slopes	A	6.5	3.2%
256A	Deerfield loamy sand, 0 to 3 percent slopes	B	10.2	5.1%
256B	Deerfield loamy sand, 3 to 8 percent slopes	B	4.9	2.4%
653	Udorthents, sandy		1.2	0.6%
656	Udorthents-Urban land complex		83.1	41.4%
Totals for Area of Interest			**200.9**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

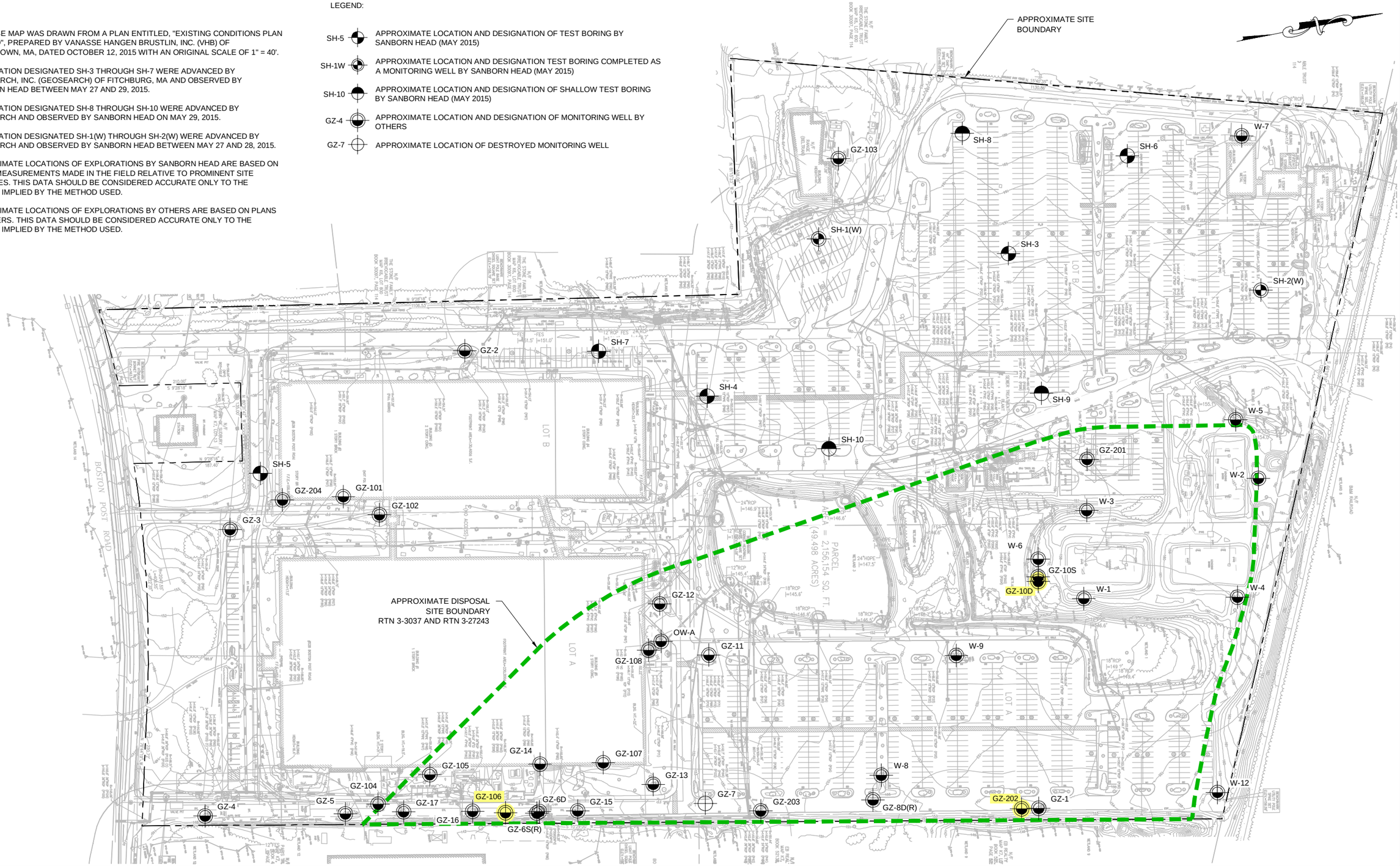
Geotechnical Documents

NOTES:

1. THE BASE MAP WAS DRAWN FROM A PLAN ENTITLED, "EXISTING CONDITIONS PLAN OF LAND", PREPARED BY VANASSE HANGEN BRUSTLIN, INC. (VHB) OF WATERTOWN, MA, DATED OCTOBER 12, 2015 WITH AN ORIGINAL SCALE OF 1" = 40'.
2. EXPLORATION DESIGNATED SH-3 THROUGH SH-7 WERE ADVANCED BY GEOSEARCH, INC. (GEOSEARCH) OF FITCHBURG, MA AND OBSERVED BY SANBORN HEAD BETWEEN MAY 27 AND 29, 2015.
3. EXPLORATION DESIGNATED SH-8 THROUGH SH-10 WERE ADVANCED BY GEOSEARCH AND OBSERVED BY SANBORN HEAD ON MAY 29, 2015.
4. EXPLORATION DESIGNATED SH-1(W) THROUGH SH-2(W) WERE ADVANCED BY GEOSEARCH AND OBSERVED BY SANBORN HEAD BETWEEN MAY 27 AND 28, 2015.
5. APPROXIMATE LOCATIONS OF EXPLORATIONS BY SANBORN HEAD ARE BASED ON TAPED MEASUREMENTS MADE IN THE FIELD RELATIVE TO PROMINENT SITE FEATURES. THIS DATA SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.
6. APPROXIMATE LOCATIONS OF EXPLORATIONS BY OTHERS ARE BASED ON PLANS BY OTHERS. THIS DATA SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

