

DRAINAGE REPORT

For



PROPOSED

“UNIFIED Parkway”

***Providence Road @ Boston Road
Sutton, Massachusetts
Worcester County***

Prepared by:

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BOHLER //

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I. EXECUTIVE SUMMARY

This report examines the changes in drainage that can be expected as the result of the development of a proposed subdivision road proposed to connect Providence Road to Boston Road in Sutton, Massachusetts. The overall site contains approximately 448± acres of land. The project, which contains approximately 74.3± acres of land, contains an existing gravel operation accessed by multiple onsite dirt roads. The remaining portion of the site is undeveloped consisting of shrub and wooded areas.

The proposed project includes the construction of a new 5,360±-foot-long subdivision road along with new landscaping, storm water management components and associated utilities. This report addresses a comparative analysis of the pre- and post-development site runoff conditions. Additionally, this report provides calculations documenting the design of the proposed stormwater conveyance/management system as illustrated within the accompanying Site Development Plans prepared by Bohler. The project will also provide erosion and sedimentation controls during the demolition and construction periods, as well as long term stabilization of the site.

For the purposes of this analysis the pre- and post-development drainage conditions were analyzed at six (6) “design points” where stormwater runoff currently drains to under existing conditions. These design points are described in further detail in **Section II** below. A summary of the existing and proposed conditions peak runoff rates for the 2-, 10-, 25-, and 100-year storms can be found in **Table 1.1** below. In addition, the project has been designed to meet or exceed the Stormwater Management Standards as detailed herein.

Table 1.1: Design Point Peak Runoff Rate Summary

Point of Analysis	2-Year Storm			10-Year Storm			25-Year Storm			100-Year Storm		
	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
DP1	0.00	0.00	0.00	0.09	0.03	-0.06	0.37	0.20	-0.17	2.40	1.40	-1.00
DP2	0.00	0.00	0.00	0.04	0.04	0.00	0.27	0.24	-0.03	2.08	1.89	-0.19
DP3	0.00	0.00	0.00	0.03	0.03	0.00	0.25	0.25	0.00	1.66	1.66	0.00
DP4	0.00	0.00	0.00	0.19	0.12	-0.07	1.01	0.83	-0.18	4.07	3.32	-0.75
DP5	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.18	0.09	-0.09
DP6	0.11	0.04	-0.07	3.30	1.96	-1.34	8.95	5.76	-3.19	22.55	16.90	-5.65

**Flows are represented in cubic feet per second (cfs)*

II. EXISTING SITE CONDITIONS

Existing Site Description

The project contains approximately 74.3± acres of land located between Providence Road and Boston Road in Sutton, Massachusetts. The central portion of the site contains an existing gravel operation accessed by multiple onsite dirt roads. The remaining portion of the site is undeveloped consisting of shrub and wooded areas.

On-Site Soil Information

Majority of the soils at the site are mapped as Hinckley loamy sand and Merrimac fine sandy loam which are classified by the Natural Resource Conservation Service (NRCS) as Hydrologic Soil Group (HSG) “A”. A small portion of the site is mapped as Sudbury fine sandy loam which is classified as HSG “B”. The central portion of the site is mapped as gravel pits with undetermined HSG.

Based upon on-site geotechnical testing performed in September 2021 which indicated the presence of loamy sand, sandy loam, sand and gravel, majority of the site including areas mapped as gravel pits have been analyzed as HSG “A”, and a small portion of the site has been classified as HSG “B”. Based upon the testing performed, infiltration systems have been modeled with HSG “A” soils for the purposes of this analysis. Refer to **Appendix C** for additional information.

Existing Collection and Conveyance

The southern portion of the site drains overland to the south to a wetland system located at Boston Road. The northern portion of the site drains overland to the north to a large onsite wetland system. The central portion of the site drains overland to an existing well/Wellhead Protection Area (Zone I) prior to overflowing to the large onsite wetland system to the north. Slopes on the site range from 1%-33% with on-site elevations ranging from 560± in the western portion of the site to 358± adjacent to Providence Road.

Existing Watersheds and Design Point Information

For the purposes of this analysis, the pre- and post-development drainage conditions were analyzed at six (6) “design points” where stormwater runoff currently drains to under existing conditions.

The total area analyzed is approximately 74.3± acres, of which approximately 3± acres is located offsite. The site was subdivided into six (6) separate sub-catchments for the existing conditions as described below. The minimum time of concentration for all proposed areas is calculated as 6 minutes (0.1 hr). There is currently no stormwater infrastructure, flow controls or treatment systems located onsite. Runoff generated onsite flows overland to the design points described below.

Design Point #1 (DP1) is a wetland system located adjacent to Boston Road and located east of the subject site. Under existing conditions this design point receives stormwater flows from approximately 10.5± acres of land designated as Watershed “E1”. Watershed E1 flows overland to DP1 and consists of dirt roads and wooded areas and has a calculated curve number (CN) of 34 and a time of concentration (Tc) of 30.3 minutes.

Design Point #2 (DP2) is the eastern boundary of the limit of work in the southern portion of the subject site. Under existing conditions this design point receives stormwater flows from approximately 16.5± acres of land designated as Watershed “E2”. Watershed E2 consists of dirt roads, shrub and wooded areas and has a CN of 31 and a Tc of 18.5 minutes.

Design Point #3 (DP3) is the onsite wetland system located in the western portion of the subject site. Under existing conditions this design point receives stormwater flows from approximately 20.9± acres of land designated as Watershed “E3”. Watershed E3 consists of shrub and wooded areas and has a CN of 30 and a Tc of 24.6 minutes.

Design Point #4 (DP4) is the eastern boundary of the limit of work in the central portion of the subject site. Under existing conditions this design point receives stormwater flows from approximately 9.4± acres of land designated as Watershed “E4” that ultimately flow to the existing well/Wellhead Protection Area (Zone I). Watershed E4 consists of dirt roads, shrub, and wooded areas and has a CN of 37 and a Tc of 21.7 minutes.

Design Point #5 (DP5) is the western boundary of the limit of work in the northern portion of the subject site. Under existing conditions this design point receives stormwater flows from approximately 0.9± acres of land designated as Watershed “E5”. Watershed E5 consists of dirt roads, shrub, and wooded areas and has a CN of 32 and a Tc of 9.6 minutes.

Design Point #6 (DP6) is the northeastern boundary of the limit of work in the northeastern portion of the subject site. Under existing conditions this design point receives stormwater flows from approximately 16.1± acres of land designated as Watershed “E6”. Watershed E6 consists of dirt roads, shrub, and wooded areas and has a CN of 45 and a Tc of 10.5 minutes.

Refer to **Table 1.1** for the calculated existing conditions peak rates of runoff. For additional hydrologic information, refer to **Appendix D** and the Drainage Area Maps in the appendices of this report for a graphical representation of the existing drainage areas.

III. PROPOSED SITE CONDITIONS

Proposed Development Description

The proposed project consists of the construction of a new 5,360±-foot-long subdivision road along with new landscaping, associated utilities, and a new stormwater management system. The site has been designed to drain to deep-sump, hooded catch basins. The catch basins will capture and convey stormwater runoff, via an underground pipe system, to one of four (4) proposed surface infiltration basins. Pretreatment of stormwater runoff will be provided by a combination of the deep-sump hooded catch basins and forebays prior to discharge into the proposed infiltration basins.

Proposed Development Collection and Conveyance

Deep sump hooded catch basins are proposed to collect and route runoff from the paved roadway to the infiltration basins. Pipes have been designed for the 25-year storm using the Rational Method, and culverts at road crossings have been sized for the 100-year storm. Pipe, inlet, and outlet protection sizing calculations are included in **Appendix F**.

The best management practices (BMPs) incorporated into the proposed stormwater management system have been designed to meet the total suspended solid (TSS) removal requirements as set forth in the Massachusetts Department of Environmental Protection Stormwater Handbook standards. Refer to **Appendix F** for calculations. In addition, a Stormwater Operation and Maintenance (O&M) Plan, attached in **Appendix G**, has been developed which includes scheduled maintenance and periodic inspections of stormwater management structures.

Proposed Watersheds and Design Point Information

The project has been designed to maintain existing drainage watersheds to the greatest extent possible, with the same design points described in **Section II** above. The site was subdivided into ten (10) separate sub-catchments for the proposed conditions as described below. The minimum time of concentration for all proposed areas is calculated as 6 minutes (0.1 hr).

Under proposed conditions, DP1 receives stormwater flows from approximately 10.6± acres of land. The sub-catchments associated with DP1 are described in more detail below in **Table 3.1**.

Table 3.1: DP1 Sub-catchment Summary

Sub-catchment Name	Total Area (acres)	Cover Description	Curve Number (CN)	Time of Concentration (Tc, minutes)	Hydrologic Routing
P1a	1.4±	Paved parking, grass, basin bottom	85	6.0	Basin #4
P1b	9.3±	Dirt roads, grass, woods	32	26.2	DP1

DP2 receives stormwater flows from approximately 14.4± acres of land designated at Watershed “P2”. Watershed P2 consists of dirt roads, shrub, grass and wooded areas and has a CN of 31 and a Tc of 16.2 minutes.

DP3 receives stormwater flows from approximately 20.9± acres of land designated at Watershed “P3”. Watershed P3 consists of shrub and wooded areas and has a CN of 30 and a Tc of 24.6 minutes.

Under proposed conditions, DP4 receives stormwater flows from approximately 9.1± acres of land. The sub-catchments associated with DP4 are described in more detail below in **Table 3.2**.

Table 3.2: DP4 Sub-catchment Summary

Sub-catchment Name	Total Area (acres)	Cover Description	Curve Number (CN)	Time of Concentration (Tc, minutes)	Hydrologic Routing
P4a	4.3±	Paved parking, grass, basin bottom	89	6.0	Basin #3
P4d	18.5±	Dirt roads, shrub, grass, woods	38	6.0	DP4

DP5 receives stormwater flows from approximately $0.1\pm$ acres of land designated at Watershed “P5”. Watershed P5 consists of shrub and grass areas and has a CN of 38 and a Tc of 6 minutes.

DP6 receives stormwater flows from approximately $19.1\pm$ acres of land. The sub-catchments associated with DP6 are described in more detail below in **Table 3.3**.

Table 3.3: DP6 Sub-catchment Summary

Sub-catchment Name	Total Area (acres)	Cover Description	Curve Number (CN)	Time of Concentration (Tc, minutes)	Hydrologic Routing
P4b	$3.5\pm$	Paved parking, grass, basin bottom	84	6.0	Basin #2
P4c	$2.0\pm$	Paved parking, grass, basin bottom	88	6.0	Basin #1
P4e	$13.6\pm$	Dirt roads, shrub, grass, woods	43	8.5	DP6

Refer to **Table 1.1** for the calculated proposed conditions peak rates of runoff. For additional hydrologic information, refer to **Appendix D** and the Drainage Area Maps in the appendices of this report for a graphical representation of the proposed drainage areas.

IV. METHODOLOGY

Peak Flow Calculations

Methodology utilized to design the proposed stormwater management system includes compliance with the guidelines set forth in the latest edition of the Massachusetts DEP Stormwater Handbook. The pre- and post-development runoff rates being discharged from the site were computed using the HydroCAD computer program. The drainage area and outlet information were entered into the program, which routes storm flows based on NRCS TR-20 and TR-55 methods. The other components of the model were determined following standard NRCS procedures for Curve Numbers (CNs) and times of concentrations documented in the appendices of this report. The rainfall data utilized and listed below in table 4.1 below for stormwater calculations is based on NOAA. Refer to **Appendix F** for more information.

Table 4.1: NOAA Rainfall Intensities

Frequency	2 year	10 year	25 year	100 year
Rainfall* (inches)	3.27	5.07	6.19	7.92

* Values derived from NOAA ATLAS on 11/02/21

The proposed stormwater management as designed will provide a decrease in peak rates of runoff from the proposed facility for the 2-, 10-, 25- and 100-year design storm events. Additionally, the proposed project meets, or exceeds, the MADEP Stormwater Management standards. Compliance with these standards is described further below.

V. STORMWATER MANAGEMENT STANDARDS

Standard #1: No New Untreated Discharges

The project has been designed so that proposed impervious areas shall be collected and passed through the proposed drainage system for treatment prior to discharge.

Standard #2: Peak Rate Attenuation

As outlined in **Table 1.1**, the development of the site and the proposed stormwater management system, have been designed so that post-development peak rates of runoff are below pre-development conditions for the 2-, 10-, 25- and 100-year storm events at all design points.

Standard #3: Recharge

The stormwater runoff from the project will be collected and diverted to one of four (4) proposed surface infiltration basins. The project as proposed will involve the creation of 7.4± acres of new impervious area and is required to infiltrate 16,163 cubic feet of stormwater as defined in Stormwater Standard 3. The proposed infiltration basins will provide a total of 172,947 cubic feet of volume below the lowest outlet for groundwater recharge. Refer to **Appendix F** of this report for calculations documenting required and provided recharge volumes.

The DEP Stormwater Standards require that the infiltration BMP drains completely within 72 hours of the end of the storm event. Calculations showing that the proposed infiltration basin will drain within 72 hours are included in **Appendix F** of this report.

A four (4) foot separation is provided to estimated seasonal high groundwater, therefore a groundwater mounding analysis is not required.

Standard #4: Water Quality

Water quality treatment is provided via deep sump catch basins, forebays, and surface infiltration basins. TSS removal calculations are included in **Appendix F** of this report. The project as proposed will involve the creation of 7.4± acres of new impervious area and is required to treat 26,938 cubic feet of water quality volume as defined in Stormwater Standard 4. The proposed infiltration basins provide a total of 172,947 cubic feet of water quality volume below the lowest outlet for water quality treatment. Refer to **Appendix F** of this report for calculations documenting required and provided water quality volumes.

Standard #5: Land Use with Higher Potential Pollutant Loads

Not Applicable for this project.

Standard #6: Critical Areas

A Zone II has been established for the site which covers the central portion of the site. A Zone I Wellhead Protection Area is located in the eastern portion of the Zone II in the central portion of the site. The project has been designed to provide one (1) inch of water quality volume in accordance with Standard #6 and as outlined in Standard #4 above.

The proposed stormwater management system has been designed to provide at least eighty percent (80%) removal of Total Suspended Solids (TSS) through the use of several Best Management Practices (BMPs), including deep-sump hooded catch basins, forebays, and surface infiltration basins. The deep-sump hooded catch basins and forebays will provide a minimum of 44% TSS removal prior to all infiltration basins. Refer to **Appendix F** for TSS removal calculations.

Standard #7: Redevelopment

Not Applicable for this project.

Standard #8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

The proposed project will provide construction period erosion and sedimentation controls as indicated within the site plan set provided for this project. This includes a proposed construction exit, protection for stormwater inlets, and various other techniques as outlined on the erosion and sediment control sheets. Additionally, the project is required to file a Notice of Intent with the US EPA and implement a Stormwater Pollution Prevention Plan (SWPPP) during the construction period. The SWPPP will be prepared prior to the start of construction and will be implemented by the site contractor under the guidance and responsibility of the project's proponent.

Standard #9: Operation and Maintenance Plan (O&M Plan)

An Operation and Maintenance (O&M) Plan for this site has been prepared and is included in **Appendix G** of this report. The O&M Plan includes a list of responsible parties and outlines procedures and time tables for the long-term operation and maintenance of the proposed site stormwater management system, including initial inspections upon completion of construction, and periodic monitoring of the system components, in accordance with established practices and the manufacturer's recommendations.

Standard #10: Prohibition of Illicit Discharges

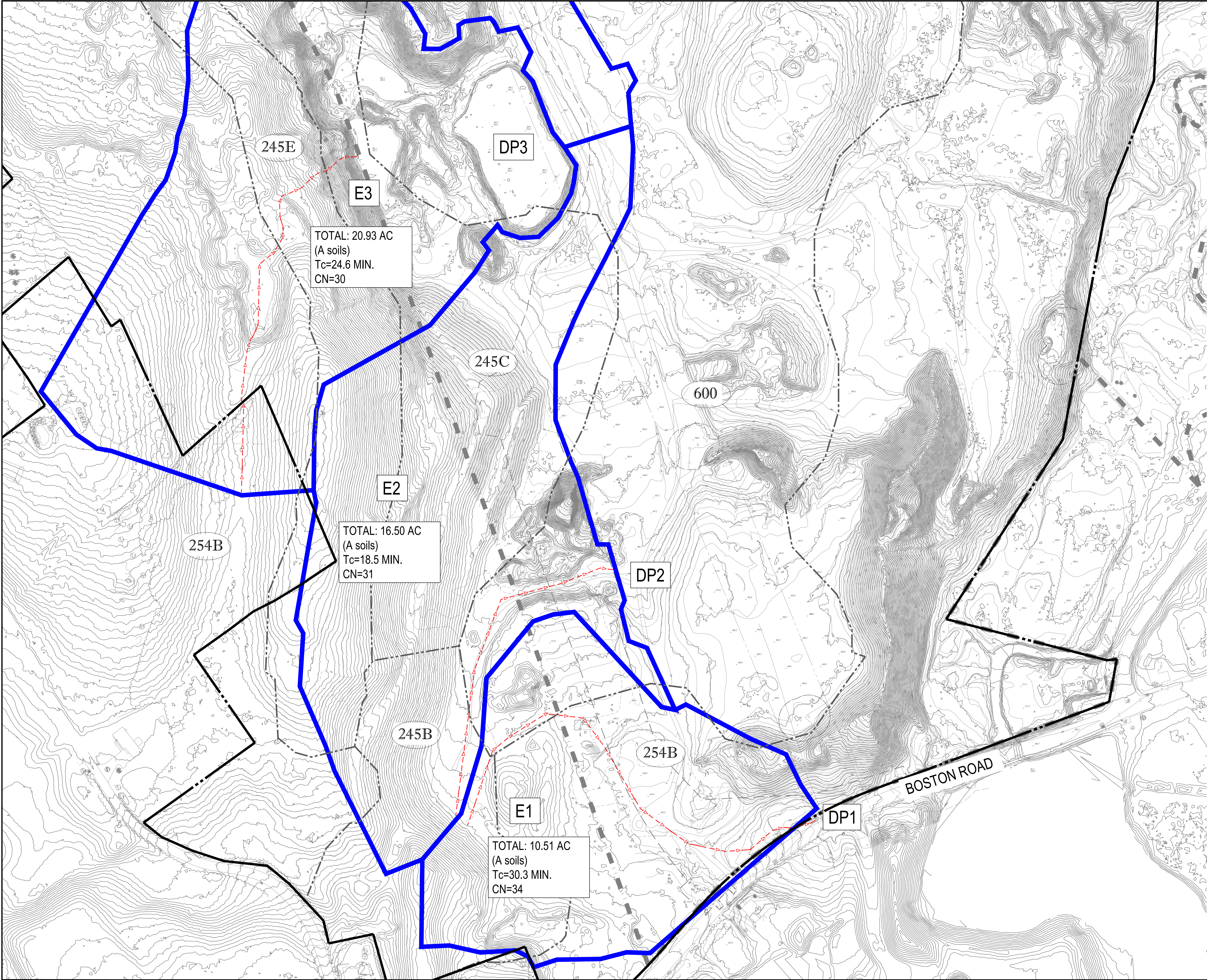
The proposed stormwater system will only convey allowable non-stormwater discharges (firefighting waters, irrigation, air conditioning condensates, etc.) and will not contain any illicit discharges from prohibited sources. An Illicit Discharge Statement is included in **Appendix G** of this report.

VI. SUMMARY

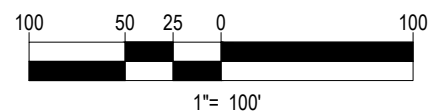
In summary, the proposed stormwater management system illustrated on the drawings prepared by Bohler results in a reduction in peak rates of runoff from the subject site when compared to pre-development conditions for the 2-, 10-, 25- and 100-year storm frequencies. In addition, the proposed best management practices will result in an effective removal of total suspended solids from the post-development runoff. The pre-development versus post-development stormwater discharge comparisons are contained in **Table 1.1**.

APPENDIX D: EXISTING CONDITIONS HYDROLOGIC ANALYSIS (Revised 12/16/21)

- EXISTING CONDITIONS DRAINAGE MAP
- EXISTING CONDITIONS HYDROCAD COMPUTATIONS



KEY	
	SOIL GROUP
	SOIL BOUNDARY
	TIME OF CONCENTRATION
	EXISTING WATERSHED
	DESIGN POINT



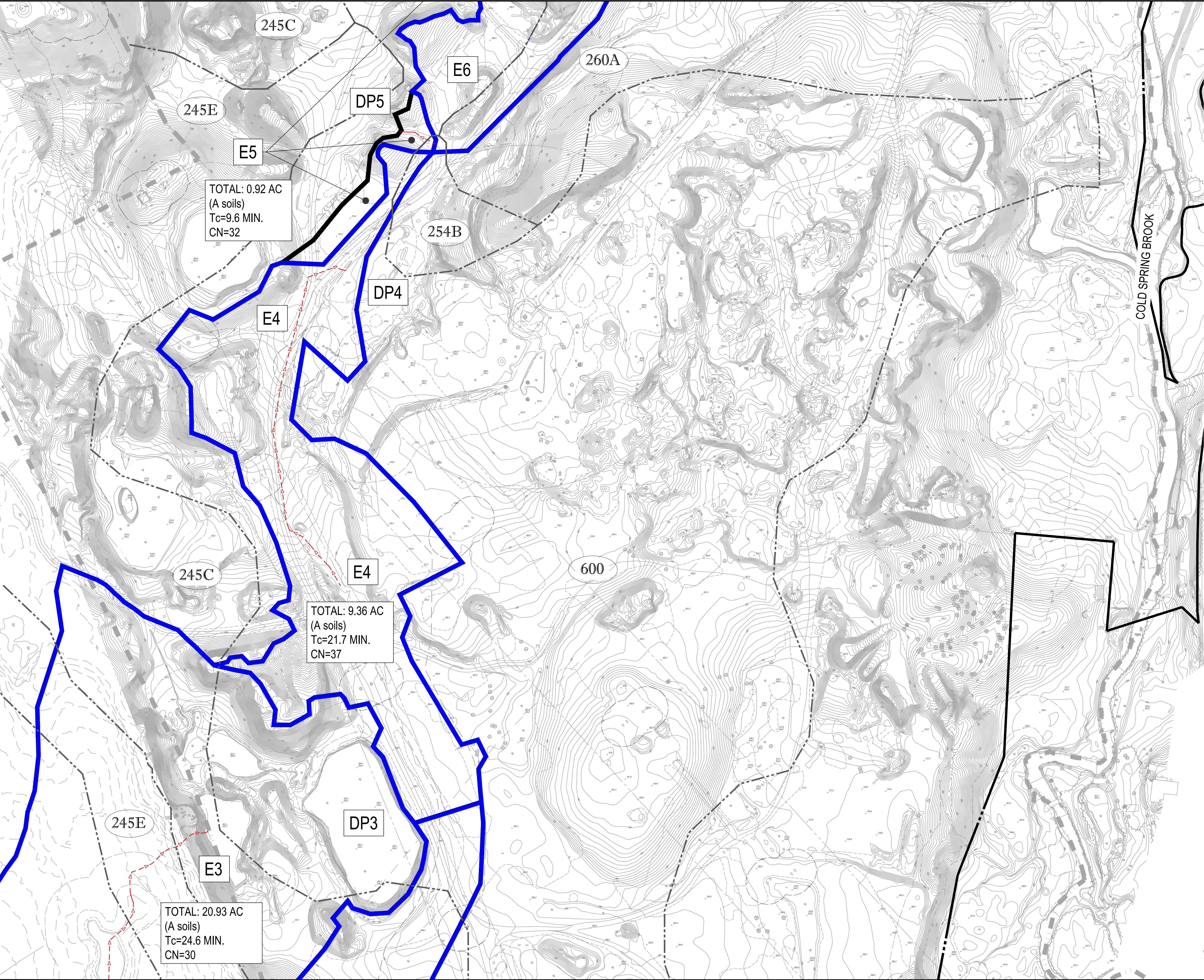
**PRE-DEVELOPMENT
DRAINAGE ANALYSIS
EXHIBIT**

UNIFIED PARKWAY
PROVIDENCE ROAD @ BOSTON ROAD
SUTTON, MA

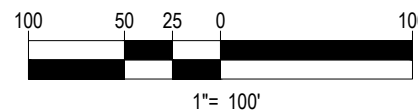
PREPARED BY

BOHLER //

SCALE: 1"=100' DATE: 11/10/2021



KEY	
654	SOIL GROUP
---	SOIL BOUNDARY
- - -	TIME OF CONCENTRATION
E1	EXISTING WATERSHED
DP1	DESIGN POINT

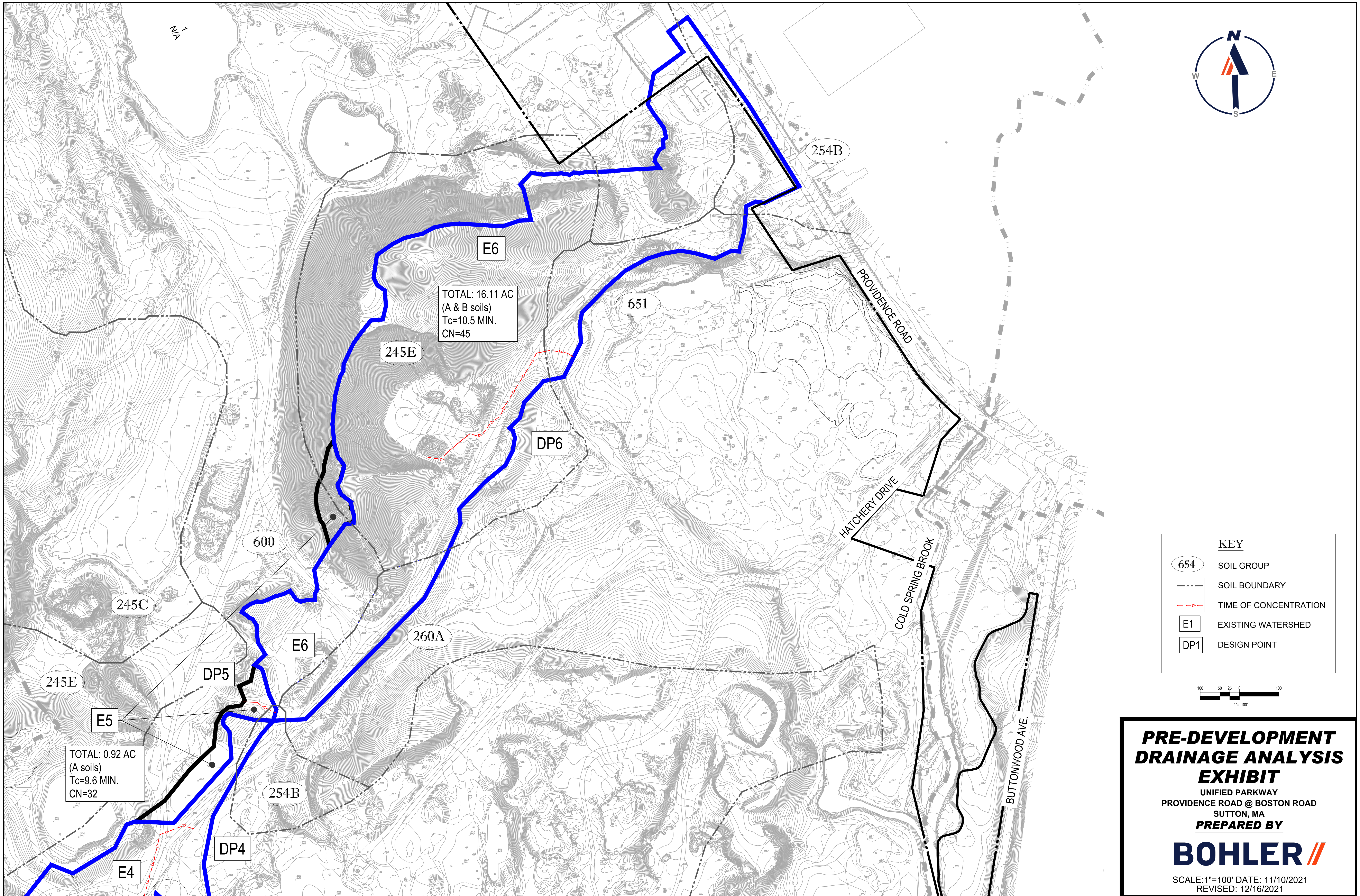


**PRE-DEVELOPMENT
DRAINAGE ANALYSIS
EXHIBIT**

UNIFIED PARKWAY
PROVIDENCE ROAD @ BOSTON ROAD
SUTTON, MA
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SCALE: 1"=100' DATE: 11/10/2021
REVISED: 12/16/2021



