STORMWATER MANAGEMENT REPORT

Site Development Plan
"Diamond Hill Estates"
Walpole, Massachusetts

August 5, 2020

Prepared for:

Wall Street Development Corp.
P.O. Box 272
Westwood, MA 02090

Prepared by:

GLM Engineering Consultants, Inc.
19 Exchange Street
Holliston, Massachusetts 01746
(508) 429 - 1100

COMMONWEALTH OF MASSACHUSETTS
PAUL E. TRUAX
CIVIL
NO. 46527
REGISTERED
PROFESSIONAL ENGINEER

8-7-2020

Paul E. Truax
Professional Engineer

Robert S.Truax
Project Manager/Design Eng.

CONTENTS

Introduction:

The applicant, Wall Street Development Corp., is proposing to develop a 12 Unit Condominium project, located off Dupee Street, in Walpole Massachusetts. The proposed project was filed with Massachusetts Housing pursuant to Massachusetts General Laws Chapter 40B. The 12 Units will be townhouse style dwellings in a condominium association. The existing property consists of a undeveloped wooded land. The total project area consists of 1.19 acres.
The proposal is to reconstruct Dupee Street and extend the roadway to provide access and egress for the twelve (12) units. The Project will be serviced by Town water, sewer and other available public utilities. The stormwater generated from the Project will be captured, conveyed, treated and mitigated on-site utilizing Best Management Practices.

The purpose of these calculations is to demonstrate design compliance of the Project's stormwater management system for water quality and quantity, specifically post-development peak discharge rates per the DEP's Stormwater Management Policy, the Town of Walpole Land Subdivision Regulations. As designed, the system will mitigate peak rates of runoff for storms up to and including the 100-year event under post-construction conditions.

Methodology/Sources of Data:

The overall storm water management plan for the project is designed to maintain the peak rate of storm water runoff from the site after development. The Soil Conservation Service Modified Soil Cover Complex Method, the computer program "HydroCAD" by Applied Microcomputer Systems, and the procedures specified in Urban Hydrology for storm Small Watersheds were used to determine pre-and post-developed peak flow rates of runoff from the site. The 2, 10, 25 and 100-year, 24-hour storm frequencies were used in the comparison of pre and post- development conditions. The rainfall data for the Type III, 24-hour storm events follow:

Frequency (Years)	Rainfall (inches)
2	3.25
10	4.90
50	6.10
100	7.00

The storm water runoff will be controlled through the use of "Best Management Practices" and in conformance with the MADEP Stormwater Management Policy.

Soils:

The Natural Resources Conservation Service, Hydrologic Soils Group Map indicates that the on-site soils consist of Montauk fine sandy loam (300B) in the area. On-site soil testing was performed by our office on July 2, 2019. The parent material ll was classified in the field as sandy loam. A conservative infiltration rate of 0.27 inches/hour was utilize in sizing the infiltration basin.

Existing Site Conditions:

The project site is located off the Dupee. The existing property consists of undeveloped woodlands. The total project area consists of 1.19 acres.
The site slopes from a high point to the north towards High Plain Street and a small portion to the south towards Summit Avenue. The existing stormwater runoff from the site flows via overland flow to the north and discharges into the existing drainage system in High Plain Street. There are two catch basins located at the intersection of Dupee Street and High Plain Street.

The stormwater runoff generated from the existing site discharges to two (2) design points. Subcatchment 1E flows via overland flow towards Summit Avenue and Subcatchment 2E flows to the drainage system in High Plain Street.

Description	Comments
1E	Overland flow towards Summit Ave
2E	Overland flow towards High Plain St.

Post-developed Runoff:

The Project proposal is to reconstruct the portion of Dupee Street that is currently maintained by the Town and extend the roadway approximately five hundred feet to provide access and egres to the twelve (12) Townhouse Units. The Runoff generated from the Project will be collected via deep sump catch basins where it will be conveyed to a retention basin for mitigation. The proposed system will reduce or match all post-development peak flows for all design storms including the 100-year storm event.