LEGEND:

- SH-5 — APPROXIMATE LOCATION AND DESIGNATION OF TEST BORING BY SANBORN HEAD (MAY 2015)
- SH-1W — APPROXIMATE LOCATION AND DESIGNATION TEST BORING COMPLETED AS A MONITORING WELL BY SANBORN HEAD (MAY 2015)
- SH-10 — APPROXIMATE LOCATION AND DESIGNATION OF SHALLOW TEST BORING BY SANBORN HEAD (MAY 2015)
- GZ-4 — APPROXIMATE LOCATION AND DESIGNATION OF MONITORING WELL BY OTHERS
- GZ-7 — APPROXIMATE LOCATION OF DESTROYED MONITORING WELL



SANBORN HEAD

GRAPHICAL SCALE
80' 40' 0' 80' 160'

NO.	DATE	DESCRIPTION	BY

DRAWN BY: C.GREEN
DESIGNED BY: L.NORTON
REVIEWED BY: P.PINTO
PROJECT MGR: L.NORTON
PIC: P.PINTO
DATE: FEBRUARY 2016

ENVIRONMENTAL CONSULTING SERVICES
528 BOSTON POST ROAD
SUDBURY, MASSACHUSETTS

PROJECT NUMBER: 3888.02

EXPLORATION LOCATION PLAN

SHEET NUMBER: 1

SANBORN HEAD

Sanborn, Head & Associates, Inc.

Project: Raytheon Company
Location: Sudbury, MA
Project No.: 3888.00

Log of Monitoring Well SH-1

Ground Elevation: Not Available

Drilling Method: 4¼" I.D. Hollow Stem Augers

Sampling Method: 2" O.D. Split Spoon, Automatic Hammer

Drilling Company: Geosearch, Inc.
Foreman: R. Gerard-Maillet
Date Started: 05/27/15 **Date Finished: 05/28/15**
Logged By: J. Findon-Henry **Checked By: K. Stetson**

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Casing	Depth of Hole	Stab. Time
05/27/15	09:00	4'	Ground Surface	15'	17'	Upon Completion
06/01/15	09:10	3.3'	Top of PVC			

Depth (ft)	Sample Information: Sample No.	Depth (ft)	Spoon Blows per 6 in	Pen/ Rec (in)	Field Testing Data	Stratum: Log	Description	Geologic Description	Well Diagram	Well Description
0							0' ASPHALT 0.3' FILL -----1'-----	(0 to 0.3'): ASPHALT.		2" Dia. Flushmounted Road Box Set in Concrete (0 to 1')
	S-1	0.5 - 1		---	PID: ND			S-1 (0.5 to 1'): Light brown, fine to coarse SAND, little Gravel, little Silt. Moist. FILL.		TPVC (0.3')
2	S-2	1 - 4		---	PID: ND			S-2 (1 to 4'): Light brown, fine to coarse SAND, little Silt, trace Gravel. Moist.		2" Dia. Sch. 40 PVC Riser (0.3 to 5')
										Concrete (0 to 1')
4	S-3	4 - 5		---	PID: ND			S-3 (4 to 5'): Light brown, fine SAND, little Silt, trace Gravel. Wet.		Bentonite Chips (1 to 3')
	S-4	5 - 7	8 7 9 9	24/8	PID: ND			S-4 (5 to 7'): Medium dense, light brown, fine SAND, some Silt. Wet.		2" Dia. Sch. 40 PVC Well Screen (0.010" Slots) (5 to 15')
6										
8							SAND			
10	S-5	10 - 12	9 8 9 12	24/11	PID: ND			S-5 (10 to 12'): Medium dense, light brown, fine SAND, some Silt. Wet.		Filter Sand (3 to 17')
12										
14										
16	S-6	15 - 17	10 15 20 19	24/13	PID: ND			S-6 (15 to 17'): Dense, light brown, fine SAND, some Silt. Wet.		
							-----17'-----	Boring terminated at 17 feet. No refusal encountered.		
18										
20								NOTES:		
22								1. Soil samples were screened for volatile organic compounds (VOCs) using a Photovac Model 2020 Photoionization Detector (PID) with a 10.6 eV lamp, calibrated to a 100 parts per million by volume (ppmv) isobutylene-in-air standard using a response factor of 1.0. Results are presented in ppmv; the typical detection limit is 1 ppmv. ND indicates not detected. NA indicates not available. The PID measures relative levels of VOCs. Although PID screening cannot be used directly to quantify VOC concentrations or identify individual compounds, the results can serve as a relative indicator for the presence of VOCs.		
24										
26								2. Test boring was advanced by hand excavation and vacuum extraction methods between approximately 1 to 5 feet. Samples were collected using a handheld auger.		
28										
30										
32										
34										

BORING LOG P:\3800S\3888.00\WORK\LOGS\3888.00 LOGS.GPJ 2010 SANBORN HEAD V1.GLB 2010 SANBORN HEAD V1.GDT 8/17/15

SANBORN HEAD

Sanborn, Head & Associates, Inc.