KEY

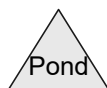
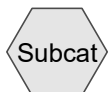
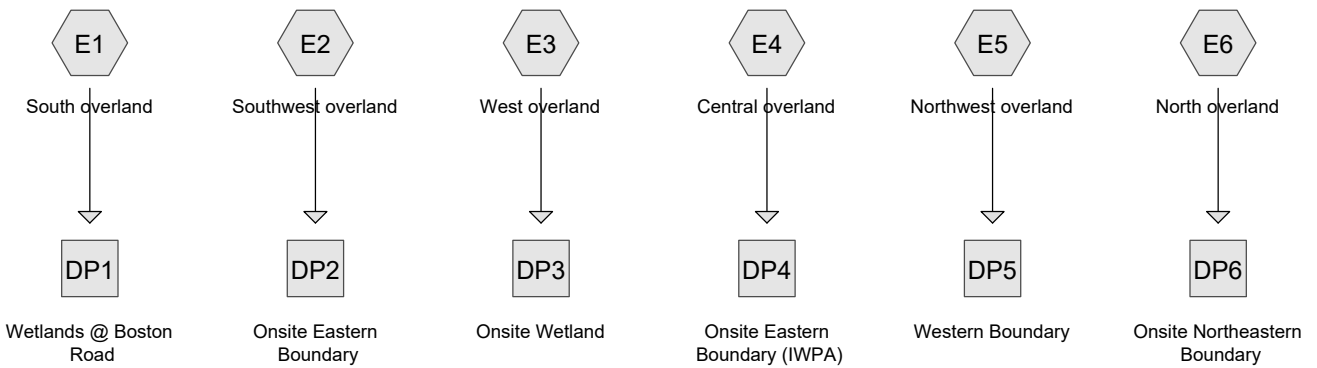
654	SOIL GROUP
---	SOIL BOUNDARY
---	TIME OF CONCENTRATION
E1	EXISTING WATERSHED
DP1	DESIGN POINT

**PRE-DEVELOPMENT
DRAINAGE ANALYSIS
EXHIBIT**

UNIFIED PARKWAY
PROVIDENCE ROAD @ BOSTON ROAD
SUTTON, MA
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SCALE: 1"=100' DATE: 11/10/2021
REVISED: 12/16/2021



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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
7.913	72	Dirt roads, HSG A (E1, E2, E4, E5, E6)
0.345	82	Dirt roads, HSG B (E6)
13.867	30	Meadow, non-grazed, HSG A (E2, E3, E4, E5, E6)
0.533	58	Meadow, non-grazed, HSG B (E6)
51.476	30	Woods, Good, HSG A (E1, E2, E3, E4, E5, E6)
0.185	55	Woods, Good, HSG B (E6)
74.319	35	TOTAL AREA

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
73.256	HSG A	E1, E2, E3, E4, E5, E6
1.063	HSG B	E6
0.000	HSG C	
0.000	HSG D	
0.000	Other	
74.319		TOTAL AREA

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Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
7.913	0.345	0.000	0.000	0.000	8.258	Dirt roads	E1, E2, E4, E5, E6
13.867	0.533	0.000	0.000	0.000	14.400	Meadow, non-grazed	E2, E3, E4, E5, E6
51.476	0.185	0.000	0.000	0.000	51.661	Woods, Good	E1, E2, E3, E4, E5, E6
73.256	1.063	0.000	0.000	0.000	74.319	TOTAL AREA	

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Existing HydroCAD - REV1

Type III 24-hr 2-YR Rainfall=3.27"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentE1: South overland	Runoff Area=10.511 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=1,127' Tc=30.3 min CN=34 Runoff=0.00 cfs 0.000 af
SubcatchmentE2: Southwest overland	Runoff Area=16.496 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=795' Tc=18.5 min CN=31 Runoff=0.00 cfs 0.000 af
SubcatchmentE3: West overland	Runoff Area=20.930 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=926' Tc=24.6 min CN=30 Runoff=0.00 cfs 0.000 af
SubcatchmentE4: Central overland	Runoff Area=9.362 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=870' Tc=21.7 min CN=37 Runoff=0.00 cfs 0.000 af
SubcatchmentE5: Northwest overland	Runoff Area=0.915 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=89' Tc=9.6 min CN=32 Runoff=0.00 cfs 0.000 af
SubcatchmentE6: North overland	Runoff Area=16.105 ac 0.00% Impervious Runoff Depth=0.05" Flow Length=508' Tc=10.5 min CN=45 Runoff=0.11 cfs 0.070 af
Reach DP1: Wetlands @ Boston Road	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
Reach DP2: Onsite Eastern Boundary	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
Reach DP3: Onsite Wetland	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
Reach DP4: Onsite Eastern Boundary (IWPA)	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
Reach DP5: Western Boundary	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
Reach DP6: Onsite Northeastern Boundary	Inflow=0.11 cfs 0.070 af Outflow=0.11 cfs 0.070 af

Total Runoff Area = 74.319 ac Runoff Volume = 0.070 af Average Runoff Depth = 0.01"
100.00% Pervious = 74.319 ac 0.00% Impervious = 0.000 ac

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Type III 24-hr 2-YR Rainfall=3.27"

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Summary for Subcatchment E1: South overland

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.27"

Area (ac)	CN	Description
1.096	72	Dirt roads, HSG A
9.415	30	Woods, Good, HSG A
10.511	34	Weighted Average
10.511		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0460	0.09		Sheet Flow, 418-415.7
					Woods: Light underbrush n= 0.400 P2= 3.00"
13.7	596	0.0210	0.72		Shallow Concentrated Flow, 415.7 - 403.3
					Woodland Kv= 5.0 fps
2.1	109	0.0030	0.88		Shallow Concentrated Flow, 403.3 to 403
					Unpaved Kv= 16.1 fps
1.9	76	0.0170	0.65		Shallow Concentrated Flow, 403 to 401.7
					Woodland Kv= 5.0 fps
0.7	122	0.0300	2.79		Shallow Concentrated Flow, 401.7 to 398
					Unpaved Kv= 16.1 fps
1.9	109	0.0370	0.96		Shallow Concentrated Flow, 398 to 394
					Woodland Kv= 5.0 fps
0.9	65	0.0310	1.23		Shallow Concentrated Flow, 394 to 392
					Short Grass Pasture Kv= 7.0 fps
30.3	1,127	Total			

Summary for Subcatchment E2: Southwest overland

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.27"

Area (ac)	CN	Description
11.766	30	Woods, Good, HSG A
0.463	72	Dirt roads, HSG A
4.267	30	Meadow, non-grazed, HSG A
16.496	31	Weighted Average
16.496		100.00% Pervious Area

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Type III 24-hr 2-YR Rainfall=3.27"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0316	0.12		Sheet Flow, 418 to 416.4 Grass: Dense n= 0.240 P2= 3.00"
11.5	745	0.0238	1.08		Shallow Concentrated Flow, 416.4 to 398.7 Short Grass Pasture Kv= 7.0 fps
18.5	795	Total			

Summary for Subcatchment E3: West overland

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.27"

Area (ac)	CN	Description
18.741	30	Woods, Good, HSG A
2.189	30	Meadow, non-grazed, HSG A
20.930	30	Weighted Average
20.930		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		Sheet Flow, 502 - 500 Woods: Light underbrush n= 0.400 P2= 3.00"
5.1	331	0.0470	1.08		Shallow Concentrated Flow, 500 - 484.4 Woodland Kv= 5.0 fps
8.4	283	0.0014	0.56		Shallow Concentrated Flow, 484.4 to 484 Grassed Waterway Kv= 15.0 fps
1.4	262	0.3820	3.09		Shallow Concentrated Flow, 484 to 384 Woodland Kv= 5.0 fps
24.6	926	Total			

Summary for Subcatchment E4: Central overland

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.27"

Area (ac)	CN	Description
1.600	72	Dirt roads, HSG A
3.076	30	Woods, Good, HSG A
4.686	30	Meadow, non-grazed, HSG A
9.362	37	Weighted Average
9.362		100.00% Pervious Area

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Type III 24-hr 2-YR Rainfall=3.27"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	50	0.0150	0.06		Sheet Flow, 390-389.25 Woods: Light underbrush n= 0.400 P2= 3.00"
1.4	75	0.0300	0.87		Shallow Concentrated Flow, 389.25-387 Woodland Kv= 5.0 fps
0.6	51	0.0470	1.52		Shallow Concentrated Flow, 387-384.6 Short Grass Pasture Kv= 7.0 fps
5.4	694	0.0180	2.16		Shallow Concentrated Flow, 384.6-372 Unpaved Kv= 16.1 fps
21.7	870	Total			

Summary for Subcatchment E5: Northwest overland

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.27"

Area (ac)	CN	Description
0.044	72	Dirt roads, HSG A
0.076	30	Woods, Good, HSG A
0.795	30	Meadow, non-grazed, HSG A
0.915	32	Weighted Average
0.915		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0080	0.10		Sheet Flow, 374.3-374.5 Grass: Short n= 0.150 P2= 3.00"
1.2	39	0.0060	0.54		Shallow Concentrated Flow, 374.5-374.25 Short Grass Pasture Kv= 7.0 fps
9.6	89	Total			

Summary for Subcatchment E6: North overland

Runoff = 0.11 cfs @ 15.26 hrs, Volume= 0.070 af, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.27"

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Area (ac)	CN	Description
4.710	72	Dirt roads, HSG A
8.402	30	Woods, Good, HSG A
1.930	30	Meadow, non-grazed, HSG A
0.345	82	Dirt roads, HSG B
0.185	55	Woods, Good, HSG B
0.533	58	Meadow, non-grazed, HSG B
16.105	45	Weighted Average
16.105		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	50	0.0800	0.11		Sheet Flow, 368-364 Woods: Light underbrush n= 0.400 P2= 3.00"
0.3	28	0.0790	1.41		Shallow Concentrated Flow, 364-361.8 Woodland Kv= 5.0 fps
0.4	29	0.0340	1.29		Shallow Concentrated Flow, 361.8-360.8 Short Grass Pasture Kv= 7.0 fps
1.5	314	0.0440	3.38		Shallow Concentrated Flow, 360.8-347 Unpaved Kv= 16.1 fps
1.0	87	0.0800	1.41		Shallow Concentrated Flow, 347-340 Woodland Kv= 5.0 fps
10.5	508	Total			

Summary for Reach DP1: Wetlands @ Boston Road

Inflow Area = 10.511 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP2: Onsite Eastern Boundary

Inflow Area = 16.496 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP3: Onsite Wetland

Inflow Area = 20.930 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP4: Onsite Eastern Boundary (IWPA)

Inflow Area = 9.362 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-YR event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP5: Western Boundary

Inflow Area = 0.915 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-YR event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP6: Onsite Northeastern Boundary

Inflow Area = 16.105 ac, 0.00% Impervious, Inflow Depth = 0.05" for 2-YR event
Inflow = 0.11 cfs @ 15.26 hrs, Volume= 0.070 af
Outflow = 0.11 cfs @ 15.26 hrs, Volume= 0.070 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentE1: South overland Runoff Area=10.511 ac 0.00% Impervious Runoff Depth=0.07"
 Flow Length=1,127' Tc=30.3 min CN=34 Runoff=0.09 cfs 0.060 af

SubcatchmentE2: Southwest overland Runoff Area=16.496 ac 0.00% Impervious Runoff Depth=0.02"
 Flow Length=795' Tc=18.5 min CN=31 Runoff=0.04 cfs 0.023 af

SubcatchmentE3: West overland Runoff Area=20.930 ac 0.00% Impervious Runoff Depth=0.01"
 Flow Length=926' Tc=24.6 min CN=30 Runoff=0.03 cfs 0.012 af

SubcatchmentE4: Central overland Runoff Area=9.362 ac 0.00% Impervious Runoff Depth=0.15"
 Flow Length=870' Tc=21.7 min CN=37 Runoff=0.19 cfs 0.116 af

SubcatchmentE5: Northwest overland Runoff Area=0.915 ac 0.00% Impervious Runoff Depth=0.03"
 Flow Length=89' Tc=9.6 min CN=32 Runoff=0.00 cfs 0.002 af

SubcatchmentE6: North overland Runoff Area=16.105 ac 0.00% Impervious Runoff Depth=0.46"
 Flow Length=508' Tc=10.5 min CN=45 Runoff=3.30 cfs 0.623 af

Reach DP1: Wetlands @ Boston Road Inflow=0.09 cfs 0.060 af
 Outflow=0.09 cfs 0.060 af

Reach DP2: Onsite Eastern Boundary Inflow=0.04 cfs 0.023 af
 Outflow=0.04 cfs 0.023 af

Reach DP3: Onsite Wetland Inflow=0.03 cfs 0.012 af
 Outflow=0.03 cfs 0.012 af

Reach DP4: Onsite Eastern Boundary (IWPA) Inflow=0.19 cfs 0.116 af
 Outflow=0.19 cfs 0.116 af

Reach DP5: Western Boundary Inflow=0.00 cfs 0.002 af
 Outflow=0.00 cfs 0.002 af

Reach DP6: Onsite Northeastern Boundary Inflow=3.30 cfs 0.623 af
 Outflow=3.30 cfs 0.623 af

Total Runoff Area = 74.319 ac Runoff Volume = 0.836 af Average Runoff Depth = 0.13"
100.00% Pervious = 74.319 ac 0.00% Impervious = 0.000 ac

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Type III 24-hr 10-YR Rainfall=5.07"

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Summary for Subcatchment E1: South overland

Runoff = 0.09 cfs @ 15.77 hrs, Volume= 0.060 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.07"

Area (ac)	CN	Description
1.096	72	Dirt roads, HSG A
9.415	30	Woods, Good, HSG A
10.511	34	Weighted Average
10.511		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0460	0.09		Sheet Flow, 418-415.7
					Woods: Light underbrush n= 0.400 P2= 3.00"
13.7	596	0.0210	0.72		Shallow Concentrated Flow, 415.7 - 403.3
					Woodland Kv= 5.0 fps
2.1	109	0.0030	0.88		Shallow Concentrated Flow, 403.3 to 403
					Unpaved Kv= 16.1 fps
1.9	76	0.0170	0.65		Shallow Concentrated Flow, 403 to 401.7
					Woodland Kv= 5.0 fps
0.7	122	0.0300	2.79		Shallow Concentrated Flow, 401.7 to 398
					Unpaved Kv= 16.1 fps
1.9	109	0.0370	0.96		Shallow Concentrated Flow, 398 to 394
					Woodland Kv= 5.0 fps
0.9	65	0.0310	1.23		Shallow Concentrated Flow, 394 to 392
					Short Grass Pasture Kv= 7.0 fps
30.3	1,127	Total			

Summary for Subcatchment E2: Southwest overland

Runoff = 0.04 cfs @ 22.19 hrs, Volume= 0.023 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.07"

Area (ac)	CN	Description
11.766	30	Woods, Good, HSG A
0.463	72	Dirt roads, HSG A
4.267	30	Meadow, non-grazed, HSG A
16.496	31	Weighted Average
16.496		100.00% Pervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0316	0.12		Sheet Flow, 418 to 416.4 Grass: Dense n= 0.240 P2= 3.00"
11.5	745	0.0238	1.08		Shallow Concentrated Flow, 416.4 to 398.7 Short Grass Pasture Kv= 7.0 fps
18.5	795	Total			

Summary for Subcatchment E3: West overland

Runoff = 0.03 cfs @ 23.74 hrs, Volume= 0.012 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.07"

Area (ac)	CN	Description
18.741	30	Woods, Good, HSG A
2.189	30	Meadow, non-grazed, HSG A
20.930	30	Weighted Average
20.930		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		Sheet Flow, 502 - 500 Woods: Light underbrush n= 0.400 P2= 3.00"
5.1	331	0.0470	1.08		Shallow Concentrated Flow, 500 - 484.4 Woodland Kv= 5.0 fps
8.4	283	0.0014	0.56		Shallow Concentrated Flow, 484.4 to 484 Grassed Waterway Kv= 15.0 fps
1.4	262	0.3820	3.09		Shallow Concentrated Flow, 484 to 384 Woodland Kv= 5.0 fps
24.6	926	Total			

Summary for Subcatchment E4: Central overland

Runoff = 0.19 cfs @ 14.73 hrs, Volume= 0.116 af, Depth= 0.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.07"

Area (ac)	CN	Description
1.600	72	Dirt roads, HSG A
3.076	30	Woods, Good, HSG A
4.686	30	Meadow, non-grazed, HSG A
9.362	37	Weighted Average
9.362		100.00% Pervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	50	0.0150	0.06		Sheet Flow, 390-389.25 Woods: Light underbrush n= 0.400 P2= 3.00"
1.4	75	0.0300	0.87		Shallow Concentrated Flow, 389.25-387 Woodland Kv= 5.0 fps
0.6	51	0.0470	1.52		Shallow Concentrated Flow, 387-384.6 Short Grass Pasture Kv= 7.0 fps
5.4	694	0.0180	2.16		Shallow Concentrated Flow, 384.6-372 Unpaved Kv= 16.1 fps
21.7	870	Total			

Summary for Subcatchment E5: Northwest overland

Runoff = 0.00 cfs @ 20.86 hrs, Volume= 0.002 af, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.07"

Area (ac)	CN	Description
0.044	72	Dirt roads, HSG A
0.076	30	Woods, Good, HSG A
0.795	30	Meadow, non-grazed, HSG A
0.915	32	Weighted Average
0.915		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0080	0.10		Sheet Flow, 374.3-374.5 Grass: Short n= 0.150 P2= 3.00"
1.2	39	0.0060	0.54		Shallow Concentrated Flow, 374.5-374.25 Short Grass Pasture Kv= 7.0 fps
9.6	89	Total			

Summary for Subcatchment E6: North overland

Runoff = 3.30 cfs @ 12.37 hrs, Volume= 0.623 af, Depth= 0.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.07"

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Area (ac)	CN	Description
4.710	72	Dirt roads, HSG A
8.402	30	Woods, Good, HSG A
1.930	30	Meadow, non-grazed, HSG A
0.345	82	Dirt roads, HSG B
0.185	55	Woods, Good, HSG B
0.533	58	Meadow, non-grazed, HSG B
16.105	45	Weighted Average
16.105		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	50	0.0800	0.11		Sheet Flow, 368-364 Woods: Light underbrush n= 0.400 P2= 3.00"
0.3	28	0.0790	1.41		Shallow Concentrated Flow, 364-361.8 Woodland Kv= 5.0 fps
0.4	29	0.0340	1.29		Shallow Concentrated Flow, 361.8-360.8 Short Grass Pasture Kv= 7.0 fps
1.5	314	0.0440	3.38		Shallow Concentrated Flow, 360.8-347 Unpaved Kv= 16.1 fps
1.0	87	0.0800	1.41		Shallow Concentrated Flow, 347-340 Woodland Kv= 5.0 fps
10.5	508	Total			

Summary for Reach DP1: Wetlands @ Boston Road

Inflow Area = 10.511 ac, 0.00% Impervious, Inflow Depth = 0.07" for 10-YR event
 Inflow = 0.09 cfs @ 15.77 hrs, Volume= 0.060 af
 Outflow = 0.09 cfs @ 15.77 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP2: Onsite Eastern Boundary

Inflow Area = 16.496 ac, 0.00% Impervious, Inflow Depth = 0.02" for 10-YR event
 Inflow = 0.04 cfs @ 22.19 hrs, Volume= 0.023 af
 Outflow = 0.04 cfs @ 22.19 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP3: Onsite Wetland

Inflow Area = 20.930 ac, 0.00% Impervious, Inflow Depth = 0.01" for 10-YR event
 Inflow = 0.03 cfs @ 23.74 hrs, Volume= 0.012 af
 Outflow = 0.03 cfs @ 23.74 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP4: Onsite Eastern Boundary (IWPA)

Inflow Area = 9.362 ac, 0.00% Impervious, Inflow Depth = 0.15" for 10-YR event
Inflow = 0.19 cfs @ 14.73 hrs, Volume= 0.116 af
Outflow = 0.19 cfs @ 14.73 hrs, Volume= 0.116 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP5: Western Boundary

Inflow Area = 0.915 ac, 0.00% Impervious, Inflow Depth = 0.03" for 10-YR event
Inflow = 0.00 cfs @ 20.86 hrs, Volume= 0.002 af
Outflow = 0.00 cfs @ 20.86 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP6: Onsite Northeastern Boundary

Inflow Area = 16.105 ac, 0.00% Impervious, Inflow Depth = 0.46" for 10-YR event
Inflow = 3.30 cfs @ 12.37 hrs, Volume= 0.623 af
Outflow = 3.30 cfs @ 12.37 hrs, Volume= 0.623 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

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Type III 24-hr 25-YR Rainfall=6.19"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentE1: South overland Runoff Area=10.511 ac 0.00% Impervious Runoff Depth=0.25"
 Flow Length=1,127' Tc=30.3 min CN=34 Runoff=0.37 cfs 0.215 af

SubcatchmentE2: Southwest overland Runoff Area=16.496 ac 0.00% Impervious Runoff Depth=0.13"
 Flow Length=795' Tc=18.5 min CN=31 Runoff=0.27 cfs 0.173 af

SubcatchmentE3: West overland Runoff Area=20.930 ac 0.00% Impervious Runoff Depth=0.09"
 Flow Length=926' Tc=24.6 min CN=30 Runoff=0.25 cfs 0.163 af

SubcatchmentE4: Central overland Runoff Area=9.362 ac 0.00% Impervious Runoff Depth=0.39"
 Flow Length=870' Tc=21.7 min CN=37 Runoff=1.01 cfs 0.305 af

SubcatchmentE5: Northwest overland Runoff Area=0.915 ac 0.00% Impervious Runoff Depth=0.16"
 Flow Length=89' Tc=9.6 min CN=32 Runoff=0.02 cfs 0.012 af

SubcatchmentE6: North overland Runoff Area=16.105 ac 0.00% Impervious Runoff Depth=0.88"
 Flow Length=508' Tc=10.5 min CN=45 Runoff=8.95 cfs 1.179 af

Reach DP1: Wetlands @ Boston Road Inflow=0.37 cfs 0.215 af
 Outflow=0.37 cfs 0.215 af

Reach DP2: Onsite Eastern Boundary Inflow=0.27 cfs 0.173 af
 Outflow=0.27 cfs 0.173 af

Reach DP3: Onsite Wetland Inflow=0.25 cfs 0.163 af
 Outflow=0.25 cfs 0.163 af

Reach DP4: Onsite Eastern Boundary (IWPA) Inflow=1.01 cfs 0.305 af
 Outflow=1.01 cfs 0.305 af

Reach DP5: Western Boundary Inflow=0.02 cfs 0.012 af
 Outflow=0.02 cfs 0.012 af

Reach DP6: Onsite Northeastern Boundary Inflow=8.95 cfs 1.179 af
 Outflow=8.95 cfs 1.179 af

Total Runoff Area = 74.319 ac Runoff Volume = 2.048 af Average Runoff Depth = 0.33"
100.00% Pervious = 74.319 ac 0.00% Impervious = 0.000 ac

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Type III 24-hr 25-YR Rainfall=6.19"

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Summary for Subcatchment E1: South overland

Runoff = 0.37 cfs @ 13.20 hrs, Volume= 0.215 af, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.19"

Area (ac)	CN	Description
1.096	72	Dirt roads, HSG A
9.415	30	Woods, Good, HSG A
10.511	34	Weighted Average
10.511		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0460	0.09		Sheet Flow, 418-415.7
					Woods: Light underbrush n= 0.400 P2= 3.00"
13.7	596	0.0210	0.72		Shallow Concentrated Flow, 415.7 - 403.3
					Woodland Kv= 5.0 fps
2.1	109	0.0030	0.88		Shallow Concentrated Flow, 403.3 to 403
					Unpaved Kv= 16.1 fps
1.9	76	0.0170	0.65		Shallow Concentrated Flow, 403 to 401.7
					Woodland Kv= 5.0 fps
0.7	122	0.0300	2.79		Shallow Concentrated Flow, 401.7 to 398
					Unpaved Kv= 16.1 fps
1.9	109	0.0370	0.96		Shallow Concentrated Flow, 398 to 394
					Woodland Kv= 5.0 fps
0.9	65	0.0310	1.23		Shallow Concentrated Flow, 394 to 392
					Short Grass Pasture Kv= 7.0 fps
30.3	1,127	Total			

Summary for Subcatchment E2: Southwest overland

Runoff = 0.27 cfs @ 15.11 hrs, Volume= 0.173 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.19"

Area (ac)	CN	Description
11.766	30	Woods, Good, HSG A
0.463	72	Dirt roads, HSG A
4.267	30	Meadow, non-grazed, HSG A
16.496	31	Weighted Average
16.496		100.00% Pervious Area

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Type III 24-hr 25-YR Rainfall=6.19"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0316	0.12		Sheet Flow, 418 to 416.4 Grass: Dense n= 0.240 P2= 3.00"
11.5	745	0.0238	1.08		Shallow Concentrated Flow, 416.4 to 398.7 Short Grass Pasture Kv= 7.0 fps
18.5	795	Total			

Summary for Subcatchment E3: West overland

Runoff = 0.25 cfs @ 15.54 hrs, Volume= 0.163 af, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.19"

Area (ac)	CN	Description
18.741	30	Woods, Good, HSG A
2.189	30	Meadow, non-grazed, HSG A
20.930	30	Weighted Average
20.930		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		Sheet Flow, 502 - 500 Woods: Light underbrush n= 0.400 P2= 3.00"
5.1	331	0.0470	1.08		Shallow Concentrated Flow, 500 - 484.4 Woodland Kv= 5.0 fps
8.4	283	0.0014	0.56		Shallow Concentrated Flow, 484.4 to 484 Grassed Waterway Kv= 15.0 fps
1.4	262	0.3820	3.09		Shallow Concentrated Flow, 484 to 384 Woodland Kv= 5.0 fps
24.6	926	Total			

Summary for Subcatchment E4: Central overland

Runoff = 1.01 cfs @ 12.61 hrs, Volume= 0.305 af, Depth= 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.19"

Area (ac)	CN	Description
1.600	72	Dirt roads, HSG A
3.076	30	Woods, Good, HSG A
4.686	30	Meadow, non-grazed, HSG A
9.362	37	Weighted Average
9.362		100.00% Pervious Area

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Type III 24-hr 25-YR Rainfall=6.19"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	50	0.0150	0.06		Sheet Flow, 390-389.25 Woods: Light underbrush n= 0.400 P2= 3.00"
1.4	75	0.0300	0.87		Shallow Concentrated Flow, 389.25-387 Woodland Kv= 5.0 fps
0.6	51	0.0470	1.52		Shallow Concentrated Flow, 387-384.6 Short Grass Pasture Kv= 7.0 fps
5.4	694	0.0180	2.16		Shallow Concentrated Flow, 384.6-372 Unpaved Kv= 16.1 fps
21.7	870	Total			

Summary for Subcatchment E5: Northwest overland

Runoff = 0.02 cfs @ 14.69 hrs, Volume= 0.012 af, Depth= 0.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.19"