The proposed runoff areas have been divided into three (3) subcatchments. Subcatchments 1P discharges via overland flow towards Summit Avenue. Subcatchment 3P is directed to the drainage basin, 2P bypasses the basin and flows via overland to High Plain Street. Design Point 1L combines the overland flow from 2P, the outflow from the drainage basin, to provide a comparison of pre- and post-developed flow to the drainage system in High Plain Street.

Predeveloped	Post Developed	Comments
1E	1P	Overland flow towards Summit Ave
2E	1L	Flow to High Street

The following is a summary comparison of peak flows:

Summary of *Peak* Stormwater Runoff Rates								
Design Point	2Yr Peak Flow (cfs)		10-Yr Peak Flow (cfs)		25-Yr Peak Flow (cfs)		100-Yr Peak Flow (cfs)	
	Exist.	*Prop.*	*Exist.*	*Prop.*	*Exist.*	*Prop.*	*Exist.*	*Prop.*
(1E) 1P	0.59	0.68	1.47	1.40	2.21	1.95	2.78	2.37
(2E) 1L	1.50	1.36	3.35	3.23	4.83	4.83	5.98	5.87

The following is a summary of the Retention Basin:

Summary of Retention Basin								
Design Point	2-Yr Volume (cu.ft.)		10-Yr Volume (ac-ft)		25-Yr Volume (ac-ft)		100-Yr Volume (ac-ft)	
	Peak Elev.Ft.	*Outflow (cfs)*	*Peak Elev. Ft.*	*Outflow (cfs)*	*Peak Elev.Ft.*	*Outflow (cfs)*	*Peak Elev.Ft.*	*Outflow (cfs)*
1P	110.16	0.50	110.58	2.99	110.81	4.91	110.96	6.27

The proposed pipe network has been designed to convey stormwater flows for the 25-year storm event.

Summary:

The calculations performed for all design storm events indicate that there is no overall net increase in the peak rate of runoff for the Project site. Therefore, with the implementation of the stormwater management system as designed, there will be adequate protection against pollutants, flooding, siltation, or other drainage problems. The stormwater management system along with the Operation and Maintenance plan contained herein will satisfy all of the objectives of the DEP's Stormwater Management Regulations and the Town of Walpole Subdivision Rules.

Massachusetts Stormwater Management Standards:

Standard 1: No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the commonwealth:
All new stormwater discharges will be treated and remove a minimum of eighty (80) percent total suspended solids. The surface runoff from the proposed impervious surfaces will be treated and mitigated prior to discharge to abutting properties.

Standard 2: Stormwater management systems shall be designed so that the Post-developed peak discharge rates do not exceed Pre-developed peak discharge rates:
The proposed project as designed will result in no increase in post-development runoff over pre-developed rates. ***See Appendix A.***

Standard 3: Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, stormwater best management practices and good operation and maintenance:
No proposed change from existing.

Standard 4: Stormwater management systems shall be designed to remove 80% of average annual post-construction load of total suspended solids (TSS):
The proposed design will provide treatment and groundwater recharge through the use of an infiltration basin to control runoff from the impervious surfaces.

Standard 5: For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce discharge of stormwater runoff from such land uses to the maximum extent practicable:
The project is not a land use with higher potential pollutant load (LUHPPL).

Standard 6: Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of specific source control and pollution prevention measures and specific structural stormwater best management practices determined by the department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook.
The project site is not located in a Critical area.

Standard 7: A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extend practible:
The proposed project is not a redevelopment.

Standard 8: A plan to control construction-related impacts, including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented:
The proposed project plan set includes an erosion control plan to be implemented during construction period. A Stormwater Pollution Prevention Plan (SWPPP) will be prepared prior to the commencement of construction.