Project: Raytheon Company
Location: Sudbury, MA
Project No.: 3888.00

Log of Monitoring Well SH-2

Ground Elevation: Not Available

Drilling Method: 4¼" I.D. Hollow Stem Augers

Sampling Method: 2" O.D. Split Spoon, Automatic Hammer

Drilling Company: Geosearch, Inc.
Foreman: R. Gerard-Maillet
Date Started: 05/27/15 **Date Finished: 05/28/15**
Logged By: J. Findon-Henry **Checked By: K. Stetson**

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Casing	Depth of Hole	Stab. Time
05/28/15	08:00	4'	Ground Surface	20'	22'	Upon Completion
06/01/15	12:30	4.7'	Top of PVC			

Depth (ft)	Sample Information: Sample No.	Depth (ft)	Spoon Blows per 6 in	Pen/ Rec (in)	Field Testing Data	Stratum: Log	Description	Geologic Description	Well Diagram	Well Description
0							0' ASPHALT 0.3'	(0 to 0.3'): ASPHALT.		2" Dia. Flushmounted Road Box Set in Concrete (0 to 1')
	S-1	0.5 - 2		---	PID: ND		FILL	S-1 (0.5 to 2'): Light brown, fine to coarse SAND, little Gravel, little Silt. Moist. FILL.		TPVC (0.3')
2	S-2	2 - 4		---	PID: ND		-----2'-----	S-2 (2 to 4'): Light brown, fine SAND, little Gravel, little Silt. Moist.		2" Dia. Sch. 40 PVC Riser (0.3 to 5')
										Concrete (0 to 1')
4	S-3	4 - 6	2 4 4 5	24/12	PID: ND			S-3 (4 to 6'): Loose, light brown, fine SAND, little Silt. Wet.		Bentonite Chips (1 to 3')
										2" Dia. Sch. 40 PVC Well Screen (0.010" Slots) (5 to 15')
6	S-4	6 - 8	5 5 4 5	24/14	PID: ND			S-4 (6 to 8'): Medium dense, light brown, fine SAND, little Silt. Wet.		
8										
10	S-5	10 - 12	2 3 4 5	24/10	PID: ND			S-5 (10 to 12'): Loose, light brown, fine SAND, little Silt. Wet.		
12							SAND			Filter Sand (3 to 22')
14										
	S-6	15 - 17	3 3 3 3	24/13	PID: ND			S-6 (15 to 17'): Loose, light brown, fine SAND, some Silt. Wet.		
16										
18										
20	S-7	20 - 22	2 3 4 5	24/10	PID: ND			S-7 (20 to 22'): Loose, light brown, fine SAND, some Silt. Wet.		
22							-----22'-----	Boring terminated at 22 feet. No refusal encountered.		
24										
26										
28										
30										
32										
34										

NOTES:

1. Soil samples were screened for volatile organic compounds (VOCs) using a Photovac Model 2020 Photoionization Detector (PID) with a 10.6 eV lamp, calibrated to a 100 parts per million by volume (ppmv) isobutylene-in-air standard using a response factor of 1.0. Results are presented in ppmv; the typical detection limit is 1 ppmv. ND indicates not detected. NA indicates not available. The PID measures relative levels of VOCs. Although PID screening cannot be used directly to quantify VOC concentrations or identify individual compounds, the results can serve as a relative indicator for the presence of VOCs.

2. Test boring was advanced by hand excavation and vacuum extraction methods between approximately 1 to 5 feet. Samples were collected using a handheld auger.

SANBORN HEAD

Sanborn, Head & Associates, Inc.

Project: Raytheon Company
Location: Sudbury, MA
Project No.: 3888.00

Log of Boring SH-3

Ground Elevation: Not Available

Drilling Method: 4" I.D. Casing Drive and Wash

Sampling Method: 2" O.D. Split Spoon, Automatic Hammer

Drilling Company: Geosearch, Inc.
Foreman: R. Gerard-Maillet
Date Started: 05/27/15 **Date Finished: 05/28/15**
Logged By: J. Findon-Henry **Checked By: K. Stetson**

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Casing	Depth of Hole	Stab. Time
05/28/15	13:00	5'	Ground Surface	21'	21'	Upon Completion