Area (ac)	CN	Description
0.044	72	Dirt roads, HSG A
0.076	30	Woods, Good, HSG A
0.795	30	Meadow, non-grazed, HSG A
0.915	32	Weighted Average
0.915		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0080	0.10		Sheet Flow, 374.3-374.5 Grass: Short n= 0.150 P2= 3.00"
1.2	39	0.0060	0.54		Shallow Concentrated Flow, 374.5-374.25 Short Grass Pasture Kv= 7.0 fps
9.6	89	Total			

Summary for Subcatchment E6: North overland

Runoff = 8.95 cfs @ 12.21 hrs, Volume= 1.179 af, Depth= 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.19"

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Type III 24-hr 25-YR Rainfall=6.19"

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Area (ac)	CN	Description
4.710	72	Dirt roads, HSG A
8.402	30	Woods, Good, HSG A
1.930	30	Meadow, non-grazed, HSG A
0.345	82	Dirt roads, HSG B
0.185	55	Woods, Good, HSG B
0.533	58	Meadow, non-grazed, HSG B
16.105	45	Weighted Average
16.105		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	50	0.0800	0.11		Sheet Flow, 368-364 Woods: Light underbrush n= 0.400 P2= 3.00"
0.3	28	0.0790	1.41		Shallow Concentrated Flow, 364-361.8 Woodland Kv= 5.0 fps
0.4	29	0.0340	1.29		Shallow Concentrated Flow, 361.8-360.8 Short Grass Pasture Kv= 7.0 fps
1.5	314	0.0440	3.38		Shallow Concentrated Flow, 360.8-347 Unpaved Kv= 16.1 fps
1.0	87	0.0800	1.41		Shallow Concentrated Flow, 347-340 Woodland Kv= 5.0 fps
10.5	508	Total			

Summary for Reach DP1: Wetlands @ Boston Road

Inflow Area = 10.511 ac, 0.00% Impervious, Inflow Depth = 0.25" for 25-YR event
 Inflow = 0.37 cfs @ 13.20 hrs, Volume= 0.215 af
 Outflow = 0.37 cfs @ 13.20 hrs, Volume= 0.215 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP2: Onsite Eastern Boundary

Inflow Area = 16.496 ac, 0.00% Impervious, Inflow Depth = 0.13" for 25-YR event
 Inflow = 0.27 cfs @ 15.11 hrs, Volume= 0.173 af
 Outflow = 0.27 cfs @ 15.11 hrs, Volume= 0.173 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP3: Onsite Wetland

Inflow Area = 20.930 ac, 0.00% Impervious, Inflow Depth = 0.09" for 25-YR event
 Inflow = 0.25 cfs @ 15.54 hrs, Volume= 0.163 af
 Outflow = 0.25 cfs @ 15.54 hrs, Volume= 0.163 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP4: Onsite Eastern Boundary (IWPA)

Inflow Area = 9.362 ac, 0.00% Impervious, Inflow Depth = 0.39" for 25-YR event
Inflow = 1.01 cfs @ 12.61 hrs, Volume= 0.305 af
Outflow = 1.01 cfs @ 12.61 hrs, Volume= 0.305 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP5: Western Boundary

Inflow Area = 0.915 ac, 0.00% Impervious, Inflow Depth = 0.16" for 25-YR event
Inflow = 0.02 cfs @ 14.69 hrs, Volume= 0.012 af
Outflow = 0.02 cfs @ 14.69 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP6: Onsite Northeastern Boundary

Inflow Area = 16.105 ac, 0.00% Impervious, Inflow Depth = 0.88" for 25-YR event
Inflow = 8.95 cfs @ 12.21 hrs, Volume= 1.179 af
Outflow = 8.95 cfs @ 12.21 hrs, Volume= 1.179 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentE1: South overland	Runoff Area=10.511 ac 0.00% Impervious Runoff Depth=0.70" Flow Length=1,127' Tc=30.3 min CN=34 Runoff=2.40 cfs 0.609 af
SubcatchmentE2: Southwest overland	Runoff Area=16.496 ac 0.00% Impervious Runoff Depth=0.47" Flow Length=795' Tc=18.5 min CN=31 Runoff=2.08 cfs 0.643 af
SubcatchmentE3: West overland	Runoff Area=20.930 ac 0.00% Impervious Runoff Depth=0.40" Flow Length=926' Tc=24.6 min CN=30 Runoff=1.66 cfs 0.694 af
SubcatchmentE4: Central overland	Runoff Area=9.362 ac 0.00% Impervious Runoff Depth=0.95" Flow Length=870' Tc=21.7 min CN=37 Runoff=4.07 cfs 0.738 af
SubcatchmentE5: Northwest overland	Runoff Area=0.915 ac 0.00% Impervious Runoff Depth=0.54" Flow Length=89' Tc=9.6 min CN=32 Runoff=0.18 cfs 0.041 af
SubcatchmentE6: North overland	Runoff Area=16.105 ac 0.00% Impervious Runoff Depth=1.69" Flow Length=508' Tc=10.5 min CN=45 Runoff=22.55 cfs 2.274 af
Reach DP1: Wetlands @ Boston Road	Inflow=2.40 cfs 0.609 af Outflow=2.40 cfs 0.609 af
Reach DP2: Onsite Eastern Boundary	Inflow=2.08 cfs 0.643 af Outflow=2.08 cfs 0.643 af
Reach DP3: Onsite Wetland	Inflow=1.66 cfs 0.694 af Outflow=1.66 cfs 0.694 af
Reach DP4: Onsite Eastern Boundary (IWPA)	Inflow=4.07 cfs 0.738 af Outflow=4.07 cfs 0.738 af
Reach DP5: Western Boundary	Inflow=0.18 cfs 0.041 af Outflow=0.18 cfs 0.041 af
Reach DP6: Onsite Northeastern Boundary	Inflow=22.55 cfs 2.274 af Outflow=22.55 cfs 2.274 af

Total Runoff Area = 74.319 ac Runoff Volume = 4.999 af Average Runoff Depth = 0.81"
100.00% Pervious = 74.319 ac 0.00% Impervious = 0.000 ac

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Type III 24-hr 100-YR Rainfall=7.92"

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Summary for Subcatchment E1: South overland

Runoff = 2.40 cfs @ 12.67 hrs, Volume= 0.609 af, Depth= 0.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.92"

Area (ac)	CN	Description
1.096	72	Dirt roads, HSG A
9.415	30	Woods, Good, HSG A
10.511	34	Weighted Average
10.511		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0460	0.09		Sheet Flow, 418-415.7
					Woods: Light underbrush n= 0.400 P2= 3.00"
13.7	596	0.0210	0.72		Shallow Concentrated Flow, 415.7 - 403.3
					Woodland Kv= 5.0 fps
2.1	109	0.0030	0.88		Shallow Concentrated Flow, 403.3 to 403
					Unpaved Kv= 16.1 fps
1.9	76	0.0170	0.65		Shallow Concentrated Flow, 403 to 401.7
					Woodland Kv= 5.0 fps
0.7	122	0.0300	2.79		Shallow Concentrated Flow, 401.7 to 398
					Unpaved Kv= 16.1 fps
1.9	109	0.0370	0.96		Shallow Concentrated Flow, 398 to 394
					Woodland Kv= 5.0 fps
0.9	65	0.0310	1.23		Shallow Concentrated Flow, 394 to 392
					Short Grass Pasture Kv= 7.0 fps
30.3	1,127	Total			

Summary for Subcatchment E2: Southwest overland

Runoff = 2.08 cfs @ 12.58 hrs, Volume= 0.643 af, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.92"

Area (ac)	CN	Description
11.766	30	Woods, Good, HSG A
0.463	72	Dirt roads, HSG A
4.267	30	Meadow, non-grazed, HSG A
16.496	31	Weighted Average
16.496		100.00% Pervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0316	0.12		Sheet Flow, 418 to 416.4 Grass: Dense n= 0.240 P2= 3.00"
11.5	745	0.0238	1.08		Shallow Concentrated Flow, 416.4 to 398.7 Short Grass Pasture Kv= 7.0 fps
18.5	795	Total			

Summary for Subcatchment E3: West overland

Runoff = 1.66 cfs @ 12.73 hrs, Volume= 0.694 af, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.92"

Area (ac)	CN	Description
18.741	30	Woods, Good, HSG A
2.189	30	Meadow, non-grazed, HSG A
20.930	30	Weighted Average
20.930		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		Sheet Flow, 502 - 500 Woods: Light underbrush n= 0.400 P2= 3.00"
5.1	331	0.0470	1.08		Shallow Concentrated Flow, 500 - 484.4 Woodland Kv= 5.0 fps
8.4	283	0.0014	0.56		Shallow Concentrated Flow, 484.4 to 484 Grassed Waterway Kv= 15.0 fps
1.4	262	0.3820	3.09		Shallow Concentrated Flow, 484 to 384 Woodland Kv= 5.0 fps
24.6	926	Total			

Summary for Subcatchment E4: Central overland

Runoff = 4.07 cfs @ 12.47 hrs, Volume= 0.738 af, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.92"

Area (ac)	CN	Description
1.600	72	Dirt roads, HSG A
3.076	30	Woods, Good, HSG A
4.686	30	Meadow, non-grazed, HSG A
9.362	37	Weighted Average
9.362		100.00% Pervious Area

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Type III 24-hr 100-YR Rainfall=7.92"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	50	0.0150	0.06		Sheet Flow, 390-389.25 Woods: Light underbrush n= 0.400 P2= 3.00"
1.4	75	0.0300	0.87		Shallow Concentrated Flow, 389.25-387 Woodland Kv= 5.0 fps
0.6	51	0.0470	1.52		Shallow Concentrated Flow, 387-384.6 Short Grass Pasture Kv= 7.0 fps
5.4	694	0.0180	2.16		Shallow Concentrated Flow, 384.6-372 Unpaved Kv= 16.1 fps
21.7	870	Total			

Summary for Subcatchment E5: Northwest overland

Runoff = 0.18 cfs @ 12.42 hrs, Volume= 0.041 af, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.92"

Area (ac)	CN	Description
0.044	72	Dirt roads, HSG A
0.076	30	Woods, Good, HSG A
0.795	30	Meadow, non-grazed, HSG A
0.915	32	Weighted Average
0.915		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0080	0.10		Sheet Flow, 374.3-374.5 Grass: Short n= 0.150 P2= 3.00"
1.2	39	0.0060	0.54		Shallow Concentrated Flow, 374.5-374.25 Short Grass Pasture Kv= 7.0 fps
9.6	89	Total			

Summary for Subcatchment E6: North overland

Runoff = 22.55 cfs @ 12.17 hrs, Volume= 2.274 af, Depth= 1.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.92"

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Type III 24-hr 100-YR Rainfall=7.92"

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Area (ac)	CN	Description
4.710	72	Dirt roads, HSG A
8.402	30	Woods, Good, HSG A
1.930	30	Meadow, non-grazed, HSG A
0.345	82	Dirt roads, HSG B
0.185	55	Woods, Good, HSG B
0.533	58	Meadow, non-grazed, HSG B
16.105	45	Weighted Average
16.105		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	50	0.0800	0.11		Sheet Flow, 368-364 Woods: Light underbrush n= 0.400 P2= 3.00"
0.3	28	0.0790	1.41		Shallow Concentrated Flow, 364-361.8 Woodland Kv= 5.0 fps
0.4	29	0.0340	1.29		Shallow Concentrated Flow, 361.8-360.8 Short Grass Pasture Kv= 7.0 fps
1.5	314	0.0440	3.38		Shallow Concentrated Flow, 360.8-347 Unpaved Kv= 16.1 fps
1.0	87	0.0800	1.41		Shallow Concentrated Flow, 347-340 Woodland Kv= 5.0 fps
10.5	508	Total			

Summary for Reach DP1: Wetlands @ Boston Road

Inflow Area = 10.511 ac, 0.00% Impervious, Inflow Depth = 0.70" for 100-YR event
 Inflow = 2.40 cfs @ 12.67 hrs, Volume= 0.609 af
 Outflow = 2.40 cfs @ 12.67 hrs, Volume= 0.609 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP2: Onsite Eastern Boundary

Inflow Area = 16.496 ac, 0.00% Impervious, Inflow Depth = 0.47" for 100-YR event
 Inflow = 2.08 cfs @ 12.58 hrs, Volume= 0.643 af
 Outflow = 2.08 cfs @ 12.58 hrs, Volume= 0.643 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP3: Onsite Wetland

Inflow Area = 20.930 ac, 0.00% Impervious, Inflow Depth = 0.40" for 100-YR event
 Inflow = 1.66 cfs @ 12.73 hrs, Volume= 0.694 af
 Outflow = 1.66 cfs @ 12.73 hrs, Volume= 0.694 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP4: Onsite Eastern Boundary (IWPA)

Inflow Area = 9.362 ac, 0.00% Impervious, Inflow Depth = 0.95" for 100-YR event
Inflow = 4.07 cfs @ 12.47 hrs, Volume= 0.738 af
Outflow = 4.07 cfs @ 12.47 hrs, Volume= 0.738 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP5: Western Boundary

Inflow Area = 0.915 ac, 0.00% Impervious, Inflow Depth = 0.54" for 100-YR event
Inflow = 0.18 cfs @ 12.42 hrs, Volume= 0.041 af
Outflow = 0.18 cfs @ 12.42 hrs, Volume= 0.041 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

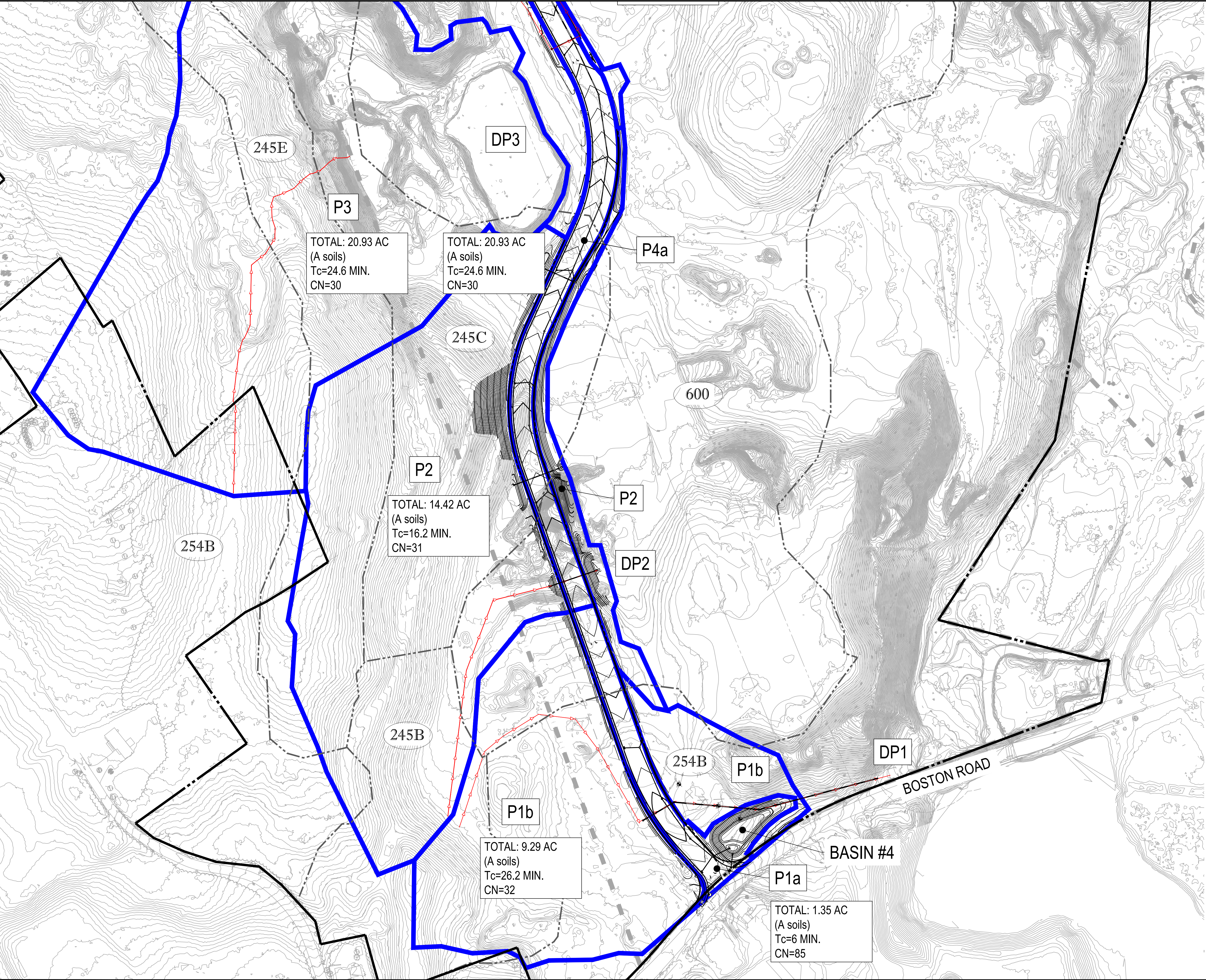
Summary for Reach DP6: Onsite Northeastern Boundary

Inflow Area = 16.105 ac, 0.00% Impervious, Inflow Depth = 1.69" for 100-YR event
Inflow = 22.55 cfs @ 12.17 hrs, Volume= 2.274 af
Outflow = 22.55 cfs @ 12.17 hrs, Volume= 2.274 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

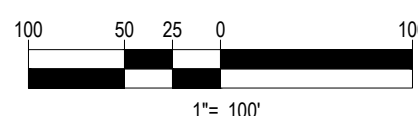
**APPENDIX E: PROPOSED CONDITIONS HYDROLOGIC ANALYSIS (Revised
12/16/21)**

- *PROPOSED CONDITIONS DRAINAGE MAP*
- *PROPOSED CONDITIONS HYDROCAD CALCULATIONS*



KEY

- 654 SOIL GROUP
- SOIL BOUNDARY
- - - - - TIME OF CONCENTRATION
- P1 PROPOSED WATERSHED
- DP1 DESIGN POINT



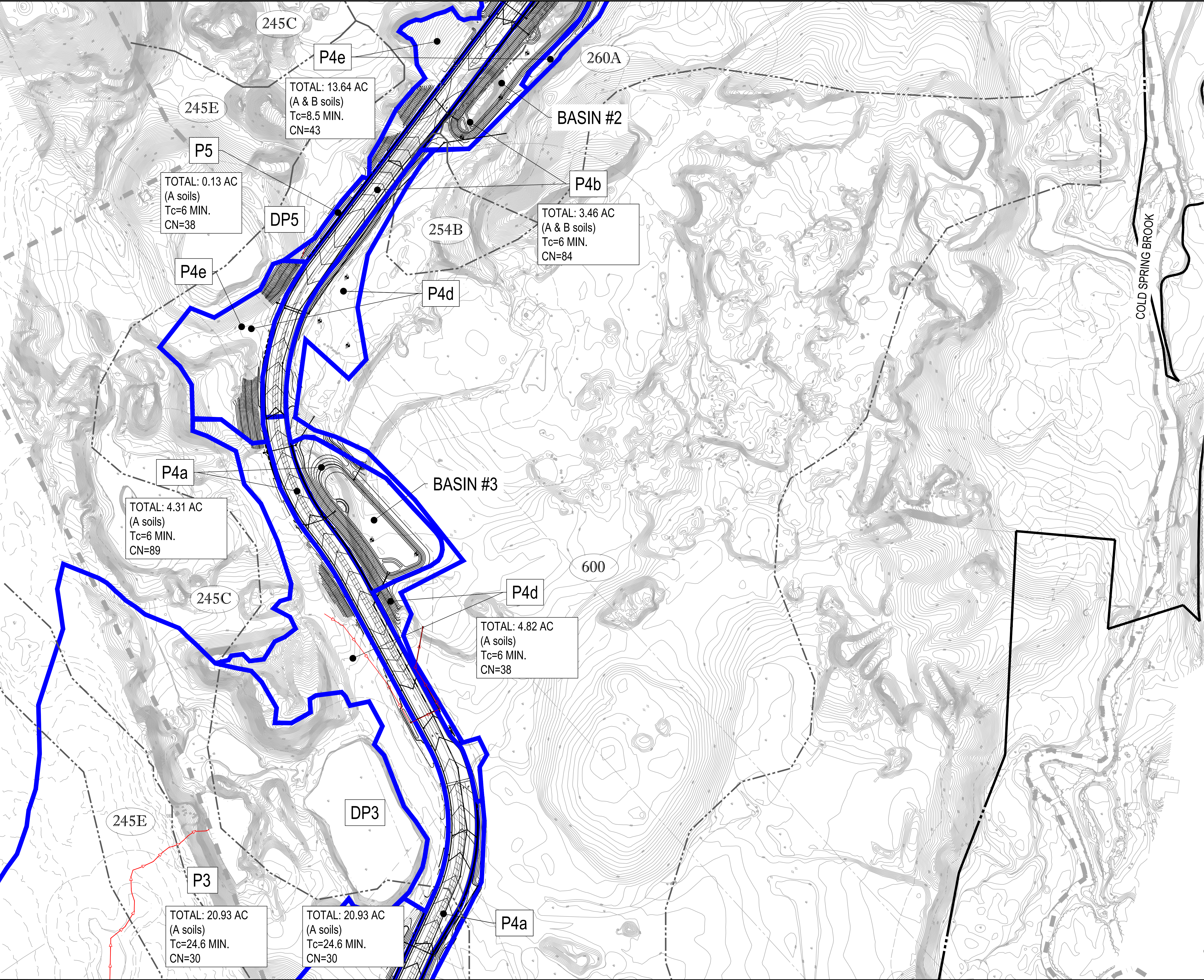
**POST-DEVELOPMENT
DRAINAGE ANALYSIS
EXHIBIT**

UNIFIED PARKWAY
PROVIDENCE ROAD @ BOSTON ROAD
SUTTON, MA

PREPARED BY

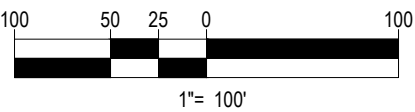
BOHLER

SCALE: 1"=100' DATE: 11/10/2021



KEY

- 654 SOIL GROUP
- SOIL BOUNDARY
- - - - TIME OF CONCENTRATION
- P1 PROPOSED WATERSHED
- DP1 DESIGN POINT



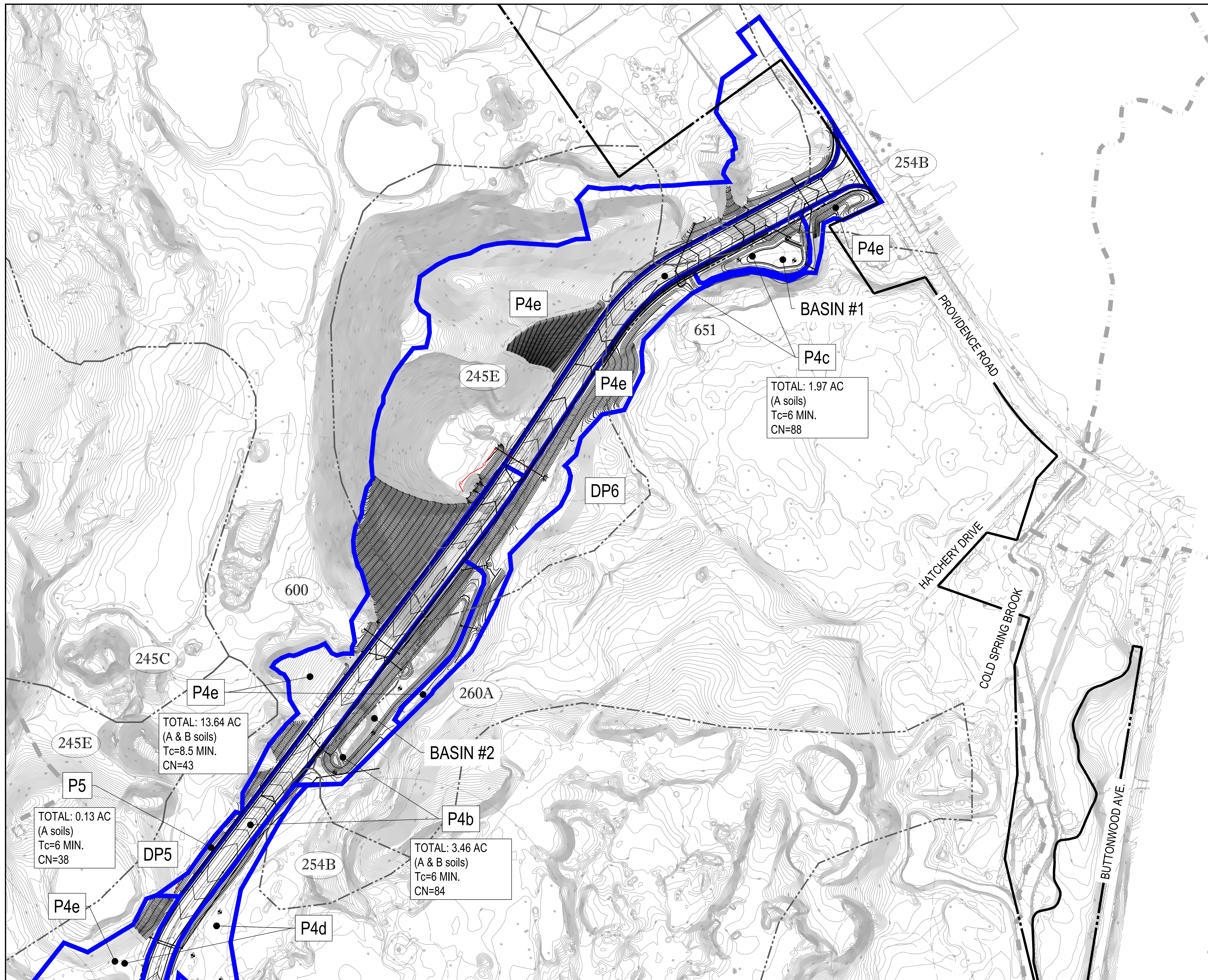
**POST-DEVELOPMENT
DRAINAGE ANALYSIS
EXHIBIT**

UNIFIED PARKWAY
PROVIDENCE ROAD @ BOSTON ROAD
SUTTON, MA

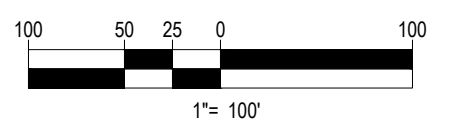
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SCALE: 1"=100' DATE: 11/10/2021
REVISED: 12/16/2021