Depth (ft)	Sample Information: Sample No.	Depth (ft)	Spoon Blows per 6 in	Pen/ Rec (in)	Field Testing Data	Stratum: Log	Description	Geologic Description	Remarks
0							0'		1. Soil samples were screened for volatile organic compounds (VOCs) using a Photovac Model 2020 Photoionization Detector (PID) with a 10.6 eV lamp, calibrated to a 100 parts per million by volume (ppmv) isobutylene-in-air standard using a response factor of 1.0. Results are presented in ppmv; the typical detection limit is 1 ppmv. ND indicates not detected. NA indicates not available. The PID measures relative levels of VOCs. Although PID screening cannot be used directly to quantify VOC concentrations or identify individual compounds, the results can serve as a relative indicator for the presence of VOCs. 2. Test boring was advanced by hand excavation and vacuum extraction methods between approximately 1 to 4 feet. Samples were collected using a handheld auger.
							ASPHALT	(0 to 0.3'): ASPHALT.	
	S-1	0.5 - 2		---	PID: ND		0.5	S-1 (0.5 to 2'): Light brown, fine to coarse SAND, little Gravel, little Silt. Moist. FILL.	
2							FILL		
	S-2	2 - 3		---	PID: ND		2'	S-2 (2 to 3'): Light brown, fine SAND, little Silt. Moist.	
	S-3	3 - 4		---	PID: ND			S-3 (3 to 4'): Light brown, fine SAND, little Silt. Moist.	
4									
	S-4	5 - 7	6 6 10 10	24/9	PID: ND			S-4 (5 to 7'): Medium dense, light brown, fine SAND, little Silt. Wet.	
6									
8									
10	S-5	10 - 12	5 6 6 9	24/10	PID: ND			S-5 (10 to 12'): Medium dense, light brown, fine SAND, some Silt. Wet.	
							SAND		
12									
14									
	S-6	15 - 17	4 6 4 3	24/13	PID: ND			S-6 (15 to 17'): Medium dense, light brown, fine SAND and Silt. Wet.	Rock/Gravel drill cuttings observed in drilling wash between approximately 15 to 21 feet.
16									
18									
20	S-7	20 - 20	100/0"	0/0				S-7 (20 to 20'): No Recovery.	
							21'		
								Boring terminated at 21 feet due to roller bit refusal.	
22									
24									
26									
28									
30									
32									
34									

BORING LOG P:\3800S\3888.00\WORK\LOGS\3888.00 LOGS.GPJ 2010 SANBORN HEAD V1.GLB 2010 SANBORN HEAD V1.GDT 8/17/15

SANBORN HEAD

Sanborn, Head & Associates, Inc.

Project: Raytheon Company
Location: Sudbury, MA
Project No.: 3888.00

Log of Boring SH-4

Ground Elevation: Not Available

Drilling Method: 4" I.D. Casing Drive and Wash

Sampling Method: 2" O.D. Split Spoon, Automatic Hammer

Drilling Company: Geosearch, Inc.
Foreman: R. Gerard-Maillet
Date Started: 05/27/15 **Date Finished: 05/29/15**
Logged By: J. Findon-Henry **Checked By: K. Stetson**

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Casing	Depth of Hole	Stab. Time
05/29/15	08:00	4'	Ground Surface	24'	26'	Upon Completion

Depth (ft)	Sample Information: Sample No.	Depth (ft)	Spoon Blows per 6 in	Pen/ Rec (in)	Field Testing Data	Stratum: Log	Description	Geologic Description	Remarks
0							0' ASPHALT 0.3'	(0 to 0.3'): ASPHALT.	1. Soil samples were screened for volatile organic compounds (VOCs) using a Photovac Model 2020 Photoionization Detector (PID) with a 10.6 eV lamp, calibrated to a 100 parts per million by volume (ppmv) isobutylene-in-air standard using a response factor of 1.0. Results are presented in ppmv; the typical detection limit is 1 ppmv. ND indicates not detected. NA indicates not available. The PID measures relative levels of VOCs. Although PID screening cannot be used directly to quantify VOC concentrations or identify individual compounds, the results can serve as a relative indicator for the presence of VOCs. 2. Test boring was advanced by hand excavation and vacuum extraction methods between approximately 1 to 4 feet. Samples were collected using a handheld auger.
	S-1	0.5 - 2		---	PID: ND			S-1 (0.5 to 2'): Brown, fine to coarse SAND, some Silt, trace Gravel. Moist. FILL.	
2	S-2	2 - 4		---	PID: ND			S-2 (2 to 4'): Brown, fine to coarse SAND, some Silt, trace Gravel. Moist. FILL.	
4	S-3	4 - 6	2 2 4 3	24/8	PID: ND		FILL	S-3 (4 to 6'): Loose, brown, fine to coarse SAND, little Silt, trace Gravel, slight Organic odor. Wet. FILL.	
6	S-4	6 - 8	2 2 8 13	24/9	PID: ND			S-4A (6 to 7.8'): Medium dense, brown, fine to coarse SAND, little Silt, trace Gravel, slight Organic odor. Wet. FILL.	
8					PID: ND		-----7.8'-----	S-4B (7.8 to 8'): Medium dense, brown, fine SAND and Silt. Wet.	
	S-5	9 - 11	9 11 9 9	24/12	PID: ND			S-5 (9 to 11'): Medium dense, light brown, fine SAND, some Silt. Wet.	
10	S-6	11 - 13	12 12 13 14	24/10	PID: ND			S-6 (11 to 13'): Medium dense, light brown, fine SAND, some Silt. Wet.	
12									
14	S-7	14 - 16	7 7 7 7	24/10	PID: ND			S-7 (14 to 16'): Medium dense, light brown, fine SAND and Silt. Wet.	
16							SAND		
18									
20	S-8	19 - 21	9 6 4 4	24/9	PID: ND			S-8 (19 to 21'): Medium dense, brown/gray, fine SAND, some Silt. Wet.	
22									
24	S-9	24 - 26	20 24 80 100	24/14	PID: ND		-----24'-----	S-9 (24 to 26'): Very dense, gray, fine to coarse SAND, little Gravel, little Silt. Wet. GLACIAL TILL.	
							GLACIAL TILL		
26							-----26'-----	Boring terminated at 26 feet. No refusal encountered.	
28									
30									
32									
34									