KEY	
654	SOIL GROUP
---	SOIL BOUNDARY
---	TIME OF CONCENTRATION
P1	PROPOSED WATERSHED
DP1	DESIGN POINT



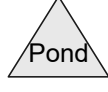
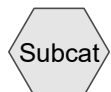
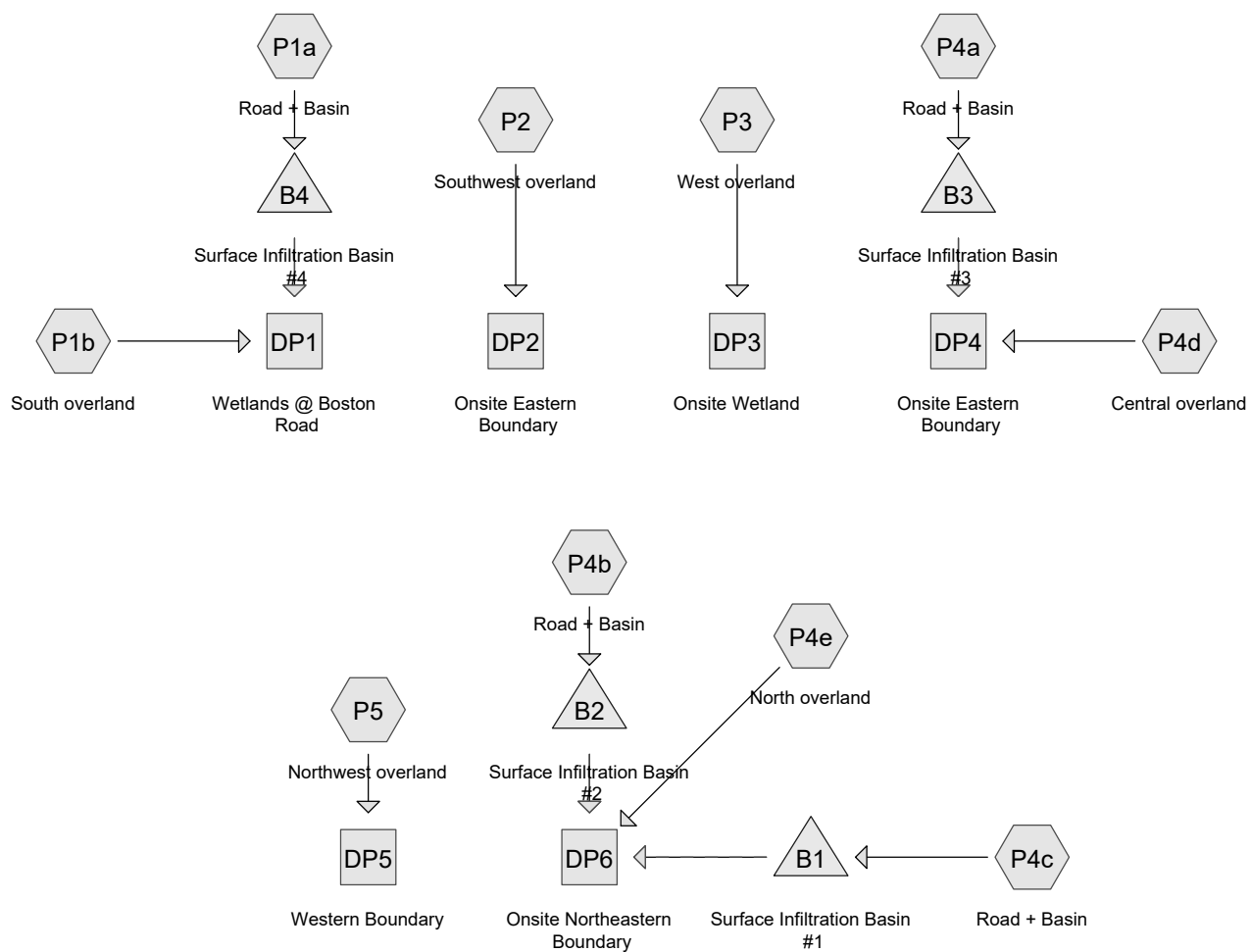
**POST-DEVELOPMENT
DRAINAGE ANALYSIS
EXHIBIT**

UNIFIED PARKWAY
PROVIDENCE ROAD @ BOSTON ROAD
SUTTON, MA

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Routing Diagram for W211141-PR-REV1

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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
11.806	39	>75% Grass cover, Good, HSG A (P1a, P1b, P2, P4a, P4b, P4c, P4d, P4e, P5)
0.690	61	>75% Grass cover, Good, HSG B (P4b, P4e)
0.987	98	Bot. Basin, 0% imp, HSG A (P1a, P4a, P4c)
0.373	98	Bot. Basin, 0% imp, HSG B (P4b)
3.860	72	Dirt roads, HSG A (P1b, P2, P4d, P4e)
8.335	30	Meadow, non-grazed, HSG A (P2, P3, P4d, P4e, P5)
7.421	98	Paved parking, HSG A (P1a, P4a, P4b, P4c)
40.847	30	Woods, Good, HSG A (P1b, P2, P3, P4d, P4e)
74.319	42	TOTAL AREA

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
73.256	HSG A	P1a, P1b, P2, P3, P4a, P4b, P4c, P4d, P4e, P5
1.063	HSG B	P4b, P4e
0.000	HSG C	
0.000	HSG D	
0.000	Other	
74.319		TOTAL AREA

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Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
11.806	0.690	0.000	0.000	0.000	12.496	>75% Grass cover, Good	P1a, P1b, P2, P4a, P4b, P4c, P4d, P4e, P5
0.987	0.373	0.000	0.000	0.000	1.360	Bot. Basin, 0% imp	P1a, P4a, P4b, P4c
3.860	0.000	0.000	0.000	0.000	3.860	Dirt roads	P1b, P2, P4d, P4e
8.335	0.000	0.000	0.000	0.000	8.335	Meadow, non-grazed	P2, P3, P4d, P4e, P5
7.421	0.000	0.000	0.000	0.000	7.421	Paved parking	P1a, P4a, P4b, P4c
40.847	0.000	0.000	0.000	0.000	40.847	Woods, Good	P1b, P2, P3, P4d, P4e
73.256	1.063	0.000	0.000	0.000	74.319	TOTAL AREA	

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Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	P1b	0.00	0.00	592.0	0.0270	0.013	24.0	0.0	0.0
2	P2	0.00	0.00	112.0	0.0180	0.013	15.0	0.0	0.0
3	P4d	0.00	0.00	75.0	0.0060	0.013	15.0	0.0	0.0
4	P4d	0.00	0.00	117.0	0.0090	0.013	15.0	0.0	0.0
5	P4d	0.00	0.00	88.0	0.0150	0.013	15.0	0.0	0.0
6	P4e	0.00	0.00	132.0	0.0300	0.013	15.0	0.0	0.0
7	B1	353.00	352.00	29.0	0.0345	0.013	18.0	0.0	0.0
8	B2	363.00	362.00	38.0	0.0263	0.013	12.0	0.0	0.0
9	B3	373.00	372.00	33.0	0.0303	0.013	12.0	0.0	0.0
10	B4	392.00	386.00	286.0	0.0210	0.013	24.0	0.0	0.0

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Type III 24-hr 2-YR Rainfall=3.27"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentP1a: Road + Basin	Runoff Area=1.353 ac 71.47% Impervious Runoff Depth=1.82" Tc=6.0 min CN=85 Runoff=2.83 cfs 0.205 af
SubcatchmentP1b: South overland	Runoff Area=9.292 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=1,347' Tc=26.2 min CN=32 Runoff=0.00 cfs 0.000 af
SubcatchmentP2: Southwest overland	Runoff Area=14.423 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=762' Tc=16.2 min CN=31 Runoff=0.00 cfs 0.000 af
SubcatchmentP3: West overland	Runoff Area=20.930 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=926' Tc=24.6 min CN=30 Runoff=0.00 cfs 0.000 af
SubcatchmentP4a: Road + Basin	Runoff Area=4.310 ac 67.33% Impervious Runoff Depth=2.15" Tc=6.0 min CN=89 Runoff=10.53 cfs 0.771 af
SubcatchmentP4b: Road + Basin	Runoff Area=3.464 ac 59.90% Impervious Runoff Depth=1.74" Tc=6.0 min CN=84 Runoff=6.93 cfs 0.503 af
SubcatchmentP4c: Road + Basin	Runoff Area=1.966 ac 75.13% Impervious Runoff Depth=2.06" Tc=6.0 min CN=88 Runoff=4.63 cfs 0.338 af
SubcatchmentP4d: Central overland	Runoff Area=4.819 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=607' Tc=6.0 min CN=38 Runoff=0.00 cfs 0.000 af
SubcatchmentP4e: North overland	Runoff Area=13.637 ac 0.00% Impervious Runoff Depth=0.03" Flow Length=270' Tc=8.5 min CN=43 Runoff=0.04 cfs 0.031 af
SubcatchmentP5: Northwest overland	Runoff Area=0.125 ac 0.00% Impervious Runoff Depth=0.00" Tc=6.0 min CN=38 Runoff=0.00 cfs 0.000 af
Reach DP1: Wetlands @ Boston Road	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
Reach DP2: Onsite Eastern Boundary	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
Reach DP3: Onsite Wetland	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
Reach DP4: Onsite Eastern Boundary	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
Reach DP5: Western Boundary	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af
Reach DP6: Onsite Northeastern Boundary	Inflow=0.04 cfs 0.031 af Outflow=0.04 cfs 0.031 af

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Type III 24-hr 2-YR Rainfall=3.27"

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Pond B1: Surface Infiltration Basin #1 Peak Elev=354.15' Storage=6,455 cf Inflow=4.63 cfs 0.338 af
Discarded=0.36 cfs 0.338 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.36 cfs 0.338 af

Pond B2: Surface Infiltration Basin #2 Peak Elev=363.49' Storage=7,712 cf Inflow=6.93 cfs 0.503 af
Discarded=0.92 cfs 0.503 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.92 cfs 0.503 af

Pond B3: Surface Infiltration Basin #3 Peak Elev=373.39' Storage=6,399 cf Inflow=10.53 cfs 0.771 af
Discarded=3.34 cfs 0.771 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=3.34 cfs 0.771 af

Pond B4: Surface Infiltration Basin #4 Peak Elev=393.68' Storage=2,204 cf Inflow=2.83 cfs 0.205 af
Discarded=0.69 cfs 0.205 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.69 cfs 0.205 af

Total Runoff Area = 74.319 ac Runoff Volume = 1.847 af Average Runoff Depth = 0.30"
90.01% Pervious = 66.898 ac 9.99% Impervious = 7.421 ac

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Type III 24-hr 2-YR Rainfall=3.27"

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Summary for Subcatchment P1a: Road + Basin

Runoff = 2.83 cfs @ 12.09 hrs, Volume= 0.205 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.27"

Area (ac)	CN	Description
0.967	98	Paved parking, HSG A
0.304	39	>75% Grass cover, Good, HSG A
* 0.082	98	Bot. Basin, 0% imp, HSG A
1.353	85	Weighted Average
0.386		28.53% Pervious Area
0.967		71.47% Impervious Area

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

Summary for Subcatchment P1b: South overland

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.27"

Area (ac)	CN	Description
1.367	39	>75% Grass cover, Good, HSG A
0.256	72	Dirt roads, HSG A
7.669	30	Woods, Good, HSG A
9.292	32	Weighted Average
9.292		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0460	0.09		Sheet Flow, 418-415.7
					Woods: Light underbrush n= 0.400 P2= 3.00"
14.6	620	0.0200	0.71		Shallow Concentrated Flow, 415.7 to 403.2
					Woodland Kv= 5.0 fps
1.7	85	0.0140	0.83		Shallow Concentrated Flow, 403.2 to 402
					Short Grass Pasture Kv= 7.0 fps
0.8	592	0.0270	11.83	37.17	Pipe Channel, 402 to 386
					24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'
					n= 0.013 Corrugated PE, smooth interior
26.2	1,347	Total			

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Summary for Subcatchment P2: Southwest overland

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.27"

Area (ac)	CN	Description
9.933	30	Woods, Good, HSG A
0.090	72	Dirt roads, HSG A
2.450	30	Meadow, non-grazed, HSG A
1.950	39	>75% Grass cover, Good, HSG A
14.423	31	Weighted Average
14.423		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0316	0.12		Sheet Flow, 418 to 416.42 Grass: Dense n= 0.240 P2= 3.00"
8.9	600	0.0260	1.13		Shallow Concentrated Flow, 416.4 to 401 Short Grass Pasture Kv= 7.0 fps
0.3	112	0.0180	7.06	8.67	Pipe Channel, 401-399 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
16.2	762	Total			

Summary for Subcatchment P3: West overland

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.27"

Area (ac)	CN	Description
18.741	30	Woods, Good, HSG A
2.189	30	Meadow, non-grazed, HSG A
20.930	30	Weighted Average
20.930		100.00% Pervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		Sheet Flow, 502 - 500 Woods: Light underbrush n= 0.400 P2= 3.00"
5.1	331	0.0470	1.08		Shallow Concentrated Flow, 500 - 484.4 Woodland Kv= 5.0 fps
8.4	283	0.0014	0.56		Shallow Concentrated Flow, 484.4 to 484 Grassed Waterway Kv= 15.0 fps
1.4	262	0.3820	3.09		Shallow Concentrated Flow, 484 to 384 Woodland Kv= 5.0 fps
24.6	926	Total			

Summary for Subcatchment P4a: Road + Basin

Runoff = 10.53 cfs @ 12.09 hrs, Volume= 0.771 af, Depth= 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.27"

Area (ac)	CN	Description
2.902	98	Paved parking, HSG A
0.657	39	>75% Grass cover, Good, HSG A
* 0.751	98	Bot. Basin, 0% imp, HSG A
4.310	89	Weighted Average
1.408		32.67% Pervious Area
2.902		67.33% Impervious Area

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

Summary for Subcatchment P4b: Road + Basin

Runoff = 6.93 cfs @ 12.09 hrs, Volume= 0.503 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.27"

Area (ac)	CN	Description
2.075	98	Paved parking, HSG A
0.566	39	>75% Grass cover, Good, HSG A
0.450	61	>75% Grass cover, Good, HSG B
* 0.373	98	Bot. Basin, 0% imp, HSG B
3.464	84	Weighted Average
1.389		40.10% Pervious Area
2.075		59.90% Impervious Area

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Type III 24-hr 2-YR Rainfall=3.27"

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

Summary for Subcatchment P4c: Road + Basin

Runoff = 4.63 cfs @ 12.09 hrs, Volume= 0.338 af, Depth= 2.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.27"

Area (ac)	CN	Description
1.477	98	Paved parking, HSG A
0.335	39	>75% Grass cover, Good, HSG A
* 0.154	98	Bot. Basin, 0% imp, HSG A
1.966	88	Weighted Average
0.489		24.87% Pervious Area
1.477		75.13% Impervious Area

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

Summary for Subcatchment P4d: Central overland

Runoff = 0.00 cfs @ 24.03 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.27"

Area (ac)	CN	Description
0.662	72	Dirt roads, HSG A
1.940	30	Meadow, non-grazed, HSG A
0.902	30	Woods, Good, HSG A
1.315	39	>75% Grass cover, Good, HSG A
4.819	38	Weighted Average
4.819		100.00% Pervious Area

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Type III 24-hr 2-YR Rainfall=3.27"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	50	0.0300	0.41		Sheet Flow, 394.5-393 Fallow n= 0.050 P2= 3.00"
0.7	137	0.0360	3.05		Shallow Concentrated Flow, 393-388 Unpaved Kv= 16.1 fps
1.9	140	0.0320	1.25		Shallow Concentrated Flow, 388-383.5 Short Grass Pasture Kv= 7.0 fps
0.3	75	0.0060	4.08	5.00	Pipe Channel, 379-378.55 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
0.4	117	0.0090	4.99	6.13	Pipe Channel, 378.45-377.4 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
0.2	88	0.0150	6.45	7.91	Pipe Channel, 377.3-376 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
5.6	607	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment P4e: North overland

Runoff = 0.04 cfs @ 16.92 hrs, Volume= 0.031 af, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.27"

Area (ac)	CN	Description
0.240	61	>75% Grass cover, Good, HSG B
2.852	72	Dirt roads, HSG A
1.740	30	Meadow, non-grazed, HSG A
3.602	30	Woods, Good, HSG A
5.203	39	>75% Grass cover, Good, HSG A
13.637	43	Weighted Average
13.637		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.0150	0.13		Sheet Flow, 366-365.25 Grass: Short n= 0.150 P2= 3.00"
1.8	88	0.0140	0.83		Shallow Concentrated Flow, 365.25-364 Short Grass Pasture Kv= 7.0 fps
0.2	132	0.0300	9.12	11.19	Pipe Channel, 364-360 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
8.5	270	Total			

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Summary for Subcatchment P5: Northwest overland

Runoff = 0.00 cfs @ 24.03 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR Rainfall=3.27"

Area (ac)	CN	Description
0.109	39	>75% Grass cover, Good, HSG A
0.016	30	Meadow, non-grazed, HSG A
0.125	38	Weighted Average
0.125		100.00% Pervious Area

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

Summary for Reach DP1: Wetlands @ Boston Road

Inflow Area = 10.645 ac, 9.08% Impervious, Inflow Depth = 0.00" for 2-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP2: Onsite Eastern Boundary

Inflow Area = 14.423 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP3: Onsite Wetland

Inflow Area = 20.930 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-YR event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP4: Onsite Eastern Boundary

Inflow Area = 9.129 ac, 31.79% Impervious, Inflow Depth = 0.00" for 2-YR event
 Inflow = 0.00 cfs @ 24.03 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 24.03 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

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Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP5: Western Boundary

Inflow Area = 0.125 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-YR event
 Inflow = 0.00 cfs @ 24.03 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 24.03 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP6: Onsite Northeastern Boundary

Inflow Area = 19.067 ac, 18.63% Impervious, Inflow Depth = 0.02" for 2-YR event
 Inflow = 0.04 cfs @ 16.92 hrs, Volume= 0.031 af
 Outflow = 0.04 cfs @ 16.92 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond B1: Surface Infiltration Basin #1

Inflow Area = 1.966 ac, 75.13% Impervious, Inflow Depth = 2.06" for 2-YR event
 Inflow = 4.63 cfs @ 12.09 hrs, Volume= 0.338 af
 Outflow = 0.36 cfs @ 13.46 hrs, Volume= 0.338 af, Atten= 92%, Lag= 82.2 min
 Discarded = 0.36 cfs @ 13.46 hrs, Volume= 0.338 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 354.15' @ 13.46 hrs Surf.Area= 6,401 sf Storage= 6,455 cf

Plug-Flow detention time= 177.8 min calculated for 0.337 af (100% of inflow)
 Center-of-Mass det. time= 177.7 min (991.8 - 814.2)

Volume	Invert	Avail.Storage	Storage Description
#1	353.00'	46,324 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
353.00	4,922	0	0
354.00	6,095	5,509	5,509
356.00	10,136	16,231	21,740
358.00	14,448	24,584	46,324

Device	Routing	Invert	Outlet Devices
#1	Discarded	353.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	353.00'	18.0" Round Culvert L= 29.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 353.00' / 352.00' S= 0.0345 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	356.75'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600

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#4 Secondary 357.00' Limited to weir flow at low heads
20.0' long x 10.0' breadth Broad-Crested Rectangular Weir
 Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.36 cfs @ 13.46 hrs HW=354.15' (Free Discharge)↑ **1=Exfiltration** (Exfiltration Controls 0.36 cfs)**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=353.00' (Free Discharge)↑ **2=Culvert** (Controls 0.00 cfs)↑ **3=Orifice/Grate** (Controls 0.00 cfs)**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=353.00' (Free Discharge)↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)**Summary for Pond B2: Surface Infiltration Basin #2**

Inflow Area = 3.464 ac, 59.90% Impervious, Inflow Depth = 1.74" for 2-YR event
 Inflow = 6.93 cfs @ 12.09 hrs, Volume= 0.503 af
 Outflow = 0.92 cfs @ 12.73 hrs, Volume= 0.503 af, Atten= 87%, Lag= 38.3 min
 Discarded = 0.92 cfs @ 12.73 hrs, Volume= 0.503 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Peak Elev= 363.49' @ 12.73 hrs Surf.Area= 16,537 sf Storage= 7,712 cf

Plug-Flow detention time= 70.6 min calculated for 0.503 af (100% of inflow)

Center-of-Mass det. time= 70.5 min (899.0 - 828.6)

Volume	Invert	Avail.Storage	Storage Description
#1	363.00'	122,385 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
363.00	14,913	0	0
364.00	18,225	16,569	16,569
366.00	26,672	44,897	61,466
368.00	34,247	60,919	122,385

Device	Routing	Invert	Outlet Devices
#1	Discarded	363.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	363.00'	12.0" Round Culvert L= 38.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 363.00' / 362.00' S= 0.0263 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	366.00'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	367.00'	20.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60

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Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.92 cfs @ 12.73 hrs HW=363.49' (Free Discharge)↑ **1=Exfiltration** (Exfiltration Controls 0.92 cfs)**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=363.00' (Free Discharge)↑ **2=Culvert** (Controls 0.00 cfs)↑ **3=Orifice/Grate** (Controls 0.00 cfs)**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=363.00' (Free Discharge)↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)**Summary for Pond B3: Surface Infiltration Basin #3**

Inflow Area = 4.310 ac, 67.33% Impervious, Inflow Depth = 2.15" for 2-YR event
 Inflow = 10.53 cfs @ 12.09 hrs, Volume= 0.771 af
 Outflow = 3.34 cfs @ 12.41 hrs, Volume= 0.771 af, Atten= 68%, Lag= 19.3 min
 Discarded = 3.34 cfs @ 12.41 hrs, Volume= 0.771 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 373.39' @ 12.41 hrs Surf.Area= 17,438 sf Storage= 6,399 cf

Plug-Flow detention time= 12.1 min calculated for 0.770 af (100% of inflow)
 Center-of-Mass det. time= 12.1 min (822.4 - 810.2)

Volume	Invert	Avail.Storage	Storage Description
#1	373.00'	119,215 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
373.00	15,656	0	0
374.00	20,264	17,960	17,960
376.00	25,168	45,432	63,392
378.00	30,655	55,823	119,215

Device	Routing	Invert	Outlet Devices
#1	Discarded	373.00'	8.270 in/hr Exfiltration over Surface area
#2	Primary	373.00'	12.0" Round Culvert L= 33.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 373.00' / 372.00' S= 0.0303 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	376.00'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	377.00'	20.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

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Discarded OutFlow Max=3.34 cfs @ 12.41 hrs HW=373.39' (Free Discharge)↑ **1=Exfiltration** (Exfiltration Controls 3.34 cfs)**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=373.00' (Free Discharge)↑ **2=Culvert** (Controls 0.00 cfs)↑ **3=Orifice/Grate** (Controls 0.00 cfs)**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=373.00' (Free Discharge)↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)**Summary for Pond B4: Surface Infiltration Basin #4**

Inflow Area = 1.353 ac, 71.47% Impervious, Inflow Depth = 1.82" for 2-YR event
 Inflow = 2.83 cfs @ 12.09 hrs, Volume= 0.205 af
 Outflow = 0.69 cfs @ 12.50 hrs, Volume= 0.205 af, Atten= 76%, Lag= 24.5 min
 Discarded = 0.69 cfs @ 12.50 hrs, Volume= 0.205 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 393.68' @ 12.50 hrs Surf.Area= 3,581 sf Storage= 2,204 cf

Plug-Flow detention time= 21.3 min calculated for 0.205 af (100% of inflow)
 Center-of-Mass det. time= 21.3 min (846.4 - 825.1)

Volume	Invert	Avail.Storage	Storage Description
#1	393.00'	31,603 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
393.00	2,914	0	0
394.00	3,897	3,406	3,406
396.00	7,101	10,998	14,404
398.00	10,098	17,199	31,603

Device	Routing	Invert	Outlet Devices
#1	Discarded	393.00'	8.270 in/hr Exfiltration over Surface area
#2	Primary	392.00'	24.0" Round Culvert L= 286.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 392.00' / 386.00' S= 0.0210 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	396.50'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	397.00'	20.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

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Discarded OutFlow Max=0.69 cfs @ 12.50 hrs HW=393.68' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.69 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=393.00' (Free Discharge)

↑**2=Culvert** (Passes 0.00 cfs of 5.35 cfs potential flow)

↑**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=393.00' (Free Discharge)

↑**4=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentP1a: Road + Basin	Runoff Area=1.353 ac 71.47% Impervious Runoff Depth=3.43" Tc=6.0 min CN=85 Runoff=5.27 cfs 0.387 af
SubcatchmentP1b: South overland	Runoff Area=9.292 ac 0.00% Impervious Runoff Depth=0.03" Flow Length=1,347' Tc=26.2 min CN=32 Runoff=0.03 cfs 0.024 af
SubcatchmentP2: Southwest overland	Runoff Area=14.423 ac 0.00% Impervious Runoff Depth=0.02" Flow Length=762' Tc=16.2 min CN=31 Runoff=0.04 cfs 0.020 af
SubcatchmentP3: West overland	Runoff Area=20.930 ac 0.00% Impervious Runoff Depth=0.01" Flow Length=926' Tc=24.6 min CN=30 Runoff=0.03 cfs 0.012 af
SubcatchmentP4a: Road + Basin	Runoff Area=4.310 ac 67.33% Impervious Runoff Depth=3.84" Tc=6.0 min CN=89 Runoff=18.40 cfs 1.379 af
SubcatchmentP4b: Road + Basin	Runoff Area=3.464 ac 59.90% Impervious Runoff Depth=3.33" Tc=6.0 min CN=84 Runoff=13.15 cfs 0.963 af
SubcatchmentP4c: Road + Basin	Runoff Area=1.966 ac 75.13% Impervious Runoff Depth=3.74" Tc=6.0 min CN=88 Runoff=8.22 cfs 0.612 af
SubcatchmentP4d: Central overland	Runoff Area=4.819 ac 0.00% Impervious Runoff Depth=0.18" Flow Length=607' Tc=6.0 min CN=38 Runoff=0.12 cfs 0.072 af
SubcatchmentP4e: North overland	Runoff Area=13.637 ac 0.00% Impervious Runoff Depth=0.37" Flow Length=270' Tc=8.5 min CN=43 Runoff=1.96 cfs 0.424 af
SubcatchmentP5: Northwest overland	Runoff Area=0.125 ac 0.00% Impervious Runoff Depth=0.18" Tc=6.0 min CN=38 Runoff=0.00 cfs 0.002 af
Reach DP1: Wetlands @ Boston Road	Inflow=0.03 cfs 0.024 af Outflow=0.03 cfs 0.024 af
Reach DP2: Onsite Eastern Boundary	Inflow=0.04 cfs 0.020 af Outflow=0.04 cfs 0.020 af
Reach DP3: Onsite Wetland	Inflow=0.03 cfs 0.012 af Outflow=0.03 cfs 0.012 af
Reach DP4: Onsite Eastern Boundary	Inflow=0.12 cfs 0.072 af Outflow=0.12 cfs 0.072 af
Reach DP5: Western Boundary	Inflow=0.00 cfs 0.002 af Outflow=0.00 cfs 0.002 af
Reach DP6: Onsite Northeastern Boundary	Inflow=1.96 cfs 0.424 af Outflow=1.96 cfs 0.424 af

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Pond B1: Surface Infiltration Basin #1 Peak Elev=355.11' Storage=13,488 cf Inflow=8.22 cfs 0.612 af
Discarded=0.46 cfs 0.612 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.46 cfs 0.612 af

Pond B2: Surface Infiltration Basin #2 Peak Elev=364.08' Storage=18,109 cf Inflow=13.15 cfs 0.963 af
Discarded=1.04 cfs 0.963 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=1.04 cfs 0.963 af

Pond B3: Surface Infiltration Basin #3 Peak Elev=373.92' Storage=16,277 cf Inflow=18.40 cfs 1.379 af
Discarded=3.81 cfs 1.379 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=3.81 cfs 1.379 af

Pond B4: Surface Infiltration Basin #4 Peak Elev=394.47' Storage=5,412 cf Inflow=5.27 cfs 0.387 af
Discarded=0.89 cfs 0.387 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.89 cfs 0.387 af

Total Runoff Area = 74.319 ac Runoff Volume = 3.894 af Average Runoff Depth = 0.63"
90.01% Pervious = 66.898 ac 9.99% Impervious = 7.421 ac

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Summary for Subcatchment P1a: Road + Basin

Runoff = 5.27 cfs @ 12.09 hrs, Volume= 0.387 af, Depth= 3.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.07"

Area (ac)	CN	Description
0.967	98	Paved parking, HSG A
0.304	39	>75% Grass cover, Good, HSG A
* 0.082	98	Bot. Basin, 0% imp, HSG A
1.353	85	Weighted Average
0.386		28.53% Pervious Area
0.967		71.47% Impervious Area

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

Summary for Subcatchment P1b: South overland

Runoff = 0.03 cfs @ 21.07 hrs, Volume= 0.024 af, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.07"

Area (ac)	CN	Description
1.367	39	>75% Grass cover, Good, HSG A
0.256	72	Dirt roads, HSG A
7.669	30	Woods, Good, HSG A
9.292	32	Weighted Average
9.292		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0460	0.09		Sheet Flow, 418-415.7
					Woods: Light underbrush n= 0.400 P2= 3.00"
14.6	620	0.0200	0.71		Shallow Concentrated Flow, 415.7 to 403.2
					Woodland Kv= 5.0 fps
1.7	85	0.0140	0.83		Shallow Concentrated Flow, 403.2 to 402
					Short Grass Pasture Kv= 7.0 fps
0.8	592	0.0270	11.83	37.17	Pipe Channel, 402 to 386
					24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'
					n= 0.013 Corrugated PE, smooth interior
26.2	1,347	Total			

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Summary for Subcatchment P2: Southwest overland

Runoff = 0.04 cfs @ 22.11 hrs, Volume= 0.020 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.07"

Area (ac)	CN	Description
9.933	30	Woods, Good, HSG A
0.090	72	Dirt roads, HSG A
2.450	30	Meadow, non-grazed, HSG A
1.950	39	>75% Grass cover, Good, HSG A
14.423	31	Weighted Average
14.423		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0316	0.12		Sheet Flow, 418 to 416.42 Grass: Dense n= 0.240 P2= 3.00"
8.9	600	0.0260	1.13		Shallow Concentrated Flow, 416.4 to 401 Short Grass Pasture Kv= 7.0 fps
0.3	112	0.0180	7.06	8.67	Pipe Channel, 401-399 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
16.2	762	Total			

Summary for Subcatchment P3: West overland

Runoff = 0.03 cfs @ 23.74 hrs, Volume= 0.012 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.07"

Area (ac)	CN	Description
18.741	30	Woods, Good, HSG A
2.189	30	Meadow, non-grazed, HSG A
20.930	30	Weighted Average
20.930		100.00% Pervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		Sheet Flow, 502 - 500 Woods: Light underbrush n= 0.400 P2= 3.00"
5.1	331	0.0470	1.08		Shallow Concentrated Flow, 500 - 484.4 Woodland Kv= 5.0 fps
8.4	283	0.0014	0.56		Shallow Concentrated Flow, 484.4 to 484 Grassed Waterway Kv= 15.0 fps
1.4	262	0.3820	3.09		Shallow Concentrated Flow, 484 to 384 Woodland Kv= 5.0 fps
24.6	926	Total			

Summary for Subcatchment P4a: Road + Basin

Runoff = 18.40 cfs @ 12.09 hrs, Volume= 1.379 af, Depth= 3.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.07"

Area (ac)	CN	Description
2.902	98	Paved parking, HSG A
0.657	39	>75% Grass cover, Good, HSG A
* 0.751	98	Bot. Basin, 0% imp, HSG A
4.310	89	Weighted Average
1.408		32.67% Pervious Area
2.902		67.33% Impervious Area

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

Summary for Subcatchment P4b: Road + Basin

Runoff = 13.15 cfs @ 12.09 hrs, Volume= 0.963 af, Depth= 3.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.07"

Area (ac)	CN	Description
2.075	98	Paved parking, HSG A
0.566	39	>75% Grass cover, Good, HSG A
0.450	61	>75% Grass cover, Good, HSG B
* 0.373	98	Bot. Basin, 0% imp, HSG B
3.464	84	Weighted Average
1.389		40.10% Pervious Area
2.075		59.90% Impervious Area

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

Summary for Subcatchment P4c: Road + Basin

Runoff = 8.22 cfs @ 12.09 hrs, Volume= 0.612 af, Depth= 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.07"

Area (ac)	CN	Description
1.477	98	Paved parking, HSG A
0.335	39	>75% Grass cover, Good, HSG A
* 0.154	98	Bot. Basin, 0% imp, HSG A
1.966	88	Weighted Average
0.489		24.87% Pervious Area
1.477		75.13% Impervious Area

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

Summary for Subcatchment P4d: Central overland

Runoff = 0.12 cfs @ 13.62 hrs, Volume= 0.072 af, Depth= 0.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.07"

Area (ac)	CN	Description
0.662	72	Dirt roads, HSG A
1.940	30	Meadow, non-grazed, HSG A
0.902	30	Woods, Good, HSG A
1.315	39	>75% Grass cover, Good, HSG A
4.819	38	Weighted Average
4.819		100.00% Pervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	50	0.0300	0.41		Sheet Flow, 394.5-393 Fallow n= 0.050 P2= 3.00"
0.7	137	0.0360	3.05		Shallow Concentrated Flow, 393-388 Unpaved Kv= 16.1 fps
1.9	140	0.0320	1.25		Shallow Concentrated Flow, 388-383.5 Short Grass Pasture Kv= 7.0 fps
0.3	75	0.0060	4.08	5.00	Pipe Channel, 379-378.55 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
0.4	117	0.0090	4.99	6.13	Pipe Channel, 378.45-377.4 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
0.2	88	0.0150	6.45	7.91	Pipe Channel, 377.3-376 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
5.6	607	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment P4e: North overland

Runoff = 1.96 cfs @ 12.39 hrs, Volume= 0.424 af, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.07"

Area (ac)	CN	Description
0.240	61	>75% Grass cover, Good, HSG B
2.852	72	Dirt roads, HSG A
1.740	30	Meadow, non-grazed, HSG A
3.602	30	Woods, Good, HSG A
5.203	39	>75% Grass cover, Good, HSG A
13.637	43	Weighted Average
13.637		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.0150	0.13		Sheet Flow, 366-365.25 Grass: Short n= 0.150 P2= 3.00"
1.8	88	0.0140	0.83		Shallow Concentrated Flow, 365.25-364 Short Grass Pasture Kv= 7.0 fps
0.2	132	0.0300	9.12	11.19	Pipe Channel, 364-360 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
8.5	270	Total			

Summary for Subcatchment P5: Northwest overland

Runoff = 0.00 cfs @ 13.62 hrs, Volume= 0.002 af, Depth= 0.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=5.07"

Area (ac)	CN	Description
0.109	39	>75% Grass cover, Good, HSG A
0.016	30	Meadow, non-grazed, HSG A
0.125	38	Weighted Average
0.125		100.00% Pervious Area

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

Summary for Reach DP1: Wetlands @ Boston Road

Inflow Area = 10.645 ac, 9.08% Impervious, Inflow Depth = 0.03" for 10-YR event
Inflow = 0.03 cfs @ 21.07 hrs, Volume= 0.024 af
Outflow = 0.03 cfs @ 21.07 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP2: Onsite Eastern Boundary

Inflow Area = 14.423 ac, 0.00% Impervious, Inflow Depth = 0.02" for 10-YR event
Inflow = 0.04 cfs @ 22.11 hrs, Volume= 0.020 af
Outflow = 0.04 cfs @ 22.11 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP3: Onsite Wetland

Inflow Area = 20.930 ac, 0.00% Impervious, Inflow Depth = 0.01" for 10-YR event
Inflow = 0.03 cfs @ 23.74 hrs, Volume= 0.012 af
Outflow = 0.03 cfs @ 23.74 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP4: Onsite Eastern Boundary

Inflow Area = 9.129 ac, 31.79% Impervious, Inflow Depth = 0.10" for 10-YR event
Inflow = 0.12 cfs @ 13.62 hrs, Volume= 0.072 af
Outflow = 0.12 cfs @ 13.62 hrs, Volume= 0.072 af, Atten= 0%, Lag= 0.0 min

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Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP5: Western Boundary

Inflow Area = 0.125 ac, 0.00% Impervious, Inflow Depth = 0.18" for 10-YR event
 Inflow = 0.00 cfs @ 13.62 hrs, Volume= 0.002 af
 Outflow = 0.00 cfs @ 13.62 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP6: Onsite Northeastern Boundary

Inflow Area = 19.067 ac, 18.63% Impervious, Inflow Depth = 0.27" for 10-YR event
 Inflow = 1.96 cfs @ 12.39 hrs, Volume= 0.424 af
 Outflow = 1.96 cfs @ 12.39 hrs, Volume= 0.424 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond B1: Surface Infiltration Basin #1

Inflow Area = 1.966 ac, 75.13% Impervious, Inflow Depth = 3.74" for 10-YR event
 Inflow = 8.22 cfs @ 12.09 hrs, Volume= 0.612 af
 Outflow = 0.46 cfs @ 14.07 hrs, Volume= 0.612 af, Atten= 94%, Lag= 118.9 min
 Discarded = 0.46 cfs @ 14.07 hrs, Volume= 0.612 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 355.11' @ 14.07 hrs Surf.Area= 8,330 sf Storage= 13,488 cf

Plug-Flow detention time= 309.7 min calculated for 0.612 af (100% of inflow)
 Center-of-Mass det. time= 309.7 min (1,107.1 - 797.4)

Volume	Invert	Avail.Storage	Storage Description
#1	353.00'	46,324 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
353.00	4,922	0	0
354.00	6,095	5,509	5,509
356.00	10,136	16,231	21,740
358.00	14,448	24,584	46,324

Device	Routing	Invert	Outlet Devices
#1	Discarded	353.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	353.00'	18.0" Round Culvert L= 29.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 353.00' / 352.00' S= 0.0345 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	356.75'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600

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#4 Secondary 357.00' Limited to weir flow at low heads
20.0' long x 10.0' breadth Broad-Crested Rectangular Weir
 Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.46 cfs @ 14.07 hrs HW=355.11' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.46 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=353.00' (Free Discharge)
 ↑ **2=Culvert** (Controls 0.00 cfs)
 ↑ **3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=353.00' (Free Discharge)
 ↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond B2: Surface Infiltration Basin #2

Inflow Area = 3.464 ac, 59.90% Impervious, Inflow Depth = 3.33" for 10-YR event
 Inflow = 13.15 cfs @ 12.09 hrs, Volume= 0.963 af
 Outflow = 1.04 cfs @ 13.35 hrs, Volume= 0.963 af, Atten= 92%, Lag= 75.7 min
 Discarded = 1.04 cfs @ 13.35 hrs, Volume= 0.963 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 364.08' @ 13.35 hrs Surf.Area= 18,578 sf Storage= 18,109 cf

Plug-Flow detention time= 165.7 min calculated for 0.963 af (100% of inflow)
 Center-of-Mass det. time= 165.6 min (975.6 - 810.0)

Volume	Invert	Avail.Storage	Storage Description
#1	363.00'	122,385 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
363.00	14,913	0	0
364.00	18,225	16,569	16,569
366.00	26,672	44,897	61,466
368.00	34,247	60,919	122,385

Device	Routing	Invert	Outlet Devices
#1	Discarded	363.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	363.00'	12.0" Round Culvert L= 38.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 363.00' / 362.00' S= 0.0263 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	366.00'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	367.00'	20.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60

Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=1.04 cfs @ 13.35 hrs HW=364.08' (Free Discharge)↑ **1=Exfiltration** (Exfiltration Controls 1.04 cfs)**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=363.00' (Free Discharge)↑ **2=Culvert** (Controls 0.00 cfs)↑ **3=Orifice/Grate** (Controls 0.00 cfs)**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=363.00' (Free Discharge)↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)**Summary for Pond B3: Surface Infiltration Basin #3**

Inflow Area = 4.310 ac, 67.33% Impervious, Inflow Depth = 3.84" for 10-YR event
 Inflow = 18.40 cfs @ 12.09 hrs, Volume= 1.379 af
 Outflow = 3.81 cfs @ 12.52 hrs, Volume= 1.379 af, Atten= 79%, Lag= 25.7 min
 Discarded = 3.81 cfs @ 12.52 hrs, Volume= 1.379 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 373.92' @ 12.52 hrs Surf.Area= 19,878 sf Storage= 16,277 cf

Plug-Flow detention time= 28.0 min calculated for 1.378 af (100% of inflow)
 Center-of-Mass det. time= 28.0 min (821.9 - 793.9)

Volume	Invert	Avail.Storage	Storage Description
#1	373.00'	119,215 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
373.00	15,656	0	0
374.00	20,264	17,960	17,960
376.00	25,168	45,432	63,392
378.00	30,655	55,823	119,215

Device	Routing	Invert	Outlet Devices
#1	Discarded	373.00'	8.270 in/hr Exfiltration over Surface area
#2	Primary	373.00'	12.0" Round Culvert L= 33.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 373.00' / 372.00' S= 0.0303 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	376.00'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	377.00'	20.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=3.80 cfs @ 12.52 hrs HW=373.92' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 3.80 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=373.00' (Free Discharge)

↑ **2=Culvert** (Controls 0.00 cfs)

↑ **3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=373.00' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond B4: Surface Infiltration Basin #4

Inflow Area = 1.353 ac, 71.47% Impervious, Inflow Depth = 3.43" for 10-YR event
 Inflow = 5.27 cfs @ 12.09 hrs, Volume= 0.387 af
 Outflow = 0.89 cfs @ 12.57 hrs, Volume= 0.387 af, Atten= 83%, Lag= 28.8 min
 Discarded = 0.89 cfs @ 12.57 hrs, Volume= 0.387 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 394.47' @ 12.57 hrs Surf.Area= 4,649 sf Storage= 5,412 cf

Plug-Flow detention time= 48.1 min calculated for 0.387 af (100% of inflow)
 Center-of-Mass det. time= 48.0 min (855.0 - 807.0)

Volume	Invert	Avail.Storage	Storage Description
#1	393.00'	31,603 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
393.00	2,914	0	0
394.00	3,897	3,406	3,406
396.00	7,101	10,998	14,404
398.00	10,098	17,199	31,603

Device	Routing	Invert	Outlet Devices
#1	Discarded	393.00'	8.270 in/hr Exfiltration over Surface area
#2	Primary	392.00'	24.0" Round Culvert L= 286.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 392.00' / 386.00' S= 0.0210 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	396.50'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	397.00'	20.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

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Discarded OutFlow Max=0.89 cfs @ 12.57 hrs HW=394.47' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.89 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=393.00' (Free Discharge)

↑ **2=Culvert** (Passes 0.00 cfs of 5.35 cfs potential flow)

↑ **3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=393.00' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentP1a: Road + Basin	Runoff Area=1.353 ac 71.47% Impervious Runoff Depth=4.48" Tc=6.0 min CN=85 Runoff=6.81 cfs 0.505 af
SubcatchmentP1b: South overland	Runoff Area=9.292 ac 0.00% Impervious Runoff Depth=0.16" Flow Length=1,347' Tc=26.2 min CN=32 Runoff=0.20 cfs 0.126 af
SubcatchmentP2: Southwest overland	Runoff Area=14.423 ac 0.00% Impervious Runoff Depth=0.13" Flow Length=762' Tc=16.2 min CN=31 Runoff=0.24 cfs 0.151 af
SubcatchmentP3: West overland	Runoff Area=20.930 ac 0.00% Impervious Runoff Depth=0.09" Flow Length=926' Tc=24.6 min CN=30 Runoff=0.25 cfs 0.163 af
SubcatchmentP4a: Road + Basin	Runoff Area=4.310 ac 67.33% Impervious Runoff Depth=4.92" Tc=6.0 min CN=89 Runoff=23.27 cfs 1.767 af
SubcatchmentP4b: Road + Basin	Runoff Area=3.464 ac 59.90% Impervious Runoff Depth=4.37" Tc=6.0 min CN=84 Runoff=17.09 cfs 1.263 af
SubcatchmentP4c: Road + Basin	Runoff Area=1.966 ac 75.13% Impervious Runoff Depth=4.81" Tc=6.0 min CN=88 Runoff=10.45 cfs 0.788 af
SubcatchmentP4d: Central overland	Runoff Area=4.819 ac 0.00% Impervious Runoff Depth=0.45" Flow Length=607' Tc=6.0 min CN=38 Runoff=0.83 cfs 0.179 af
SubcatchmentP4e: North overland	Runoff Area=13.637 ac 0.00% Impervious Runoff Depth=0.75" Flow Length=270' Tc=8.5 min CN=43 Runoff=5.76 cfs 0.847 af
SubcatchmentP5: Northwest overland	Runoff Area=0.125 ac 0.00% Impervious Runoff Depth=0.45" Tc=6.0 min CN=38 Runoff=0.02 cfs 0.005 af
Reach DP1: Wetlands @ Boston Road	Inflow=0.20 cfs 0.126 af Outflow=0.20 cfs 0.126 af
Reach DP2: Onsite Eastern Boundary	Inflow=0.24 cfs 0.151 af Outflow=0.24 cfs 0.151 af
Reach DP3: Onsite Wetland	Inflow=0.25 cfs 0.163 af Outflow=0.25 cfs 0.163 af
Reach DP4: Onsite Eastern Boundary	Inflow=0.83 cfs 0.179 af Outflow=0.83 cfs 0.179 af
Reach DP5: Western Boundary	Inflow=0.02 cfs 0.005 af Outflow=0.02 cfs 0.005 af
Reach DP6: Onsite Northeastern Boundary	Inflow=5.76 cfs 0.847 af Outflow=5.76 cfs 0.847 af

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Pond B1: Surface Infiltration Basin #1 Peak Elev=355.66' Storage=18,364 cf Inflow=10.45 cfs 0.788 af
Discarded=0.53 cfs 0.788 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.53 cfs 0.788 af

Pond B2: Surface Infiltration Basin #2 Peak Elev=364.47' Storage=25,542 cf Inflow=17.09 cfs 1.263 af
Discarded=1.13 cfs 1.263 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=1.13 cfs 1.263 af

Pond B3: Surface Infiltration Basin #3 Peak Elev=374.25' Storage=23,019 cf Inflow=23.27 cfs 1.767 af
Discarded=3.99 cfs 1.767 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=3.99 cfs 1.767 af

Pond B4: Surface Infiltration Basin #4 Peak Elev=394.90' Storage=7,547 cf Inflow=6.81 cfs 0.505 af
Discarded=1.02 cfs 0.505 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=1.02 cfs 0.505 af

Total Runoff Area = 74.319 ac Runoff Volume = 5.794 af Average Runoff Depth = 0.94"
90.01% Pervious = 66.898 ac 9.99% Impervious = 7.421 ac

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Summary for Subcatchment P1a: Road + Basin

Runoff = 6.81 cfs @ 12.09 hrs, Volume= 0.505 af, Depth= 4.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.19"

Area (ac)	CN	Description
0.967	98	Paved parking, HSG A
0.304	39	>75% Grass cover, Good, HSG A
* 0.082	98	Bot. Basin, 0% imp, HSG A
1.353	85	Weighted Average
0.386		28.53% Pervious Area
0.967		71.47% Impervious Area

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

Summary for Subcatchment P1b: South overland

Runoff = 0.20 cfs @ 14.94 hrs, Volume= 0.126 af, Depth= 0.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.19"

Area (ac)	CN	Description
1.367	39	>75% Grass cover, Good, HSG A
0.256	72	Dirt roads, HSG A
7.669	30	Woods, Good, HSG A
9.292	32	Weighted Average
9.292		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0460	0.09		Sheet Flow, 418-415.7
					Woods: Light underbrush n= 0.400 P2= 3.00"
14.6	620	0.0200	0.71		Shallow Concentrated Flow, 415.7 to 403.2
					Woodland Kv= 5.0 fps
1.7	85	0.0140	0.83		Shallow Concentrated Flow, 403.2 to 402
					Short Grass Pasture Kv= 7.0 fps
0.8	592	0.0270	11.83	37.17	Pipe Channel, 402 to 386
					24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'
					n= 0.013 Corrugated PE, smooth interior
26.2	1,347	Total			

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Summary for Subcatchment P2: Southwest overland

Runoff = 0.24 cfs @ 15.07 hrs, Volume= 0.151 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.19"

Area (ac)	CN	Description
9.933	30	Woods, Good, HSG A
0.090	72	Dirt roads, HSG A
2.450	30	Meadow, non-grazed, HSG A
1.950	39	>75% Grass cover, Good, HSG A
14.423	31	Weighted Average
14.423		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0316	0.12		Sheet Flow, 418 to 416.42 Grass: Dense n= 0.240 P2= 3.00"
8.9	600	0.0260	1.13		Shallow Concentrated Flow, 416.4 to 401 Short Grass Pasture Kv= 7.0 fps
0.3	112	0.0180	7.06	8.67	Pipe Channel, 401-399 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
16.2	762	Total			

Summary for Subcatchment P3: West overland

Runoff = 0.25 cfs @ 15.54 hrs, Volume= 0.163 af, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.19"

Area (ac)	CN	Description
18.741	30	Woods, Good, HSG A
2.189	30	Meadow, non-grazed, HSG A
20.930	30	Weighted Average
20.930		100.00% Pervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		Sheet Flow, 502 - 500 Woods: Light underbrush n= 0.400 P2= 3.00"
5.1	331	0.0470	1.08		Shallow Concentrated Flow, 500 - 484.4 Woodland Kv= 5.0 fps
8.4	283	0.0014	0.56		Shallow Concentrated Flow, 484.4 to 484 Grassed Waterway Kv= 15.0 fps
1.4	262	0.3820	3.09		Shallow Concentrated Flow, 484 to 384 Woodland Kv= 5.0 fps
24.6	926	Total			

Summary for Subcatchment P4a: Road + Basin

Runoff = 23.27 cfs @ 12.09 hrs, Volume= 1.767 af, Depth= 4.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.19"

Area (ac)	CN	Description
2.902	98	Paved parking, HSG A
0.657	39	>75% Grass cover, Good, HSG A
* 0.751	98	Bot. Basin, 0% imp, HSG A
4.310	89	Weighted Average
1.408		32.67% Pervious Area
2.902		67.33% Impervious Area

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

Summary for Subcatchment P4b: Road + Basin

Runoff = 17.09 cfs @ 12.09 hrs, Volume= 1.263 af, Depth= 4.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.19"

Area (ac)	CN	Description
2.075	98	Paved parking, HSG A
0.566	39	>75% Grass cover, Good, HSG A
0.450	61	>75% Grass cover, Good, HSG B
* 0.373	98	Bot. Basin, 0% imp, HSG B
3.464	84	Weighted Average
1.389		40.10% Pervious Area
2.075		59.90% Impervious Area

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

Summary for Subcatchment P4c: Road + Basin

Runoff = 10.45 cfs @ 12.09 hrs, Volume= 0.788 af, Depth= 4.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.19"

Area (ac)	CN	Description
1.477	98	Paved parking, HSG A
0.335	39	>75% Grass cover, Good, HSG A
* 0.154	98	Bot. Basin, 0% imp, HSG A
1.966	88	Weighted Average
0.489		24.87% Pervious Area
1.477		75.13% Impervious Area

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

Summary for Subcatchment P4d: Central overland

Runoff = 0.83 cfs @ 12.35 hrs, Volume= 0.179 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.19"

Area (ac)	CN	Description
0.662	72	Dirt roads, HSG A
1.940	30	Meadow, non-grazed, HSG A
0.902	30	Woods, Good, HSG A
1.315	39	>75% Grass cover, Good, HSG A
4.819	38	Weighted Average
4.819		100.00% Pervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	50	0.0300	0.41		Sheet Flow, 394.5-393 Fallow n= 0.050 P2= 3.00"
0.7	137	0.0360	3.05		Shallow Concentrated Flow, 393-388 Unpaved Kv= 16.1 fps
1.9	140	0.0320	1.25		Shallow Concentrated Flow, 388-383.5 Short Grass Pasture Kv= 7.0 fps
0.3	75	0.0060	4.08	5.00	Pipe Channel, 379-378.55 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
0.4	117	0.0090	4.99	6.13	Pipe Channel, 378.45-377.4 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
0.2	88	0.0150	6.45	7.91	Pipe Channel, 377.3-376 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
5.6	607	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment P4e: North overland

Runoff = 5.76 cfs @ 12.20 hrs, Volume= 0.847 af, Depth= 0.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.19"

Area (ac)	CN	Description
0.240	61	>75% Grass cover, Good, HSG B
2.852	72	Dirt roads, HSG A
1.740	30	Meadow, non-grazed, HSG A
3.602	30	Woods, Good, HSG A
5.203	39	>75% Grass cover, Good, HSG A
13.637	43	Weighted Average
13.637		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.0150	0.13		Sheet Flow, 366-365.25 Grass: Short n= 0.150 P2= 3.00"
1.8	88	0.0140	0.83		Shallow Concentrated Flow, 365.25-364 Short Grass Pasture Kv= 7.0 fps
0.2	132	0.0300	9.12	11.19	Pipe Channel, 364-360 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
8.5	270	Total			

Summary for Subcatchment P5: Northwest overland

Runoff = 0.02 cfs @ 12.35 hrs, Volume= 0.005 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=6.19"

Area (ac)	CN	Description
0.109	39	>75% Grass cover, Good, HSG A
0.016	30	Meadow, non-grazed, HSG A
0.125	38	Weighted Average
0.125		100.00% Pervious Area

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

Summary for Reach DP1: Wetlands @ Boston Road

Inflow Area = 10.645 ac, 9.08% Impervious, Inflow Depth = 0.14" for 25-YR event
Inflow = 0.20 cfs @ 14.94 hrs, Volume= 0.126 af
Outflow = 0.20 cfs @ 14.94 hrs, Volume= 0.126 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP2: Onsite Eastern Boundary

Inflow Area = 14.423 ac, 0.00% Impervious, Inflow Depth = 0.13" for 25-YR event
Inflow = 0.24 cfs @ 15.07 hrs, Volume= 0.151 af
Outflow = 0.24 cfs @ 15.07 hrs, Volume= 0.151 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP3: Onsite Wetland

Inflow Area = 20.930 ac, 0.00% Impervious, Inflow Depth = 0.09" for 25-YR event
Inflow = 0.25 cfs @ 15.54 hrs, Volume= 0.163 af
Outflow = 0.25 cfs @ 15.54 hrs, Volume= 0.163 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP4: Onsite Eastern Boundary

Inflow Area = 9.129 ac, 31.79% Impervious, Inflow Depth = 0.23" for 25-YR event
Inflow = 0.83 cfs @ 12.35 hrs, Volume= 0.179 af
Outflow = 0.83 cfs @ 12.35 hrs, Volume= 0.179 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP5: Western Boundary

Inflow Area = 0.125 ac, 0.00% Impervious, Inflow Depth = 0.45" for 25-YR event
 Inflow = 0.02 cfs @ 12.35 hrs, Volume= 0.005 af
 Outflow = 0.02 cfs @ 12.35 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP6: Onsite Northeastern Boundary

Inflow Area = 19.067 ac, 18.63% Impervious, Inflow Depth = 0.53" for 25-YR event
 Inflow = 5.76 cfs @ 12.20 hrs, Volume= 0.847 af
 Outflow = 5.76 cfs @ 12.20 hrs, Volume= 0.847 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond B1: Surface Infiltration Basin #1

Inflow Area = 1.966 ac, 75.13% Impervious, Inflow Depth = 4.81" for 25-YR event
 Inflow = 10.45 cfs @ 12.09 hrs, Volume= 0.788 af
 Outflow = 0.53 cfs @ 14.43 hrs, Volume= 0.788 af, Atten= 95%, Lag= 140.7 min
 Discarded = 0.53 cfs @ 14.43 hrs, Volume= 0.788 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 355.66' @ 14.43 hrs Surf.Area= 9,439 sf Storage= 18,364 cf

Plug-Flow detention time= 378.4 min calculated for 0.787 af (100% of inflow)
 Center-of-Mass det. time= 378.4 min (1,168.9 - 790.4)

Volume	Invert	Avail.Storage	Storage Description
#1	353.00'	46,324 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
353.00	4,922	0	0
354.00	6,095	5,509	5,509
356.00	10,136	16,231	21,740
358.00	14,448	24,584	46,324
Device	Routing	Invert	Outlet Devices
#1	Discarded	353.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	353.00'	18.0" Round Culvert L= 29.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 353.00' / 352.00' S= 0.0345 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	356.75'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600

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#4 Secondary 357.00' Limited to weir flow at low heads
20.0' long x 10.0' breadth Broad-Crested Rectangular Weir
 Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.53 cfs @ 14.43 hrs HW=355.66' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.53 cfs)**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=353.00' (Free Discharge)↑**2=Culvert** (Controls 0.00 cfs)↑**3=Orifice/Grate** (Controls 0.00 cfs)**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=353.00' (Free Discharge)↑**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)**Summary for Pond B2: Surface Infiltration Basin #2**