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SANBORN HEAD

Sanborn, Head & Associates, Inc.

Project: Raytheon Company
Location: Sudbury, MA
Project No.: 3888.00

Log of Boring SH-5

Ground Elevation: Not Available

Drilling Method: 4" I.D. Casing Drive and Wash

Sampling Method: 2" O.D. Split Spoon, Automatic Hammer

Drilling Company: Geosearch, Inc.
Foreman: R. Gerard-Maillet
Date Started: 05/27/15 **Date Finished: 05/29/15**
Logged By: J. Findon-Henry **Checked By: K. Stetson**

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Casing	Depth of Hole	Stab. Time
05/27/15	13:00	3.5'	Ground Surface	21'	23'	Upon Completion

Depth (ft)	Sample Information: Sample No.	Depth (ft)	Spoon Blows per 6 in	Pen/ Rec (in)	Field Testing Data	Stratum: Log	Description	Geologic Description
0							0' ASPHALT 0.3'	(0 to 0.3'): ASPHALT.
	S-1	1 - 2		---	PID: ND		FILL	S-1 (1 to 2'): Brown, fine to coarse SAND, little Silt, little Gravel. Moist. FILL.
2	S-2	2 - 4		---	PID: ND		-----2'-----	S-2 (2 to 4'): Brown, fine to coarse SAND, some Silt, trace Gravel. Moist.
4	S-3	4 - 6	6 7 6 4	24/8	PID: ND		SAND	S-3 (4 to 6'): Medium dense, light brown, fine SAND, some Silt. Wet.
6	S-4	6 - 8	5 4 8 8	24/16	PID: ND			S-4 (6 to 8'): Medium dense, light brown, fine SAND, some Silt. Wet.
8	S-5	9 - 11	5 5 4 5	24/18	PID: ND		-----9'-----	S-5 (9 to 11'): Loose, light brown, SILT, some Sand. Wet.
12								
14	S-6	14 - 16	3 2 3 2	24/13	PID: ND		SILT	S-6 (14 to 16'): Loose, light brown, SILT, some Sand. Wet.
16	S-7	16 - 18	2 1 2 1	24/15	PID: ND			S-7 (16 to 18'): Very loose, light brown, SILT, some Sand. Wet.
18								
	S-8	19 - 21	3 1 2 3	24/9	PID: ND		-----19'-----	S-8 (19 to 21'): Very loose, light brown, fine SAND and Silt. Wet.
20	S-9	21 - 23	2 2 3 3	24/13	PID: ND		SAND & SILT	S-9 (21 to 23'): Loose, light brown, fine SAND and Silt. Wet.
22							-----23'-----	Boring terminated at 23 feet. No refusal encountered.
24								
26								
28								
30								
32								
34								

Remarks

1. Soil samples were screened for volatile organic compounds (VOCs) using a Photovac Model 2020 Photoionization Detector (PID) with a 10.6 eV lamp, calibrated to a 100 parts per million by volume (ppmv) isobutylene-in-air standard using a response factor of 1.0. Results are presented in ppmv; the typical detection limit is 1 ppmv. ND indicates not detected. NA indicates not available. The PID measures relative levels of VOCs. Although PID screening cannot be used directly to quantify VOC concentrations or identify individual compounds, the results can serve as a relative indicator for the presence of VOCs.
2. Test boring was advanced by hand excavation and vacuum extraction methods between approximately 1 to 4 feet. Samples were collected using a handheld auger.

BORING LOG P:\3800S\3888.00\WORK\LOGS\3888.00 LOGS.GPJ 2010 SANBORN HEAD V1.GLB 2010 SANBORN HEAD V1.GDT 8/17/15

SANBORN HEAD

Sanborn, Head & Associates, Inc.