Inflow Area = 3.464 ac, 59.90% Impervious, Inflow Depth = 4.37" for 25-YR event
 Inflow = 17.09 cfs @ 12.09 hrs, Volume= 1.263 af
 Outflow = 1.13 cfs @ 13.75 hrs, Volume= 1.263 af, Atten= 93%, Lag= 99.9 min
 Discarded = 1.13 cfs @ 13.75 hrs, Volume= 1.263 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 364.47' @ 13.75 hrs Surf.Area= 20,198 sf Storage= 25,542 cf

Plug-Flow detention time= 224.9 min calculated for 1.262 af (100% of inflow)
 Center-of-Mass det. time= 224.8 min (1,027.1 - 802.3)

Volume	Invert	Avail.Storage	Storage Description
#1	363.00'	122,385 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
363.00	14,913	0	0
364.00	18,225	16,569	16,569
366.00	26,672	44,897	61,466
368.00	34,247	60,919	122,385

Device	Routing	Invert	Outlet Devices
#1	Discarded	363.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	363.00'	12.0" Round Culvert L= 38.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 363.00' / 362.00' S= 0.0263 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	366.00'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	367.00'	20.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60

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Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=1.13 cfs @ 13.75 hrs HW=364.47' (Free Discharge)↑ **1=Exfiltration** (Exfiltration Controls 1.13 cfs)**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=363.00' (Free Discharge)↑ **2=Culvert** (Controls 0.00 cfs)↑ **3=Orifice/Grate** (Controls 0.00 cfs)**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=363.00' (Free Discharge)↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)**Summary for Pond B3: Surface Infiltration Basin #3**

Inflow Area = 4.310 ac, 67.33% Impervious, Inflow Depth = 4.92" for 25-YR event
 Inflow = 23.27 cfs @ 12.09 hrs, Volume= 1.767 af
 Outflow = 3.99 cfs @ 12.56 hrs, Volume= 1.767 af, Atten= 83%, Lag= 28.1 min
 Discarded = 3.99 cfs @ 12.56 hrs, Volume= 1.767 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 374.25' @ 12.56 hrs Surf.Area= 20,867 sf Storage= 23,019 cf

Plug-Flow detention time= 39.1 min calculated for 1.766 af (100% of inflow)
 Center-of-Mass det. time= 39.1 min (826.3 - 787.1)

Volume	Invert	Avail.Storage	Storage Description
#1	373.00'	119,215 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
373.00	15,656	0	0
374.00	20,264	17,960	17,960
376.00	25,168	45,432	63,392
378.00	30,655	55,823	119,215

Device	Routing	Invert	Outlet Devices
#1	Discarded	373.00'	8.270 in/hr Exfiltration over Surface area
#2	Primary	373.00'	12.0" Round Culvert L= 33.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 373.00' / 372.00' S= 0.0303 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	376.00'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	377.00'	20.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=3.99 cfs @ 12.56 hrs HW=374.25' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 3.99 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=373.00' (Free Discharge)

↑ **2=Culvert** (Controls 0.00 cfs)

↑ **3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=373.00' (Free Discharge)

↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond B4: Surface Infiltration Basin #4

Inflow Area = 1.353 ac, 71.47% Impervious, Inflow Depth = 4.48" for 25-YR event
 Inflow = 6.81 cfs @ 12.09 hrs, Volume= 0.505 af
 Outflow = 1.02 cfs @ 12.60 hrs, Volume= 0.505 af, Atten= 85%, Lag= 30.7 min
 Discarded = 1.02 cfs @ 12.60 hrs, Volume= 0.505 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 394.90' @ 12.60 hrs Surf.Area= 5,334 sf Storage= 7,547 cf

Plug-Flow detention time= 62.0 min calculated for 0.505 af (100% of inflow)
 Center-of-Mass det. time= 62.0 min (861.5 - 799.5)

Volume	Invert	Avail.Storage	Storage Description
#1	393.00'	31,603 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
393.00	2,914	0	0
394.00	3,897	3,406	3,406
396.00	7,101	10,998	14,404
398.00	10,098	17,199	31,603

Device	Routing	Invert	Outlet Devices
#1	Discarded	393.00'	8.270 in/hr Exfiltration over Surface area
#2	Primary	392.00'	24.0" Round Culvert L= 286.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 392.00' / 386.00' S= 0.0210 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	396.50'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	397.00'	20.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

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Discarded OutFlow Max=1.02 cfs @ 12.60 hrs HW=394.90' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 1.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=393.00' (Free Discharge)

↑**2=Culvert** (Passes 0.00 cfs of 5.35 cfs potential flow)

↑**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=393.00' (Free Discharge)

↑**4=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

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Type III 24-hr 100-YR Rainfall=7.92"

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Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentP1a: Road + Basin	Runoff Area=1.353 ac 71.47% Impervious Runoff Depth=6.14" Tc=6.0 min CN=85 Runoff=9.18 cfs 0.692 af
SubcatchmentP1b: South overland	Runoff Area=9.292 ac 0.00% Impervious Runoff Depth=0.54" Flow Length=1,347' Tc=26.2 min CN=32 Runoff=1.40 cfs 0.419 af
SubcatchmentP2: Southwest overland	Runoff Area=14.423 ac 0.00% Impervious Runoff Depth=0.47" Flow Length=762' Tc=16.2 min CN=31 Runoff=1.89 cfs 0.562 af
SubcatchmentP3: West overland	Runoff Area=20.930 ac 0.00% Impervious Runoff Depth=0.40" Flow Length=926' Tc=24.6 min CN=30 Runoff=1.66 cfs 0.694 af
SubcatchmentP4a: Road + Basin	Runoff Area=4.310 ac 67.33% Impervious Runoff Depth=6.61" Tc=6.0 min CN=89 Runoff=30.74 cfs 2.373 af
SubcatchmentP4b: Road + Basin	Runoff Area=3.464 ac 59.90% Impervious Runoff Depth=6.02" Tc=6.0 min CN=84 Runoff=23.17 cfs 1.737 af
SubcatchmentP4c: Road + Basin	Runoff Area=1.966 ac 75.13% Impervious Runoff Depth=6.49" Tc=6.0 min CN=88 Runoff=13.86 cfs 1.063 af
SubcatchmentP4d: Central overland	Runoff Area=4.819 ac 0.00% Impervious Runoff Depth=1.03" Flow Length=607' Tc=6.0 min CN=38 Runoff=3.32 cfs 0.415 af
SubcatchmentP4e: North overland	Runoff Area=13.637 ac 0.00% Impervious Runoff Depth=1.50" Flow Length=270' Tc=8.5 min CN=43 Runoff=16.90 cfs 1.703 af
SubcatchmentP5: Northwest overland	Runoff Area=0.125 ac 0.00% Impervious Runoff Depth=1.03" Tc=6.0 min CN=38 Runoff=0.09 cfs 0.011 af
Reach DP1: Wetlands @ Boston Road	Inflow=1.40 cfs 0.419 af Outflow=1.40 cfs 0.419 af
Reach DP2: Onsite Eastern Boundary	Inflow=1.89 cfs 0.562 af Outflow=1.89 cfs 0.562 af
Reach DP3: Onsite Wetland	Inflow=1.66 cfs 0.694 af Outflow=1.66 cfs 0.694 af
Reach DP4: Onsite Eastern Boundary	Inflow=3.32 cfs 0.415 af Outflow=3.32 cfs 0.415 af
Reach DP5: Western Boundary	Inflow=0.09 cfs 0.011 af Outflow=0.09 cfs 0.011 af
Reach DP6: Onsite Northeastern Boundary	Inflow=16.90 cfs 1.703 af Outflow=16.90 cfs 1.703 af

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Type III 24-hr 100-YR Rainfall=7.92"

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Pond B1: Surface Infiltration Basin #1 Peak Elev=356.44' Storage=26,369 cf Inflow=13.86 cfs 1.063 af
Discarded=0.62 cfs 1.063 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.62 cfs 1.063 af

Pond B2: Surface Infiltration Basin #2 Peak Elev=365.05' Storage=38,138 cf Inflow=23.17 cfs 1.737 af
Discarded=1.27 cfs 1.737 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=1.27 cfs 1.737 af

Pond B3: Surface Infiltration Basin #3 Peak Elev=374.76' Storage=33,998 cf Inflow=30.74 cfs 2.373 af
Discarded=4.23 cfs 2.373 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=4.23 cfs 2.373 af

Pond B4: Surface Infiltration Basin #4 Peak Elev=395.50' Storage=11,083 cf Inflow=9.18 cfs 0.692 af
Discarded=1.21 cfs 0.692 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=1.21 cfs 0.692 af

Total Runoff Area = 74.319 ac Runoff Volume = 9.670 af Average Runoff Depth = 1.56"
90.01% Pervious = 66.898 ac 9.99% Impervious = 7.421 ac

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Summary for Subcatchment P1a: Road + Basin

Runoff = 9.18 cfs @ 12.09 hrs, Volume= 0.692 af, Depth= 6.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.92"

Area (ac)	CN	Description
0.967	98	Paved parking, HSG A
0.304	39	>75% Grass cover, Good, HSG A
* 0.082	98	Bot. Basin, 0% imp, HSG A
1.353	85	Weighted Average
0.386		28.53% Pervious Area
0.967		71.47% Impervious Area

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

Summary for Subcatchment P1b: South overland

Runoff = 1.40 cfs @ 12.66 hrs, Volume= 0.419 af, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.92"

Area (ac)	CN	Description
1.367	39	>75% Grass cover, Good, HSG A
0.256	72	Dirt roads, HSG A
7.669	30	Woods, Good, HSG A
9.292	32	Weighted Average
9.292		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	50	0.0460	0.09		Sheet Flow, 418-415.7
					Woods: Light underbrush n= 0.400 P2= 3.00"
14.6	620	0.0200	0.71		Shallow Concentrated Flow, 415.7 to 403.2
					Woodland Kv= 5.0 fps
1.7	85	0.0140	0.83		Shallow Concentrated Flow, 403.2 to 402
					Short Grass Pasture Kv= 7.0 fps
0.8	592	0.0270	11.83	37.17	Pipe Channel, 402 to 386
					24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'
					n= 0.013 Corrugated PE, smooth interior
26.2	1,347	Total			

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Summary for Subcatchment P2: Southwest overland

Runoff = 1.89 cfs @ 12.55 hrs, Volume= 0.562 af, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.92"

Area (ac)	CN	Description
9.933	30	Woods, Good, HSG A
0.090	72	Dirt roads, HSG A
2.450	30	Meadow, non-grazed, HSG A
1.950	39	>75% Grass cover, Good, HSG A
14.423	31	Weighted Average
14.423		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0316	0.12		Sheet Flow, 418 to 416.42
					Grass: Dense n= 0.240 P2= 3.00"
8.9	600	0.0260	1.13		Shallow Concentrated Flow, 416.4 to 401
					Short Grass Pasture Kv= 7.0 fps
0.3	112	0.0180	7.06	8.67	Pipe Channel, 401-399
					15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'
					n= 0.013 Corrugated PE, smooth interior
16.2	762	Total			

Summary for Subcatchment P3: West overland

Runoff = 1.66 cfs @ 12.73 hrs, Volume= 0.694 af, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.92"

Area (ac)	CN	Description
18.741	30	Woods, Good, HSG A
2.189	30	Meadow, non-grazed, HSG A
20.930	30	Weighted Average
20.930		100.00% Pervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	50	0.0400	0.09		Sheet Flow, 502 - 500 Woods: Light underbrush n= 0.400 P2= 3.00"
5.1	331	0.0470	1.08		Shallow Concentrated Flow, 500 - 484.4 Woodland Kv= 5.0 fps
8.4	283	0.0014	0.56		Shallow Concentrated Flow, 484.4 to 484 Grassed Waterway Kv= 15.0 fps
1.4	262	0.3820	3.09		Shallow Concentrated Flow, 484 to 384 Woodland Kv= 5.0 fps
24.6	926	Total			

Summary for Subcatchment P4a: Road + Basin

Runoff = 30.74 cfs @ 12.09 hrs, Volume= 2.373 af, Depth= 6.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.92"

Area (ac)	CN	Description
2.902	98	Paved parking, HSG A
0.657	39	>75% Grass cover, Good, HSG A
* 0.751	98	Bot. Basin, 0% imp, HSG A
4.310	89	Weighted Average
1.408		32.67% Pervious Area
2.902		67.33% Impervious Area

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

Summary for Subcatchment P4b: Road + Basin

Runoff = 23.17 cfs @ 12.09 hrs, Volume= 1.737 af, Depth= 6.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.92"

Area (ac)	CN	Description
2.075	98	Paved parking, HSG A
0.566	39	>75% Grass cover, Good, HSG A
0.450	61	>75% Grass cover, Good, HSG B
* 0.373	98	Bot. Basin, 0% imp, HSG B
3.464	84	Weighted Average
1.389		40.10% Pervious Area
2.075		59.90% Impervious Area

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Type III 24-hr 100-YR Rainfall=7.92"

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

Summary for Subcatchment P4c: Road + Basin

Runoff = 13.86 cfs @ 12.09 hrs, Volume= 1.063 af, Depth= 6.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.92"

Area (ac)	CN	Description
1.477	98	Paved parking, HSG A
0.335	39	>75% Grass cover, Good, HSG A
* 0.154	98	Bot. Basin, 0% imp, HSG A
1.966	88	Weighted Average
0.489		24.87% Pervious Area
1.477		75.13% Impervious Area

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

Summary for Subcatchment P4d: Central overland

Runoff = 3.32 cfs @ 12.14 hrs, Volume= 0.415 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.92"

Area (ac)	CN	Description
0.662	72	Dirt roads, HSG A
1.940	30	Meadow, non-grazed, HSG A
0.902	30	Woods, Good, HSG A
1.315	39	>75% Grass cover, Good, HSG A
4.819	38	Weighted Average
4.819		100.00% Pervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	50	0.0300	0.41		Sheet Flow, 394.5-393 Fallow n= 0.050 P2= 3.00"
0.7	137	0.0360	3.05		Shallow Concentrated Flow, 393-388 Unpaved Kv= 16.1 fps
1.9	140	0.0320	1.25		Shallow Concentrated Flow, 388-383.5 Short Grass Pasture Kv= 7.0 fps
0.3	75	0.0060	4.08	5.00	Pipe Channel, 379-378.55 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
0.4	117	0.0090	4.99	6.13	Pipe Channel, 378.45-377.4 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
0.2	88	0.0150	6.45	7.91	Pipe Channel, 377.3-376 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
5.6	607	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment P4e: North overland

Runoff = 16.90 cfs @ 12.15 hrs, Volume= 1.703 af, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.92"

Area (ac)	CN	Description
0.240	61	>75% Grass cover, Good, HSG B
2.852	72	Dirt roads, HSG A
1.740	30	Meadow, non-grazed, HSG A
3.602	30	Woods, Good, HSG A
5.203	39	>75% Grass cover, Good, HSG A
13.637	43	Weighted Average
13.637		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.0150	0.13		Sheet Flow, 366-365.25 Grass: Short n= 0.150 P2= 3.00"
1.8	88	0.0140	0.83		Shallow Concentrated Flow, 365.25-364 Short Grass Pasture Kv= 7.0 fps
0.2	132	0.0300	9.12	11.19	Pipe Channel, 364-360 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
8.5	270	Total			

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Summary for Subcatchment P5: Northwest overland

Runoff = 0.09 cfs @ 12.14 hrs, Volume= 0.011 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR Rainfall=7.92"

Area (ac)	CN	Description
0.109	39	>75% Grass cover, Good, HSG A
0.016	30	Meadow, non-grazed, HSG A
0.125	38	Weighted Average
0.125		100.00% Pervious Area

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

Summary for Reach DP1: Wetlands @ Boston Road

Inflow Area = 10.645 ac, 9.08% Impervious, Inflow Depth = 0.47" for 100-YR event
 Inflow = 1.40 cfs @ 12.66 hrs, Volume= 0.419 af
 Outflow = 1.40 cfs @ 12.66 hrs, Volume= 0.419 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP2: Onsite Eastern Boundary

Inflow Area = 14.423 ac, 0.00% Impervious, Inflow Depth = 0.47" for 100-YR event
 Inflow = 1.89 cfs @ 12.55 hrs, Volume= 0.562 af
 Outflow = 1.89 cfs @ 12.55 hrs, Volume= 0.562 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP3: Onsite Wetland

Inflow Area = 20.930 ac, 0.00% Impervious, Inflow Depth = 0.40" for 100-YR event
 Inflow = 1.66 cfs @ 12.73 hrs, Volume= 0.694 af
 Outflow = 1.66 cfs @ 12.73 hrs, Volume= 0.694 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP4: Onsite Eastern Boundary

Inflow Area = 9.129 ac, 31.79% Impervious, Inflow Depth = 0.55" for 100-YR event
 Inflow = 3.32 cfs @ 12.14 hrs, Volume= 0.415 af
 Outflow = 3.32 cfs @ 12.14 hrs, Volume= 0.415 af, Atten= 0%, Lag= 0.0 min

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Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP5: Western Boundary

Inflow Area = 0.125 ac, 0.00% Impervious, Inflow Depth = 1.03" for 100-YR event
 Inflow = 0.09 cfs @ 12.14 hrs, Volume= 0.011 af
 Outflow = 0.09 cfs @ 12.14 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Reach DP6: Onsite Northeastern Boundary

Inflow Area = 19.067 ac, 18.63% Impervious, Inflow Depth = 1.07" for 100-YR event
 Inflow = 16.90 cfs @ 12.15 hrs, Volume= 1.703 af
 Outflow = 16.90 cfs @ 12.15 hrs, Volume= 1.703 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Pond B1: Surface Infiltration Basin #1

Inflow Area = 1.966 ac, 75.13% Impervious, Inflow Depth = 6.49" for 100-YR event
 Inflow = 13.86 cfs @ 12.09 hrs, Volume= 1.063 af
 Outflow = 0.62 cfs @ 14.82 hrs, Volume= 1.063 af, Atten= 96%, Lag= 164.1 min
 Discarded = 0.62 cfs @ 14.82 hrs, Volume= 1.063 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 356.44' @ 14.82 hrs Surf.Area= 11,077 sf Storage= 26,369 cf

Plug-Flow detention time= 472.2 min calculated for 1.063 af (100% of inflow)
 Center-of-Mass det. time= 472.4 min (1,254.8 - 782.4)

Volume	Invert	Avail.Storage	Storage Description
#1	353.00'	46,324 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
353.00	4,922	0	0
354.00	6,095	5,509	5,509
356.00	10,136	16,231	21,740
358.00	14,448	24,584	46,324
Device	Routing	Invert	Outlet Devices
#1	Discarded	353.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	353.00'	18.0" Round Culvert L= 29.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 353.00' / 352.00' S= 0.0345 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#3	Device 2	356.75'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600

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#4 Secondary 357.00' Limited to weir flow at low heads
20.0' long x 10.0' breadth Broad-Crested Rectangular Weir
 Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.62 cfs @ 14.82 hrs HW=356.44' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.62 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=353.00' (Free Discharge)
 ↑ **2=Culvert** (Controls 0.00 cfs)
 ↑ **3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=353.00' (Free Discharge)
 ↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond B2: Surface Infiltration Basin #2

Inflow Area = 3.464 ac, 59.90% Impervious, Inflow Depth = 6.02" for 100-YR event
 Inflow = 23.17 cfs @ 12.09 hrs, Volume= 1.737 af
 Outflow = 1.27 cfs @ 14.14 hrs, Volume= 1.737 af, Atten= 95%, Lag= 123.3 min
 Discarded = 1.27 cfs @ 14.14 hrs, Volume= 1.737 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 365.05' @ 14.14 hrs Surf.Area= 22,679 sf Storage= 38,138 cf

Plug-Flow detention time= 309.0 min calculated for 1.736 af (100% of inflow)
 Center-of-Mass det. time= 309.0 min (1,102.4 - 793.4)

Volume	Invert	Avail.Storage	Storage Description
#1	363.00'	122,385 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
363.00	14,913	0	0
364.00	18,225	16,569	16,569
366.00	26,672	44,897	61,466
368.00	34,247	60,919	122,385

Device	Routing	Invert	Outlet Devices
#1	Discarded	363.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	363.00'	12.0" Round Culvert L= 38.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 363.00' / 362.00' S= 0.0263 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	366.00'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	367.00'	20.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60

Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=1.27 cfs @ 14.14 hrs HW=365.05' (Free Discharge)↑ **1=Exfiltration** (Exfiltration Controls 1.27 cfs)**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=363.00' (Free Discharge)↑ **2=Culvert** (Controls 0.00 cfs)↑ **3=Orifice/Grate** (Controls 0.00 cfs)**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=363.00' (Free Discharge)↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)**Summary for Pond B3: Surface Infiltration Basin #3**

Inflow Area = 4.310 ac, 67.33% Impervious, Inflow Depth = 6.61" for 100-YR event
 Inflow = 30.74 cfs @ 12.09 hrs, Volume= 2.373 af
 Outflow = 4.23 cfs @ 12.62 hrs, Volume= 2.373 af, Atten= 86%, Lag= 31.7 min
 Discarded = 4.23 cfs @ 12.62 hrs, Volume= 2.373 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 374.76' @ 12.62 hrs Surf.Area= 22,120 sf Storage= 33,998 cf

Plug-Flow detention time= 57.8 min calculated for 2.372 af (100% of inflow)
 Center-of-Mass det. time= 57.8 min (837.1 - 779.4)

Volume	Invert	Avail.Storage	Storage Description
#1	373.00'	119,215 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
373.00	15,656	0	0
374.00	20,264	17,960	17,960
376.00	25,168	45,432	63,392
378.00	30,655	55,823	119,215

Device	Routing	Invert	Outlet Devices
#1	Discarded	373.00'	8.270 in/hr Exfiltration over Surface area
#2	Primary	373.00'	12.0" Round Culvert L= 33.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 373.00' / 372.00' S= 0.0303 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	376.00'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	377.00'	20.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=4.23 cfs @ 12.62 hrs HW=374.76' (Free Discharge)↑ **1=Exfiltration** (Exfiltration Controls 4.23 cfs)**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=373.00' (Free Discharge)↑ **2=Culvert** (Controls 0.00 cfs)↑ **3=Orifice/Grate** (Controls 0.00 cfs)**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=373.00' (Free Discharge)↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)**Summary for Pond B4: Surface Infiltration Basin #4**

Inflow Area = 1.353 ac, 71.47% Impervious, Inflow Depth = 6.14" for 100-YR event
 Inflow = 9.18 cfs @ 12.09 hrs, Volume= 0.692 af
 Outflow = 1.21 cfs @ 12.65 hrs, Volume= 0.692 af, Atten= 87%, Lag= 33.5 min
 Discarded = 1.21 cfs @ 12.65 hrs, Volume= 0.692 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
 Peak Elev= 395.50' @ 12.65 hrs Surf.Area= 6,308 sf Storage= 11,083 cf

Plug-Flow detention time= 81.7 min calculated for 0.692 af (100% of inflow)
 Center-of-Mass det. time= 81.7 min (872.5 - 790.8)

Volume	Invert	Avail.Storage	Storage Description
#1	393.00'	31,603 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
393.00	2,914	0	0
394.00	3,897	3,406	3,406
396.00	7,101	10,998	14,404
398.00	10,098	17,199	31,603

Device	Routing	Invert	Outlet Devices
#1	Discarded	393.00'	8.270 in/hr Exfiltration over Surface area
#2	Primary	392.00'	24.0" Round Culvert L= 286.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 392.00' / 386.00' S= 0.0210 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	396.50'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	397.00'	20.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

W211141-PR-REV1

Prepared by Bohler

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Proposed HydroCAD - REV1
Type III 24-hr 100-YR Rainfall=7.92"

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Discarded OutFlow Max=1.21 cfs @ 12.65 hrs HW=395.50' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 1.21 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=393.00' (Free Discharge)

↑**2=Culvert** (Passes 0.00 cfs of 5.35 cfs potential flow)

↑**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=393.00' (Free Discharge)

↑**4=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

APPENDIX F: STORMWATER CALCULATIONS

- MA STANDARD #3 – RECHARGE AND DRAWDOWN TIME (Revised 12/16/21)
- MA STANDARD #4 – WATER QUALITY (Revised 12/16/21) AND TSS REMOVAL
- NOAA RAINFALL DATA
- PIPE AND CULVERT SIZING (Revised 12/16/17)
- CATCH BASIN TRIBUTARY MAP (Added 12/16/21)
- CULVERT TRIBUTARY MAP (Added 12/16/21)
- OUTLET PROTECTION SIZING

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MA DEP Standard 3: Recharge Volume Calculations

Required Recharge Volume - A Soils (0.60 in.)

Existing Site Impervious Area (ac)	0.000
Proposed Site Impervious Area (ac)	7.421
Proposed Increase in Site Impervious Area (ac)	7.421
Recharge Volume Required (cf)	16,163

Required Recharge Volume - B Soils (0.35 in.)

Existing Site Impervious Area (ac)	0.000
Proposed Site Impervious Area (ac)	0.000
Proposed Increase in Site Impervious Area (ac)	0.000
Recharge Volume Required (cf)	0

Required Recharge Volume - C Soils (0.25 in.)

Existing Site Impervious Area (ac)	0.000
Proposed Site Impervious Area (ac)	0.000
Proposed Increase in Site Impervious Area (ac)	0.000
Recharge Volume Required (cf)	0

Required Recharge Volume - D Soils (0.10 in.)