Project: Raytheon Company
Location: Sudbury, MA
Project No.: 3888.00

Log of Boring SH-6

Ground Elevation: Not Available

Drilling Method: 4" I.D. Casing Drive and Wash

Sampling Method: 2" O.D. Split Spoon, Automatic Hammer

Drilling Company: Geosearch, Inc.
Foreman: R. Gerard-Maillet
Date Started: 05/27/15 **Date Finished: 05/29/15**
Logged By: J. Findon-Henry **Checked By: K. Stetson**

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Casing	Depth of Hole	Stab. Time
05/29/15	12:00	5'	Ground Surface	15'	17'	Upon Completion

Depth (ft)	Sample Information: Sample No.	Depth (ft)	Spoon Blows per 6 in	Pen/ Rec (in)	Field Testing Data	Stratum: Log	Description	Geologic Description	Remarks
0							0' ASPHALT 0.3'	(0 to 0.3'): ASPHALT.	1. Soil samples were screened for volatile organic compounds (VOCs) using a Photovac Model 2020 Photoionization Detector (PID) with a 10.6 eV lamp, calibrated to a 100 parts per million by volume (ppmv) isobutylene-in-air standard using a response factor of 1.0. Results are presented in ppmv; the typical detection limit is 1 ppmv. ND indicates not detected. NA indicates not available. The PID measures relative levels of VOCs. Although PID screening cannot be used directly to quantify VOC concentrations or identify individual compounds, the results can serve as a relative indicator for the presence of VOCs. 2. Test boring was advanced by hand excavation and vacuum extraction methods between approximately 1 to 4 feet. Samples were collected using a handheld auger.
	S-1	0.5 - 2		---	PID: ND		FILL	S-1 (0.5 to 2'): Light brown, fine to coarse SAND and Gravel, little Silt. Moist. FILL.	
2					PID: ND		-----2'-----	S-2 (2 to 4'): Light brown, fine SAND, little Silt, trace Gravel. Moist.	
	S-2	3 - 4		---					
4									
	S-3	5 - 7	7 7 7 9	24/9	PID: ND			S-3 (5 to 7'): Medium dense, light brown, fine SAND, some Silt. Wet.	
6									
8									
							SAND		
10	S-4	10 - 12	7 10 12 15	24/10	PID: ND			S-4 (10 to 12'): Medium dense, light brown, fine SAND, some Silt. Wet.	
12									
14									
	S-5	15 - 17	7 8 10 9	24/12	PID: ND			S-5 (15 to 17'): Medium dense, light brown, fine SAND, some Silt. Wet.	
16							-----17'-----	Boring terminated at 17 feet. No refusal encountered.	
18									
20									
22									
24									
26									
28									
30									
32									
34									

BORING LOG P:\3800S\3888.00WORK\LOGS\3888.00 LOGS.GPJ 2010 SANBORN HEAD V1.GLB 2010 SANBORN HEAD V1.GDT 8/17/15

SANBORN HEAD

Sanborn, Head & Associates, Inc.

Project: Raytheon Company
Location: Sudbury, MA
Project No.: 3888.00

Log of Boring SH-7

Ground Elevation: Not Available

Drilling Method: 4¼" I.D. Hollow Stem Augers

Sampling Method: 2" O.D. Split Spoon, Automatic Hammer

Drilling Company: Geosearch, Inc.
Foreman: R. Gerard-Maillet
Date Started: 05/27/15 **Date Finished: 05/29/15**
Logged By: J. Findon-Henry **Checked By: K. Stetson**

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Casing	Depth of Hole	Stab. Time
05/27/15	13:00	4.5'	Ground Surface	12'	14'	Upon Completion

Depth (ft)	Sample Information: Sample No.	Depth (ft)	Spoon Blows per 6 in	Pen/ Rec (in)	Field Testing Data	Stratum: Log	Description	Geologic Description
0							0' ASPHALT 0.3'	(0 to 0.3'): ASPHALT.
	S-1	0.5 - 1.5		---	PID: ND			S-1 (0.5 to 1.5'): Brown, fine to coarse SAND, some Gravel, little Silt, trace Cobbles. Moist. FILL.
2	S-2	2 - 4.5		---	PID: ND			S-2 (2 to 4.5'): Brown, fine to coarse SAND, little Silt, trace Gravel. Moist. FILL.
4							FILL	
	S-3	5 - 7	3 4 6 10	24/10	PID: ND			S-3 (5 to 7'): Medium dense, brown/gray, fine to coarse SAND, trace Silt, trace Gravel, slight Organic odor. Wet. FILL.
6								
	S-4	7 - 9	5 9 10 12	24/12	PID: ND		-----7'-----	S-4 (7 to 9'): Medium dense, brown/gray, fine to coarse SAND, little Silt, trace Gravel. Wet.
8								
10	S-5	10 - 12	3 4 3 7	24/14	PID: ND		SAND	S-5 (10 to 12'): Loose, brown/gray, fine to coarse SAND, little Silt. Wet.
	S-6	12 - 14	6 7 7 9	24/0				S-6 (12 to 14'): No Recovery.
12								
14							-----14'-----	Boring terminated at 14 feet. No refusal encountered.
16								
18								
20								
22								
24								
26								
28								
30								
32								
34								

Remarks

1. Soil samples were screened for volatile organic compounds (VOCs) using a Photovac Model 2020 Photoionization Detector (PID) with a 10.6 eV lamp, calibrated to a 100 parts per million by volume (ppmv) isobutylene-in-air standard using a response factor of 1.0. Results are presented in ppmv; the typical detection limit is 1 ppmv. ND indicates not detected. NA indicates not available. The PID measures relative levels of VOCs. Although PID screening cannot be used directly to quantify VOC concentrations or identify individual compounds, the results can serve as a relative indicator for the presence of VOCs.
2. Test boring was advanced by hand excavation and vacuum extraction methods between approximately 1 to 4.5 feet. Samples were collected using a handheld auger.
An approximately 2-inch thick layer of asphalt was observed at approximately 1.5 feet.