Existing Site Impervious Area (ac)	0.000
Proposed Site Impervious Area (ac)	0.000
Proposed Increase in Site Impervious Area (ac)	0.000
Recharge Volume Required (cf)	0

Total Recharge Volume Required (cf)	16,163
--------------------------------------------	---------------

Recharge Volume Adjustment Factor

Impervious Area Directed to Infiltration BMP (ac)	7.421
%Impervious Directed to Infiltration BMP	100%
Adjustment Factor	1.00
Adjusted Total Recharge Volume Required (cf)	16,163

Provided Recharge Volume*

Basin 1	29,948
Basin 2	61,466
Basin 3	63,392
Basin 4	18,141
Total Recharge Volume Provided (cf)	172,947

Provided greater than or Equal to Required

*Volume provided below lowest outlet in cubic feet (cf)

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MA DEP Standard 3: Drawdown Time Calculations

Drawdown Time - Basin 1	
Volume below outlet pipe (Rv) (cf)	29,948
Soil Type	Loamy Sand - A
Infiltration rate (K)*	2.41
Bottom Area (sf)	4,922
Drawdown time (Hours)*	30.3
Drawdown Time - Basin 2	
Volume below outlet pipe (Rv) (cf)	61,466
Soil Type	Loamy Sand - A
Infiltration rate (K)*	2.41
Bottom Area (sf)	14,913
Drawdown time (Hours)**	20.5
Drawdown Time - Basin 3	
Volume below outlet pipe (Rv) (cf)	63,392
Soil Type	Sand - A
Infiltration rate (K)*	8.27
Bottom Area (sf)	15,656
Drawdown time (Hours)**	5.9
Drawdown Time - Basin 4	
Volume below outlet pipe (Rv) (cf)	18,141
Soil Type	Sand - A
Infiltration rate (K)*	8.27
Bottom Area (sf)	2,914
Drawdown time (Hours)**	9.0

*Infiltration Rates taken from Rawls Table

**Drawdown time = $R_v / (K \times \text{bottom area})$

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MA DEP Standard 4: Water Quality Volume Calculations

Water Quality Volume Required	
Water Quality Volume runoff (in.)*	1.0
Total Post Development Impervious Area (sf)	323,259
Required Water Quality Volume (cf)	26,938
*Water Quality volume runoff is equal to 1.0 inch of runoff times the total impervious area of the post development project site.	
Water Quality Volume Provided*	
Basin 1	29,948
Basin 2	61,466
Basin 3	63,392
Basin 4	18,141
Total Provided Water Quality Volume (cf)	172,947
<u>Provided greater than or Equal to Required</u>	
*Volume provided below lowest outlet pipe in cubic feet (cf)	

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Rational Pipe Sizing Calculations

Design Period Storm:		25 Year		Design Period Intensity*			6.6 in/hr										
LOCATION		IMPERVIOUS			OTHER			SUM CA	Tc (min)	I (in/hr)	Q (cfs)	D (in)	S (ft/ft)	Material	n	Q Full (cfs)	V Full (fps)
FROM	TO	A	C	CA	A	C	CA										
CB-106	DMH-100	0.17	0.95	0.16	0.00	0.30	0.00	0.16	6	6.6	1.06	8	0.007	HDPE	0.012	1.10	3.14
CB-101	DMH-100	0.17	0.95	0.16	0.00	0.30	0.00	0.16	6	6.6	1.07	12	0.015	HDPE	0.012	4.73	6.02
CB-100	DMH-100	0.13	0.95	0.12	0.00	0.30	0.00	0.12	6	6.6	0.80	12	0.028	HDPE	0.012	6.46	8.22
DMH-100	DMH101	0.47	0.95	0.44	0.00	0.30	0.00	0.44	6	6.6	2.93	15	0.005	HDPE	0.012	5.05	4.11
DMH-101	FES-100	0.47	0.95	0.44	0.00	0.30	0.00	0.44	6	6.6	2.93	15	0.005	HDPE	0.012	4.95	4.03
CB-104	DMH-104	0.30	0.95	0.28	0.00	0.30	0.00	0.28	6	6.6	1.85	12	0.011	HDPE	0.012	4.10	5.22
DCB-105	DMH-104	0.40	0.95	0.38	0.00	0.30	0.00	0.38	6	6.6	2.50	12	0.006	HDPE	0.012	2.86	3.64
DMH-104	DMH-103	0.69	0.95	0.66	0.00	0.30	0.00	0.66	6	6.6	4.35	12	0.013	HDPE	0.012	4.40	5.60
DMH-103	DMH-102	0.69	0.95	0.66	0.00	0.30	0.00	0.66	6	6.6	4.35	12	0.016	HDPE	0.012	4.82	6.14
CB-102	DMH-102	0.13	0.95	0.13	0.00	0.30	0.00	0.13	6	6.6	0.84	12	0.014	HDPE	0.012	4.53	5.77
CB-103	DMH-102	0.18	0.95	0.17	0.00	0.30	0.00	0.17	6	6.6	1.15	12	0.020	HDPE	0.012	5.46	6.95
DMH-102	DMH-105	1.01	0.95	0.96	0.00	0.30	0.00	0.96	6	6.6	6.34	12	0.029	HDPE	0.012	6.55	8.34
DMH-105	FES-102	1.01	0.95	0.96	0.00	0.30	0.00	0.96	6	6.6	6.34	15	0.013	HDPE	0.012	8.04	6.55
CB-200	DMH-200	0.17	0.95	0.16	0.00	0.30	0.00	0.16	6	6.6	1.04	12	0.038	HDPE	0.012	7.52	9.58
CB-201	DMH-200	0.22	0.95	0.21	0.00	0.30	0.00	0.21	6	6.6	1.38	12	0.019	HDPE	0.012	5.33	6.79
DMH-200	DMH-201	0.39	0.95	0.37	0.00	0.30	0.00	0.37	6	6.6	2.42	12	0.006	HDPE	0.012	2.99	3.81
DMH-201	DMH-202	0.39	0.95	0.37	0.00	0.30	0.00	0.37	6	6.6	2.42	12	0.006	HDPE	0.012	3.06	3.90
CB-202	DMH-202	0.13	0.95	0.13	0.00	0.30	0.00	0.13	6	6.6	0.84	12	0.033	HDPE	0.012	6.99	8.90
CB-203	DMH-202	0.18	0.95	0.17	0.00	0.30	0.00	0.17	6	6.6	1.12	12	0.016	HDPE	0.012	4.93	6.27

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Rational Pipe Sizing Calculations

Design Period Storm:		25 Year		Design Period Intensity*			6.6 in/hr										
LOCATION		IMPERVIOUS			OTHER			SUM CA	Tc (min)	I (in/hr)	Q (cfs)	D (in)	S (ft/ft)	Material	n	Q Full (cfs)	V Full (fps)
FROM	TO	A	C	CA	A	C	CA										
DMH-202	FES-201	0.70	0.95	0.66	0.00	0.30	0.00	0.66	6	6.6	4.38	12	0.019	HDPE	0.012	5.25	6.68
CB-210	DMH-208	0.14	0.95	0.13	0.00	0.30	0.00	0.13	6	6.6	0.86	12	0.034	HDPE	0.012	7.06	8.99
CB-211	DMH-208	0.19	0.95	0.18	0.00	0.30	0.00	0.18	6	6.6	1.21	12	0.016	HDPE	0.012	4.93	6.27
DMH-208	DMH-207	0.33	0.95	0.31	0.00	0.30	0.00	0.31	6	6.6	2.07	12	0.010	HDPE	0.012	3.86	4.91
DMH-207	DMH-206	0.33	0.95	0.31	0.00	0.30	0.00	0.31	6	6.6	2.07	12	0.011	HDPE	0.012	3.97	5.06
CB-208	DMH-206	0.26	0.95	0.25	0.00	0.30	0.00	0.25	6	6.6	1.63	12	0.009	HDPE	0.012	3.56	4.53
CB-209	DMH-206	0.36	0.95	0.34	0.00	0.30	0.00	0.34	6	6.6	2.27	12	0.006	HDPE	0.012	3.06	3.90
DMH-206	DMH-205	0.95	0.95	0.90	0.00	0.30	0.00	0.90	6	6.6	5.97	15	0.008	HDPE	0.012	6.06	4.94
DMH-205	DMH-204	0.95	0.95	0.90	0.00	0.30	0.00	0.90	6	6.6	5.97	15	0.008	HDPE	0.012	6.26	5.10
CB-206	DMH-204	0.10	0.95	0.10	0.00	0.30	0.00	0.10	6	6.6	0.65	12	0.024	HDPE	0.012	5.98	7.61
CB-207	DMH-204	0.14	0.95	0.13	0.00	0.30	0.00	0.13	6	6.6	0.87	12	0.023	HDPE	0.012	5.89	7.50
DMH-204	DMH-203	1.19	0.95	1.14	0.00	0.30	0.00	1.14	6	6.6	7.49	15	0.030	HDPE	0.012	12.12	9.88
CB-204	DMH-203	0.22	0.95	0.21	0.00	0.30	0.00	0.21	6	6.6	1.40	12	0.026	HDPE	0.012	6.22	7.92
CB-205	DMH-203	0.30	0.95	0.28	0.00	0.30	0.00	0.28	6	6.6	1.87	12	0.018	HDPE	0.012	5.22	6.65
DMH-203	FES-200	1.72	0.95	1.63	0.00	0.30	0.00	1.63	6	6.6	10.77	18	0.014	HDPE	0.012	13.32	7.54
CB-300	DMH-300	0.14	0.95	0.14	0.00	0.30	0.00	0.14	6	6.6	0.91	12	0.019	HDPE	0.012	5.29	6.74
CB-301	DMH-300	0.19	0.95	0.18	0.00	0.30	0.00	0.18	6	6.6	1.19	12	0.018	HDPE	0.012	5.14	6.54
DMH-300	FES-300	0.33	0.95	0.32	0.00	0.30	0.00	0.32	6	6.6	2.10	12	0.024	HDPE	0.012	5.98	7.61

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Rational Pipe Sizing Calculations

Design Period Storm:		25 Year		Design Period Intensity*			6.6 in/hr										
LOCATION		IMPERVIOUS			OTHER			SUM CA	Tc (min)	I (in/hr)	Q (cfs)	D (in)	S (ft/ft)	Material	n	Q Full (cfs)	V Full (fps)
FROM	TO	A	C	CA	A	C	CA										
CB-310	DMH-310	0.16	0.95	0.15	0.00	0.30	0.00	0.15	6	6.6	0.99	12	0.033	HDPE	0.012	6.99	8.90
CB-311	DMH-310	0.21	0.95	0.20	0.00	0.30	0.00	0.20	6	6.6	1.32	12	0.016	HDPE	0.012	4.93	6.27
DMH-310	DMH-309	0.37	0.95	0.35	0.00	0.30	0.00	0.35	6	6.6	2.30	12	0.013	HDPE	0.012	4.32	5.49
DMH-309	DMH-308	0.37	0.95	0.35	0.00	0.30	0.00	0.35	6	6.6	2.30	12	0.023	HDPE	0.012	5.85	7.45
CB-308	DMH-308	0.15	0.95	0.14	0.00	0.30	0.00	0.14	6	6.6	0.92	12	0.034	HDPE	0.012	7.12	9.06
CB-309	DMH-308	0.20	0.95	0.19	0.00	0.30	0.00	0.19	6	6.6	1.28	12	0.020	HDPE	0.012	5.46	6.95
DMH-308	DMH-307	0.72	0.95	0.68	0.00	0.30	0.00	0.68	6	6.6	4.50	12	0.015	HDPE	0.012	4.73	6.02
DMH-307	DMH-306	0.72	0.95	0.68	0.00	0.30	0.00	0.68	6	6.6	4.50	12	0.019	HDPE	0.012	5.35	6.81
CB-306	DMH-306	0.15	0.95	0.14	0.00	0.30	0.00	0.14	6	6.6	0.94	12	0.038	HDPE	0.012	7.50	9.55
CB-307	DMH-306	0.21	0.95	0.20	0.00	0.30	0.00	0.20	6	6.6	1.30	12	0.019	HDPE	0.012	5.33	6.79
DMH-306	DMH-305	1.07	0.95	1.02	0.00	0.30	0.00	1.02	6	6.6	6.74	15	0.015	HDPE	0.012	8.57	6.98
DMH-305	DMH-304	1.07	0.95	1.02	0.00	0.30	0.00	1.02	6	6.6	6.74	15	0.022	HDPE	0.012	10.33	8.42
CB-304	DMH-304	0.22	0.95	0.21	0.00	0.30	0.00	0.21	6	6.6	1.38	12	0.022	HDPE	0.012	5.69	7.24
CB-305	DMH-304	0.20	0.95	0.19	0.00	0.30	0.00	0.19	6	6.6	1.24	12	0.016	HDPE	0.012	4.93	6.27
DMH-304	DMH-303	1.49	0.95	1.42	0.00	0.30	0.00	1.42	6	6.6	9.35	18	0.016	HDPE	0.012	14.30	8.09
DMH-303	DMH-302	1.49	0.95	1.42	0.00	0.30	0.00	1.42	6	6.6	9.35	18	0.015	HDPE	0.012	13.89	7.86
CB-302	DMH-302	0.38	0.95	0.36	0.00	0.30	0.00	0.36	6	6.6	2.35	12	0.033	HDPE	0.012	6.99	8.90
CB-303	DMH-302	0.41	0.95	0.39	0.00	0.30	0.00	0.39	6	6.6	2.56	12	0.016	HDPE	0.012	4.93	6.27
DMH-302	DMH-301	2.27	0.95	2.16	0.00	0.30	0.00	2.16	6	6.6	14.26	24	0.006	HDPE	0.012	18.98	6.04
DMH-301	FES-301	2.27	0.95	2.16	0.00	0.30	0.00	2.16	6	6.6	14.26	24	0.006	HDPE	0.012	18.82	5.99

Definitive Subdivision Road
UNIFIED Parkway
Sutton, MA
Bohler Job Number: W211141
November 10, 2021
Revised December 16, 2021

Rational Pipe Sizing Calculations

Design Period Storm:		25 Year		Design Period Intensity*			6.6 in/hr										
LOCATION		IMPERVIOUS			OTHER			SUM CA	Tc (min)	I (in/hr)	Q (cfs)	D (in)	S (ft/ft)	Material	n	Q Full (cfs)	V Full (fps)
FROM	TO	A	C	CA	A	C	CA										
DCB-400	DMH-400	0.28	0.95	0.27	0.00	0.30	0.00	0.27	6	6.6	1.76	12	0.032	HDPE	0.012	6.90	8.79
DCB-401	DMH-400	0.39	0.95	0.37	0.00	0.30	0.00	0.37	6	6.6	2.45	12	0.014	HDPE	0.012	4.57	5.81
DMH-400	DMH-401	0.67	0.95	0.64	0.00	0.30	0.00	0.64	6	6.6	4.20	12	0.012	HDPE	0.012	4.23	5.38
DMH-401	DMH-402	0.67	0.95	0.64	0.00	0.30	0.00	0.64	6	6.6	4.20	12	0.015	HDPE	0.012	4.73	6.02
DMH-402	DMH-403	0.67	0.95	0.64	0.00	0.30	0.00	0.64	6	6.6	4.20	12	0.012	HDPE	0.012	4.23	5.38
DCB-402	DMH-403	0.08	0.95	0.08	0.00	0.30	0.00	0.08	6	6.6	0.50	12	0.026	HDPE	0.012	6.22	7.92
DCB-403	DMH-403	0.11	0.95	0.10	0.00	0.30	0.00	0.10	6	6.6	0.68	12	0.007	HDPE	0.012	3.21	4.08
DMH-403	FES-400	0.86	0.95	0.81	0.00	0.30	0.00	0.81	6	6.6	5.38	12	0.037	HDPE	0.012	7.42	9.45
CB-404	FES-401	0.10	0.95	0.10	0.00	0.30	0.00	0.10	6	6.6	0.63	12	0.026	HDPE	0.012	6.16	7.85
DCB-405	Exist. CB	0.60	0.95	0.57	2.90	0.30	0.87	1.44	6	6.6	9.50	12	0.061	STEEL	0.012	9.53	12.14

*Rainfall intensity provided by TR55 Exhibit 8-14 dated January 2006

Proposed Subdivision Roadway
UNIFIED Parkway
Sutton, MA
Bohler Job Number: W211141
November 10, 2021
Revised December 16, 2021

Rational Pipe Sizing Calculations (Culverts)

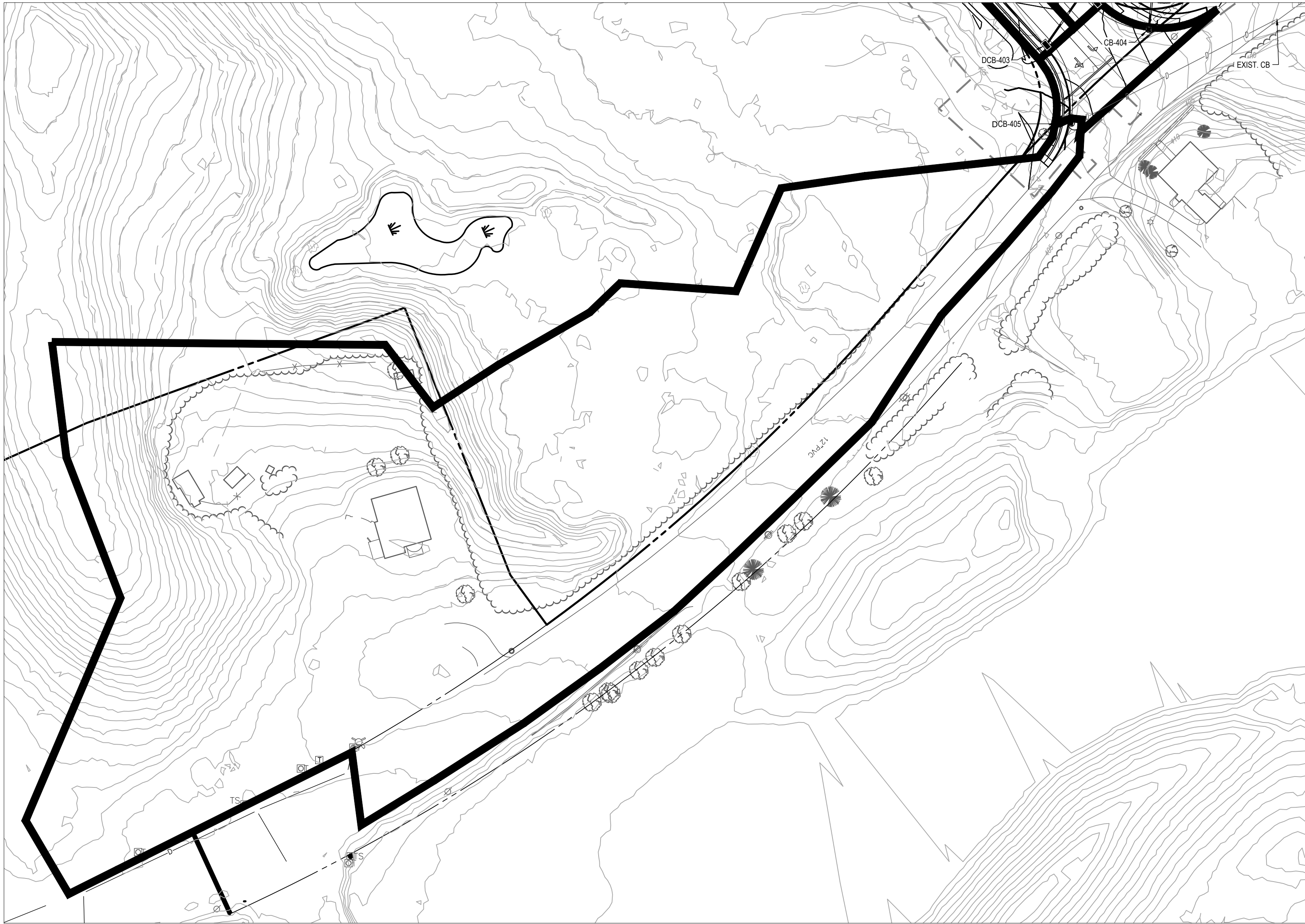
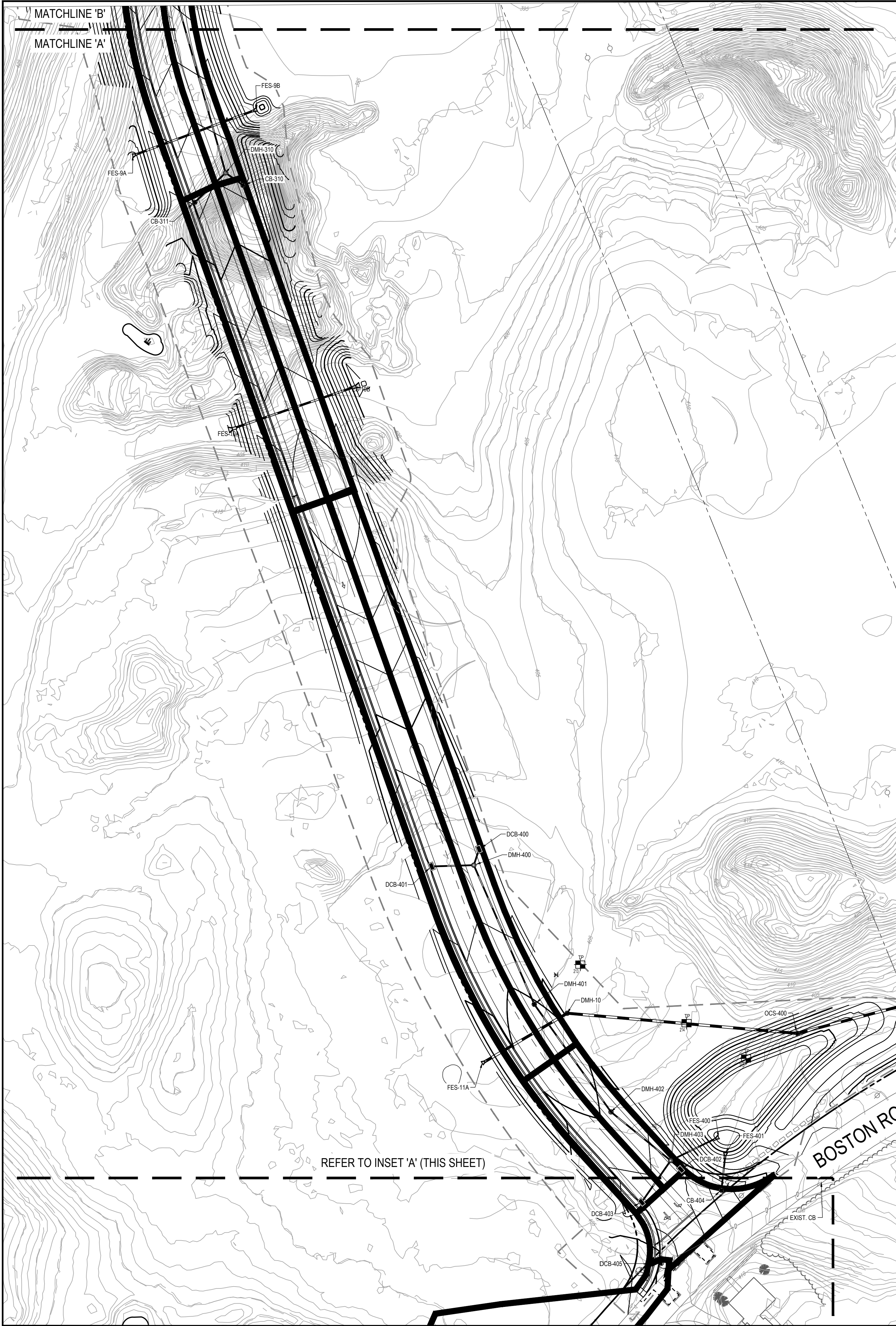
Design Period Storm:		100 Year		Design Period Intensity*			8 in/hr										
LOCATION		IMPERVIOUS			OTHER			SUM CA	Tc (min)	I (in/hr)	Q (cfs)	D (in)	S (ft/ft)	Material	n	Q Full (cfs)	V Full (fps)
FROM	TO	A	C	CA	A	C	CA										
FES-1A	DMH-1B	0.59	0.95	0.56	1.20	0.30	0.36	0.92	6	8	7.36	18	0.006	HDPE	0.012	8.67	4.90
DMH-1B	OCS-100	0.59	0.95	0.56	1.20	0.30	0.36	0.92	6	8	7.36	18	0.005	HDPE	0.012	8.05	4.55
OCS-100	HW-101	0.59	0.95	0.56	1.20	0.30	0.36	0.92	6	8	7.36	18	0.033	HDPE	0.012	20.67	11.70
FES-2A	DMH-11	0.00	0.95	0.00	3.53	0.30	1.06	1.06	6	8	8.47	18	0.029	HDPE	0.012	19.38	10.97
DMH-11	Outfall-2B	0.00	0.95	0.00	3.53	0.30	1.06	1.06	6	8	8.47	18	0.034	HDPE	0.012	20.98	11.87
FES-3A	HW-3B	0.00	0.95	0.00	3.36	0.30	1.01	1.01	6	8	8.06	15	0.030	HDPE	0.012	12.12	9.88
FES-4A	DMH-1	0.00	0.95	0.00	1.40	0.30	0.42	0.42	6	8	3.36	12	0.009	HDPE	0.012	3.66	4.66
DMH-1	DMH-2	0.00	0.95	0.00	1.40	0.30	0.42	0.42	6	8	3.36	12	0.010	HDPE	0.012	3.86	4.91
DMH-2	HW-4B	0.00	0.95	0.00	1.40	0.30	0.42	0.42	6	8	3.36	12	0.008	HDPE	0.012	3.45	4.40
DI-5A	DMH-3	0.00	0.95	0.00	1.53	0.30	0.46	0.46	6	8	3.67	15	0.005	HDPE	0.012	4.95	4.03
DMH-3	DMH-4	0.00	0.95	0.00	1.53	0.30	0.46	0.46	6	8	3.67	15	0.005	HDPE	0.012	4.95	4.03
DMH-4	DMH-5	0.00	0.95	0.00	1.53	0.30	0.46	0.46	6	8	3.67	15	0.008	HDPE	0.012	6.10	4.97
DMH-5	HW-5B	0.00	0.95	0.00	1.53	0.30	0.46	0.46	6	8	3.67	15	0.008	HDPE	0.012	6.18	5.04
DI-6A	DMH-6	0.00	0.95	0.00	1.50	0.30	0.45	0.45	6	8	3.60	12	0.012	HDPE	0.012	4.23	5.38
DMH-6	HW-6B	0.00	0.95	0.00	1.50	0.30	0.45	0.45	6	8	3.60	12	0.025	HDPE	0.012	6.10	7.77
DI-7A	DMH-7	0.00	0.95	0.00	1.85	0.30	0.56	0.56	6	8	4.44	15	0.006	HDPE	0.012	5.42	4.42
DMH-7	DMH-8	0.00	0.95	0.00	1.85	0.30	0.56	0.56	6	8	4.44	15	0.009	HDPE	0.012	6.64	5.41
DMH-8	FES-7B	0.00	0.95	0.00	1.85	0.30	0.56	0.56	6	8	4.44	15	0.015	HDPE	0.012	8.57	6.98
FES-8A	DMH-9	0.00	0.95	0.00	2.94	0.30	0.88	0.88	6	8	7.06	18	0.007	HDPE	0.012	9.52	5.39
DMH-9	FES-8B	0.00	0.95	0.00	2.94	0.30	0.88	0.88	6	8	7.06	18	0.007	HDPE	0.012	9.17	5.19

Proposed Subdivision Roadway
UNIFIED Parkway
Sutton, MA
Bohler Job Number: W211141
November 10, 2021
Revised December 16, 2021

Rational Pipe Sizing Calculations (Culverts)

Design Period Storm:		100 Year		Design Period Intensity*			8 in/hr										
LOCATION		IMPERVIOUS			OTHER			SUM CA	Tc (min)	I (in/hr)	Q (cfs)	D (in)	S (ft/ft)	Material	n	Q Full (cfs)	V Full (fps)
FROM	TO	A	C	CA	A	C	CA										
FES-9A	FES-9B	0.00	0.95	0.00	5.92	0.30	1.78	1.78	6	8	14.21	18	0.018	HDPE	0.012	15.27	8.64
FES-10A	FES-10B	0.00	0.95	0.00	4.41	0.30	1.32	1.32	6	8	10.58	18	0.017	HDPE	0.012	14.84	8.40
FES-11A	DMH-10	0.00	0.95	0.00	7.64	0.30	2.29	2.29	6	8	18.34	24	0.008	HDPE	0.012	21.92	6.98
DMH-10	OCS-400	0.00	0.95	0.00	7.64	0.30	2.29	2.29	6	8	18.34	24	0.023	HDPE	0.012	37.17	11.83
OCS-400	HW-502	0.00	0.95	0.00	7.64	0.30	2.29	2.29	6	8	18.34	24	0.021	HDPE	0.012	35.51	11.30

*Rainfall intensity provided by TR55 Exhibit 8-14 dated January 2006



INSET 'A'



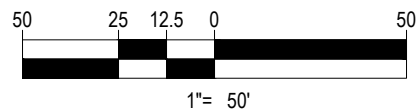
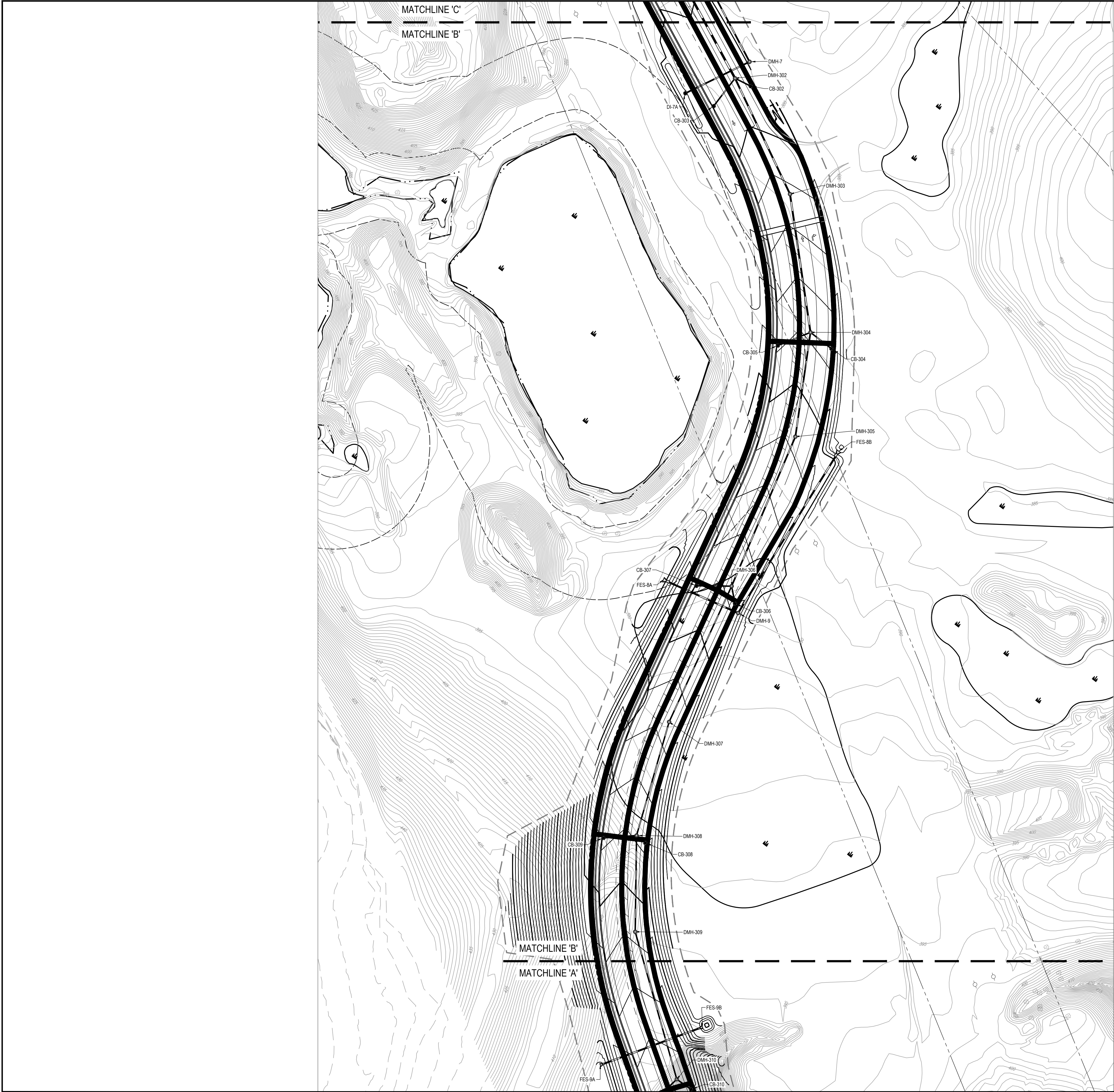
**CATCH BASIN
TRIBUTARY MAP 'A'**

UNIFIED PARKWAY
PROVIDENCE ROAD @ BOSTON ROAD
SUTTON, MA

PREPARED BY

BOHLER //

SCALE:1"=50' DATE: 12/16/2021



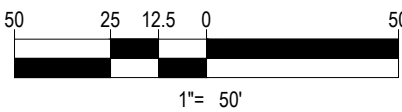
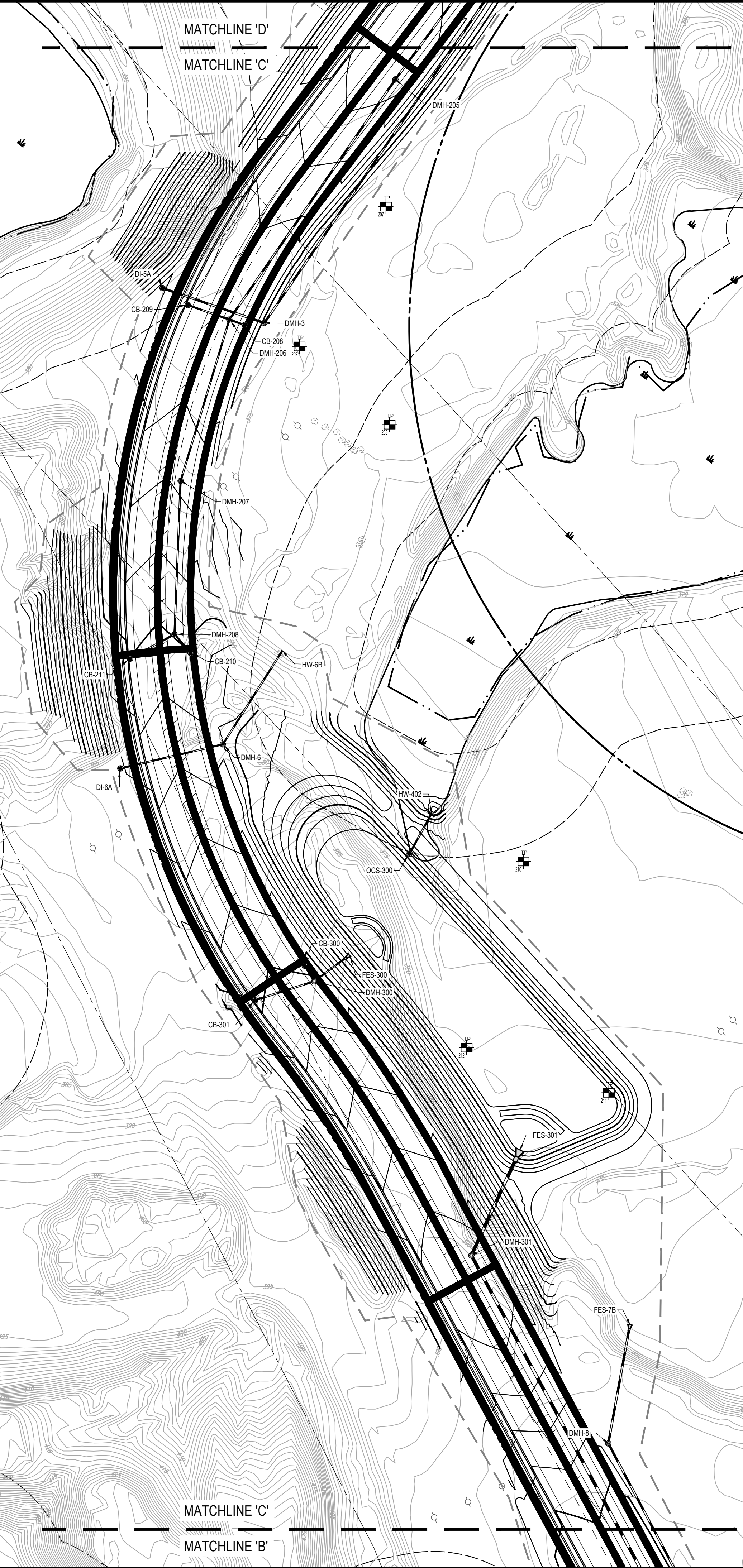
**CATCH BASIN
TRIBUTARY MAP 'B'**

UNIFIED PARKWAY
PROVIDENCE ROAD @ BOSTON ROAD
SUTTON, MA

PREPARED BY

BOHLER //

SCALE: 1"=50' DATE: 12/16/2021



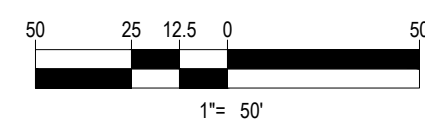
**CATCH BASIN
TRIBUTARY MAPS
'C' & 'D'**

UNIFIED PARKWAY
PROVIDENCE ROAD @ BOSTON ROAD
SUTTON, MA

PREPARED BY

BOHLER

SCALE:1"=50' DATE: 12/16/2021



**CATCH BASIN
TRIBUTARY MAP 'E'**

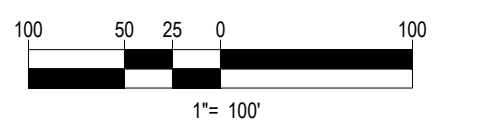
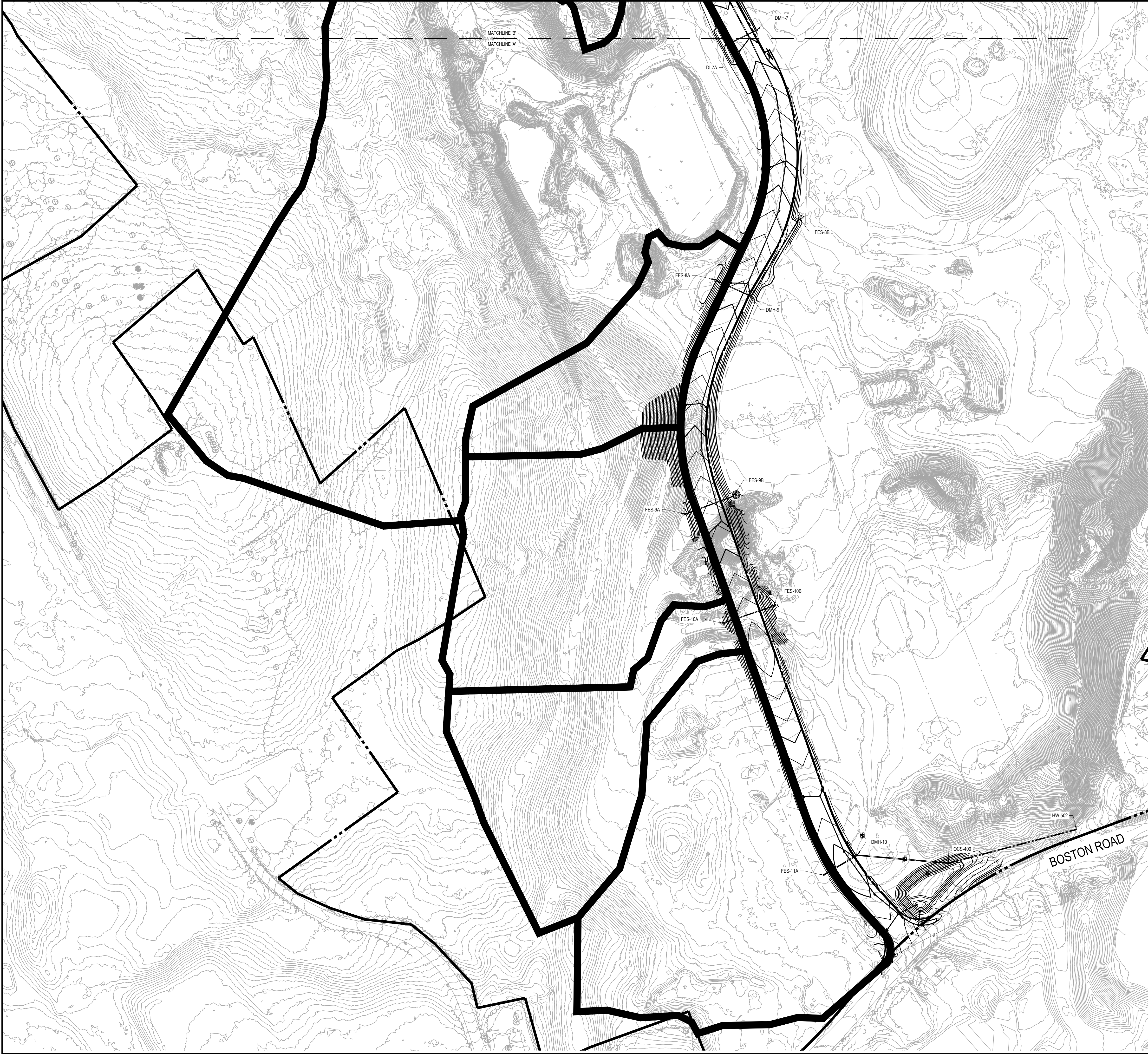
UNIFIED PARKWAY
PROVIDENCE ROAD @ BOSTON ROAD
SUTTON, MA

PREPARED BY

BOHLER //

SCALE: 1"=50' DATE: 12/16/2021





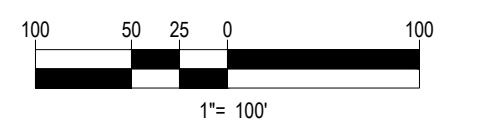
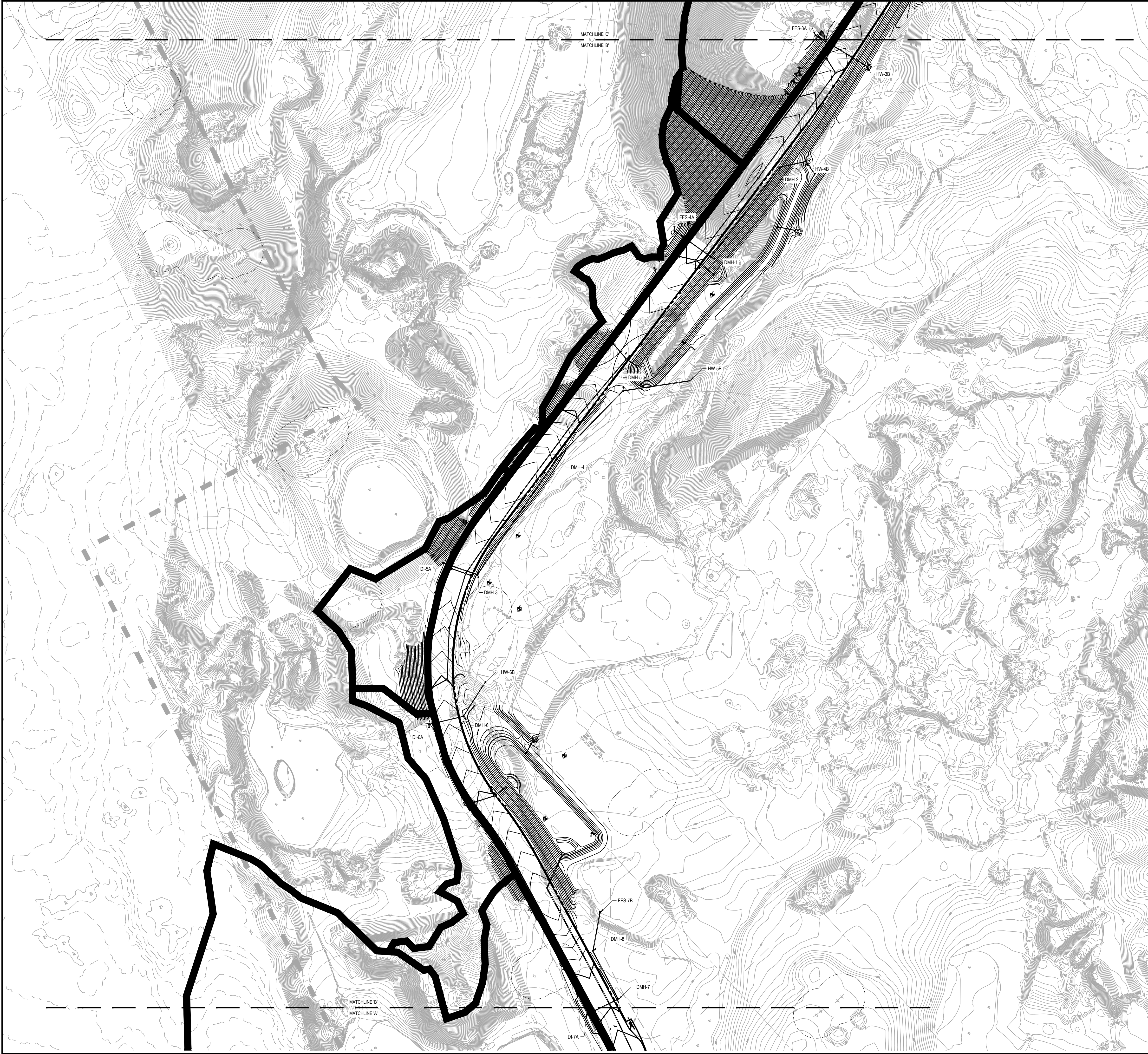
**CULVERT TRIBUTARY
MAP 'A'**

UNIFIED PARKWAY
PROVIDENCE ROAD @ BOSTON ROAD
SUTTON, MA

PREPARED BY

BOHLER //

SCALE: 1"=100' DATE: 12/16/2021



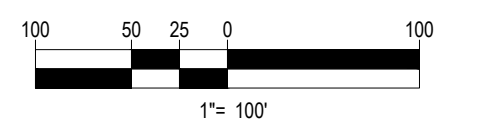
CULVERT TRIBUTARY MAP 'B'

UNIFIED PARKWAY
PROVIDENCE ROAD @ BOSTON ROAD
SUTTON, MA

PREPARED BY

BOHLER //

SCALE: 1"=100' DATE: 12/16/2021



CULVERT TRIBUTARY MAP 'C'

UNIFIED PARKWAY
PROVIDENCE ROAD @ BOSTON ROAD
SUTTON, MA

PREPARED BY

BOHLER //

SCALE: 1"=100' DATE: 12/16/2021



APPENDIX G: OPERATION AND MAINTENANCE (Revised 12/16/21)

- STORMWATER OPERATION AND MAINTENANCE PLAN
- INSPECTION REPORT
- INSPECTION AND MAINTENANCE LOG FORM
- LONG-TERM POLLUTION PREVENTION PLAN
- ILLICIT DISCHARGE STATEMENT
- SPILL PREVENTION

STORMWATER OPERATION AND MAINTENANCE PLAN

***UNIFIED Parkway
Providence Road @ Boston Road
Sutton, MA***

RESPONSIBLE PARTY DURING CONSTRUCTION:

***UGPG RE Sutton LLC
223 Worcester-Providence Turnpike
Sutton, MA 01590***

RESPONSIBLE PARTY POST CONSTRUCTION:

***UGPG RE Sutton LLC
223 Worcester-Providence Turnpike
Sutton, MA 01590***

Construction Phase

During the construction phase, all erosion control devices and measures shall be maintained in accordance with the final record plans, local/state approvals and conditions, the EPA Construction General Permit and the Stormwater Pollution Prevention Plan (SWPPP) if applicable. Additionally, the maintenance of all erosion / siltation control measures during construction shall be the responsibility of the general contractor. Contact information of the OWNER and CONTRACTOR shall be listed in the SWPPP for this site. The SWPPP also includes information regarding construction period allowable and illicit discharges, housekeeping and emergency response procedures. Upon proper notice to the property owner, the Town or its authorized designee shall be allowed to enter the property at a reasonable time and in a reasonable manner for the purposes of inspection.

Post Development Controls

Once construction is completed, the post development stormwater controls are to be operated and maintained in compliance with the following permanent procedures (note that the continued implementation of these procedures shall be the responsibility of the Owner or its assignee):

1. Subdivision Roadway: Sweep at least two (2) times per year and on a more frequent basis depending on sanding operations. All resulting sweepings shall be collected and properly disposed of offsite in accordance with MADEP and other applicable requirements.
2. Catch basins, drop inlets, manholes and piping: Inspect two (2) times per year and at the end of foliage and snow-removal seasons. These features shall be cleaned two (2) times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the catch basin or underground system. Accumulated sediment and hydrocarbons present must be removed and properly disposed of offsite in accordance with MADEP and other applicable requirements.
3. Infiltration Basin: Preventative maintenance after every major storm event during the first three (3) months of operation and at least twice per year thereafter. Inspect structure

and pretreatment BMP to ensure proper operation after every major storm event (generally equal or greater to 3.0 inches in 24 hours) for the first three months. Mow the buffer area, side slopes and basin bottom if grassed floor, rake if stone or sand bottom, remove trash and debris, remove grass clippings and accumulated organic matter. Any sediment removed shall be disposed of in accordance with MADEP and other applicable requirements.

4. Forebays: The sediment forebay areas shall be inspected once per month to ensure they are operating as intended and that all components are stable and in working order. Inspections shall be by qualified personnel. During the growing season, the forebay shall be mowed at least twice, with additional cuttings performed as needed. All vegetation (i.e. tree saplings) will be removed from embankments and the forebay bottom. The inlet to the forebay shall be inspected for erosion and sedimentation, and rip-rap shall be promptly repaired as needed. Sediment forebays shall be cleaned quarterly and when sediment depth reaches half the height of the stone weir, or three to six feet, whichever is less. After sediment is removed, replace any vegetation damaged during the clean out by either reseeding or re-sodding. Any sediment removed shall be disposed of in accordance with MADEP and other applicable requirements.

All components of the stormwater system will be accessible by the owner or their assignee.

STORMWATER MANAGEMENT SYSTEM
POST-CONSTRUCTION INSPECTION REPORT

LOCATION:

*UNIFIED Parkway
Providence Road @ Boston Road
Sutton, MA*

RESPONSIBLE PARTY:

*UGPG RE Sutton LLC
223 Worcester-Providence Turnpike
Sutton, MA 01590*

NAME OF INSPECTOR:	INSPECTION DATE:
Note Condition of the Following (sediment depth, debris, standing water, damage, etc.):	
Catch Basins / Drop Inlets:	
Discharge Points/ Flared End Sections / Rip Rap:	
Infiltration Basin:	
Other:	
Other:	

Note Recommended Actions to be taken on the Following (sediment and/or debris removal, repairs, etc.):

Catch Basins / Drop Inlets:

Discharge Points / Flared End Sections / Rip Rap:

Infiltration Basin:

Other:

Other:

Comments:

STORMWATER INSPECTION AND MAINTENANCE LOG FORM

UNIFIED Parkway

Providence Road @ Boston Road – Sutton, MA[illegible]

LONG-TERM POLLUTION PREVENTION PLAN

*UNIFIED Parkway
Providence Road @ Boston Road
Sutton, MA*

RESPONSIBLE PARTY DURING CONSTRUCTION:

*UGPG RE Sutton LLC
223 Worcester-Providence Turnpike
Sutton, MA 01590*

RESPONSIBLE PARTY POST CONSTRUCTION:

*UGPG RE Sutton LLC
223 Worcester-Providence Turnpike
Sutton, MA 01590*

For this site, the Long-Term Pollution Prevention Plan will consist of the following:

- The property owner shall be responsible for “good housekeeping” including proper periodic maintenance of building and pavement areas, curbing, landscaping, etc.
- Sweeping of roadways a minimum of twice per year with a commercial cleaning unit. Any sediment removed shall be disposed of in accordance with applicable local and state requirements.
- Regular inspections and maintenance of Stormwater Management System as noted in the “O&M Plan”.
- Snow removal shall be the responsibility of the property owner. Snow shall not be plowed, dumped and/or placed in forebays, infiltration basins or similar stormwater controls. Salting and/or sanding of pavement / walkway areas during winter conditions shall only be done in accordance with all state/local requirements and approvals.
- Reseed any bare areas as soon as they occur. Erosion control measures shall be installed in these areas to prevent deposits of sediment from entering the drainage system.
- Grass shall be maintained at a minimum blade height of two to three inches and only 1/3 of the plant height shall be removed at a time. Clippings shall not be disposed of within stormwater management areas or adjacent resource areas.
- Plants shall be pruned as necessary.
- Snow piles shall be located adjacent to or on pervious surfaces in upland areas. This will allow snow melt water to filter in to the soil, leaving behind sand and debris which can be removed in the springtime.

- In no case shall snow be disposed of or stored in resource areas (wetlands, floodplain, streams or other water bodies).
- In no case shall snow be disposed of or stored in the infiltration basins.
- If necessary, stockpiled snow will be removed from the Site and disposed of at an off-site location in accordance with all local, state and federal regulations.
- The amount of sand and deicing chemicals shall be kept at the minimum amount required to provide safe pedestrian and vehicle travel.
- Deicing chemicals are recommended as a pretreatment to storm events to minimize the amount of applied sand.
- Sand and deicing chemicals should be stockpiled under covered storage facilities that prevent precipitation and adjacent runoff from coming in contact with the deicing materials. Stockpile areas shall be located outside resource areas.
- Limit the use of deicing materials to calcium chloride within Zone II areas and next to jurisdictional wetlands.

OPERATON AND MAINTENANCE TRAINING PROGRAM

The Owner will coordinate an annual in-house training session to discuss the Operations and Maintenance Plan, the Long-Term Pollution Prevention Plan, and the Spill Prevention Plan and response procedures. Annual training will include the following:

Discuss the Operations and Maintenance Plan

- Explain the general operations of the stormwater management system and its BMPs
- Identify potential sources of stormwater pollution and measures / methods of reducing or eliminating that pollution
- Emphasize good housekeeping measures

Discuss the Spill Prevention and Response Procedures

- Explain the process in the event of a spill
- Identify potential sources of spills and procedures for cleanup and /or reporting and notification
- Complete a yearly inventory or Materials Safety Data sheets of all tenants and confirm that no potentially harmful chemicals are in use.

ILLICIT DISCHARGE STATEMENT

Certain types of non-stormwater discharges are allowed under the U.S. Environmental Protection Agency Construction General Permit. These types of discharges will be allowed under the conditions that no pollutants will be allowed to come in contact with the water prior to or after its discharge. The control measures which have been outlined previously in this LTPPP will be strictly followed to ensure that no contamination of these non-storm water discharges takes place. Any existing illicit discharges, if discovered during the course of the work, will be reported to MassDEP and the local DPW, as applicable, to be addressed in accordance with their respective policies. No illicit discharges will be allowed in conjunction with the proposed improvements.

SPILL PREVENTION AND RESPONSE PROCEDURES **(POST CONSTRUCTION)**

In order to prevent or minimize the potential for a spill of Hazardous Substances or Oil or come into contact with stormwater, the following steps will be implemented:

1. All Hazardous Substances or Oil (such as pesticides, petroleum products, fertilizers, detergents, acids, paints, paint solvents, cleaning solvents, etc.) will be stored in a secure location, with their lids on, preferably under cover, when not in use.
2. The minimum practical quantity of all such materials will be kept on site.
3. A spill control and containment kit (containing, for example, absorbent materials, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided on site.
4. Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be trained regarding these procedures and the location of the information and cleanup supplies.
5. It is the OWNER's responsibility to ensure that all Hazardous Waste on site is disposed of properly by a licensed hazardous material disposal company. The OWNER is responsible for not exceeding Hazardous Waste storage requirements mandated by the EPA or state and local authorities.

In the event of a spill of Hazardous Substances or Oil, the following procedures should be followed:

1. All measures should be taken to contain and abate the spill and to prevent the discharge of the Hazardous Substance or Oil to stormwater or off-site. (The spill area should be kept well ventilated and personnel should wear appropriate protective clothing to prevent injury from contact with the Hazardous Substances.)
2. For spills of less than five (5) gallons of material, proceed with source control and containment, clean-up with absorbent materials or other applicable means unless an imminent hazard or other circumstances dictate that the spill should be treated by a professional emergency response contractor.
3. For spills greater than five (5) gallons of material immediately contact the MADEP at the toll-free 24-hour statewide emergency number: **1-888-304-1133**, the local fire department (**9-1-1**) and an approved emergency response contractor. Provide information on the type of material spilled, the location of the spill, the quantity spilled, and the time of the spill to the emergency response contractor or coordinator, and proceed with prevention, containment and/or clean-up if so desired. (Use the form provided, or similar).
4. If there is a Reportable Quantity (RQ) release, then the National Response Center should be notified immediately at (800) 424-8802; within 14 days a report should be submitted to the EPA regional office describing the release, the date and circumstances of the release and the steps taken to prevent another release. This Pollution Prevention Plan should be updated to reflect any such steps or actions taken and measures to prevent the same from reoccurring.

[illegible][illegible][illegible]

- [illegible]

[illegible][illegible][illegible]

Cause of Spill: _____

Measures Taken to Clean up Spill: _____

Type of equipment: _____ Make: _____ Size: _____

License or S/N: _____

Location and Method of Disposal _____

Procedures, method, and precautions instituted to prevent a similar occurrence from recurring: _____

Additional Contact Numbers:

- DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP) EMERGENCY
PHONE: 1-888-304-1133
- NATIONAL RESPONSE CENTER PHONE: (800) 424-8802
- U.S. ENVIRONMENTAL PROTECTION AGENCY PHONE: (888) 372-7341