BORING LOG P:\3800S\3888.00\WORK\LOGS\3888.00 LOGS.GPJ 2010 SANBORN HEAD V1.GLB 2010 SANBORN HEAD V1.GDT 8/17/15

NOTES:

1. THE BASE MAP WAS DRAWN FROM A PLAN ENTITLED, "EXISTING CONDITIONS PLAN OF LAND", PREPARED BY VANASSE HANGEN BRUSTLIN, INC. (VHB) OF WATERTOWN, MA, DATED OCTOBER 12, 2015 WITH AN ORIGINAL SCALE OF 1" = 40'.

2. APPROXIMATE LOCATIONS OF EXPLORATIONS ARE BASED ON PLANS BY OTHERS. THIS DATA SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

3. APPROXIMATE ESTIMATED SEASONAL HIGH GROUNDWATER ELEVATIONS WERE CALCULATED FROM MARCH 19, 2015 GROUNDWATER DATA, COLLECTED BY GZA GEOENVIRONMENTAL, INC. (GZA), WITH AN ADDITIONAL 1.51 FEET ADDED IN ACCORDANCE WITH USGS FRIMPTER METHOD. ONLY THE EXPLORATIONS WITH GROUNDWATER DATA USED TO DEVELOP THE APPROXIMATE GROUNDWATER CONTOURS ARE SHOWN.

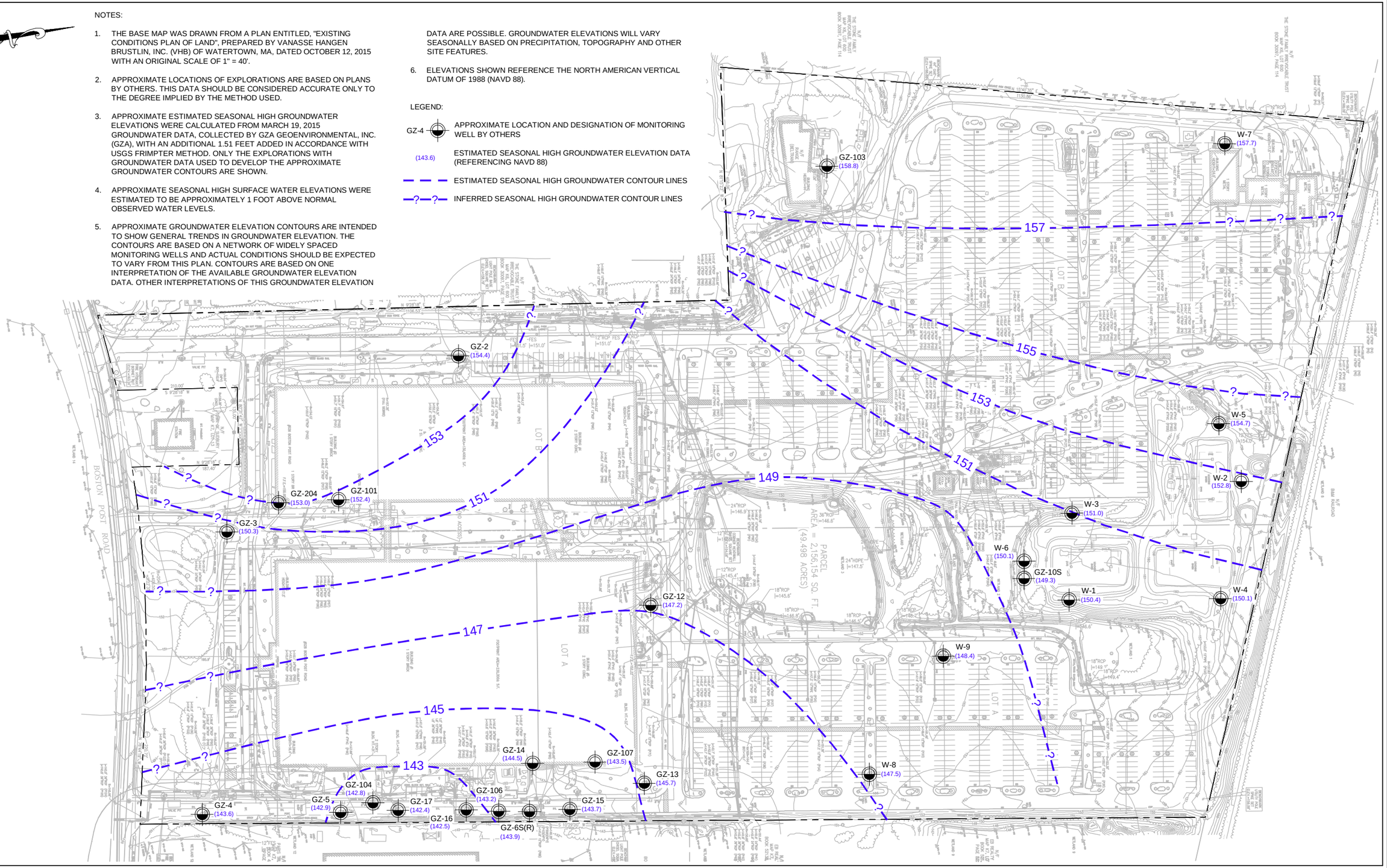
4. APPROXIMATE SEASONAL HIGH SURFACE WATER ELEVATIONS WERE ESTIMATED TO BE APPROXIMATELY 1 FOOT ABOVE NORMAL OBSERVED WATER LEVELS.

5. APPROXIMATE GROUNDWATER ELEVATION CONTOURS ARE INTENDED TO SHOW GENERAL TRENDS IN GROUNDWATER ELEVATION. THE CONTOURS ARE BASED ON A NETWORK OF WIDELY SPACED MONITORING WELLS AND ACTUAL CONDITIONS SHOULD BE EXPECTED TO VARY FROM THIS PLAN. CONTOURS ARE BASED ON ONE INTERPRETATION OF THE AVAILABLE GROUNDWATER ELEVATION DATA. OTHER INTERPRETATIONS OF THIS GROUNDWATER ELEVATION DATA ARE POSSIBLE. GROUNDWATER ELEVATIONS WILL VARY SEASONALLY BASED ON PRECIPITATION, TOPOGRAPHY AND OTHER SITE FEATURES.

6. ELEVATIONS SHOWN REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

LEGEND:

- GZ-4 — APPROXIMATE LOCATION AND DESIGNATION OF MONITORING WELL BY OTHERS
- (143.6) — ESTIMATED SEASONAL HIGH GROUNDWATER ELEVATION DATA (REFERENCING NAVD 88)
- ESTIMATED SEASONAL HIGH GROUNDWATER CONTOUR LINES
- INFERRED SEASONAL HIGH GROUNDWATER CONTOUR LINES



SANBORN HEAD

GRAPHICAL SCALE
80' 40' 0' 80' 160'

NO.	DATE	DESCRIPTION	BY

DRAWN BY: C.GREEN
DESIGNED BY: T.ORSZULAK/D.VOLPE
REVIEWED BY: M.HEIL
PROJECT MGR: L.NORTON
PIC: K.STETSON
DATE: NOVEMBER 2015

GEOTECHNICAL CONSULTING SERVICES
528 BOSTON POST ROAD
SUDBURY, MASSACHUSETTS

GROUNDWATER CONTOUR PLAN
(BASED ON GROUNDWATER DATA COLLECTED 3/19/15)

PROJECT NUMBER: 3888.02

SHEET NUMBER: 1

Appendix C
FEMA Flood Insurance Rate Map

- FEMA Flood Insurance Rate Map Number: 25017C0506F dated July 7, 2014

902000 M

901000 M

JOINS PANEL 0502

BRIDLE PATH

TRAILSIDE CIRCLE

ABANDONED RAILROAD

Hop Brook

PROFILE BASE LINE

138

137

134

133

131

130

129

128

127

126

124

C

B

CODJER LANE

BRIDGE

UNION AVENUE

ZONE AE

Town of Sudbury
250217

Approximate Property Lines

STATION ROAD

BOSTON POST ROAD

20

RAYMOND ROAD

MAPLE AVENUE

ADAMS ROAD

WOODLAND ROAD

HIGHLAND AVENUE

NOBSCOT ROAD

Landham-Allowance Brook
Tributary 2.1

TIPPLING ROCK ROAD

DUDLEY ROAD

MAP SCALE 1" = 500'

250 0 500 1000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0506F

FIRM

FLOOD INSURANCE RATE MAP

MIDDLESEX COUNTY, MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 506 OF 656
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
FRAMINGHAM, TOWN OF	250193	0506	F
SUDBURY, TOWN OF	250217	0506	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25017C0506F

MAP REVISED
JULY 7, 2014

Federal Emergency Management Agency

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

MAP SCALE 1" = 500'

250 0 500 1000

FEET

METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0506F

FIRM

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Appendix D
Nobscot Watershed Overview

Nobscot Watershed

Overview

The Nobscot watershed is located on the southern border of the Town of Sudbury. It spans an area north from the Framingham town line, south including the Raytheon property and behind 1776 Plaza, east from the summit of Nobscot Hill and the Weisblatt conservation land, and west including the confluence of Allowance and Hop brooks and the un-named pond on Warren Road. The watershed continues to the south into the Town of Framingham. Allowance Brook enters Sudbury flowing north from Framingham and is the drainage point of this watershed where it joins with Hop Brook. Pond NS2 also known as Nupsee or Nupsi Pond is a large vernal pool in the main part of the Nobscot Scout Reservation and has no stream outlet. Pond NS11 (the largest in this watershed) on Warren Road drains via NSe north into Allowance Brook, the northeast side of Nobscot Hill drains via NSf to Allowance with several un-named ponds and vernal pools along the way, and the area north and south of Route 20 at Raytheon drains via NSd to Allowance also with several small ponds. There are two Town Wells, one on the abandoned Conrail bed and one on Raymond Road. Conservation land in the watershed includes: the Nobscot Scout Reservation, the Conrail bed, the SVT Lyons-Cutler Reservation and several Sudbury Conservation properties.