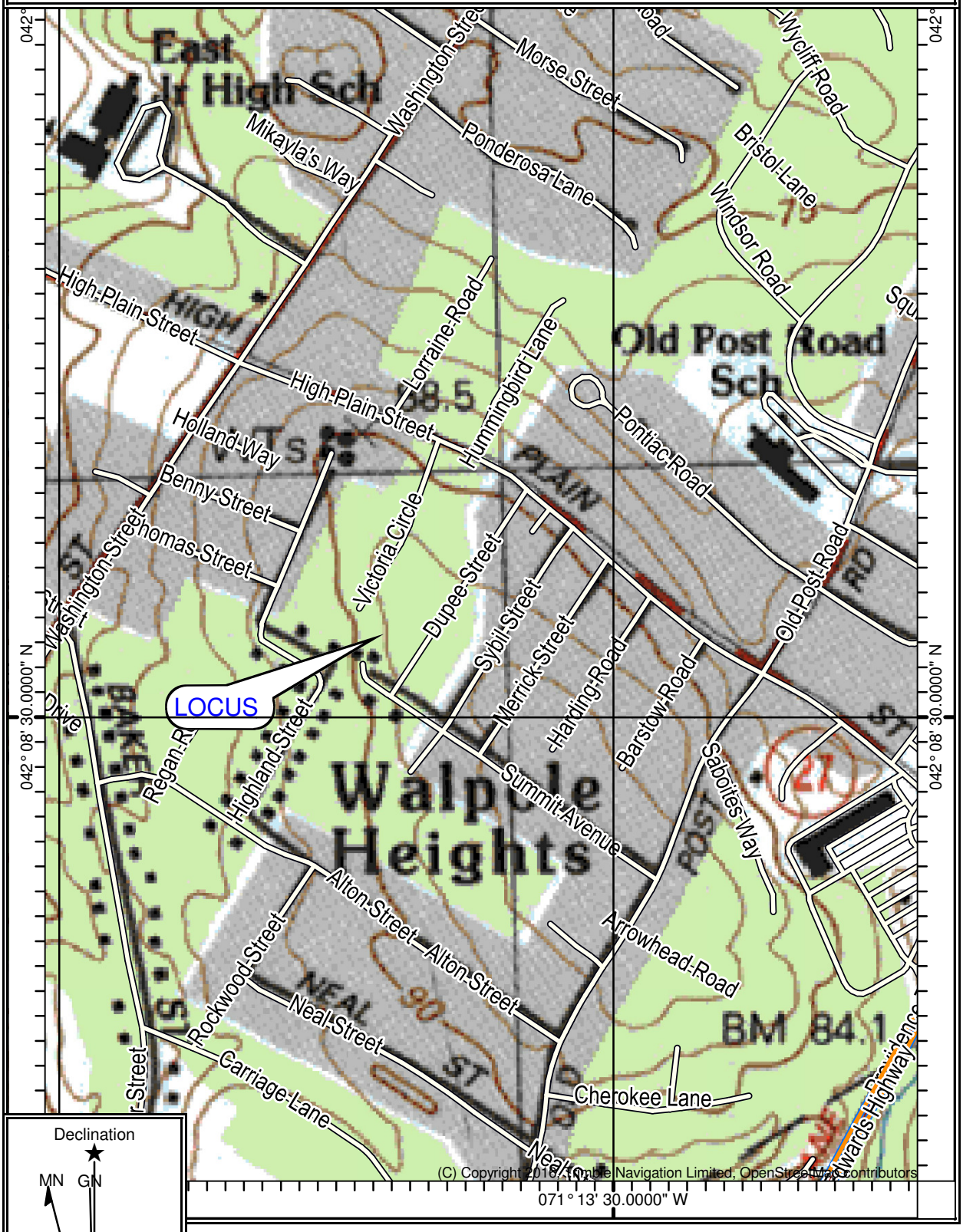
Standard 9: A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed:
A Stormwater Operation and Maintenance Plan are included. ***See Appendix D.***

Standard 10: All illicit discharges to the stormwater management system are prohibited:
An Illicit Discharge Compliance Statement was prepared for the project***. See Appendix E.***

Map Name: NORWOOD
Print Date: 08/06/20

Scale: 1 inch = 600 ft.
Map Center: 042° 08' 35.5379" N,

Horizontal Datum: NAD27



Declination

MN GN

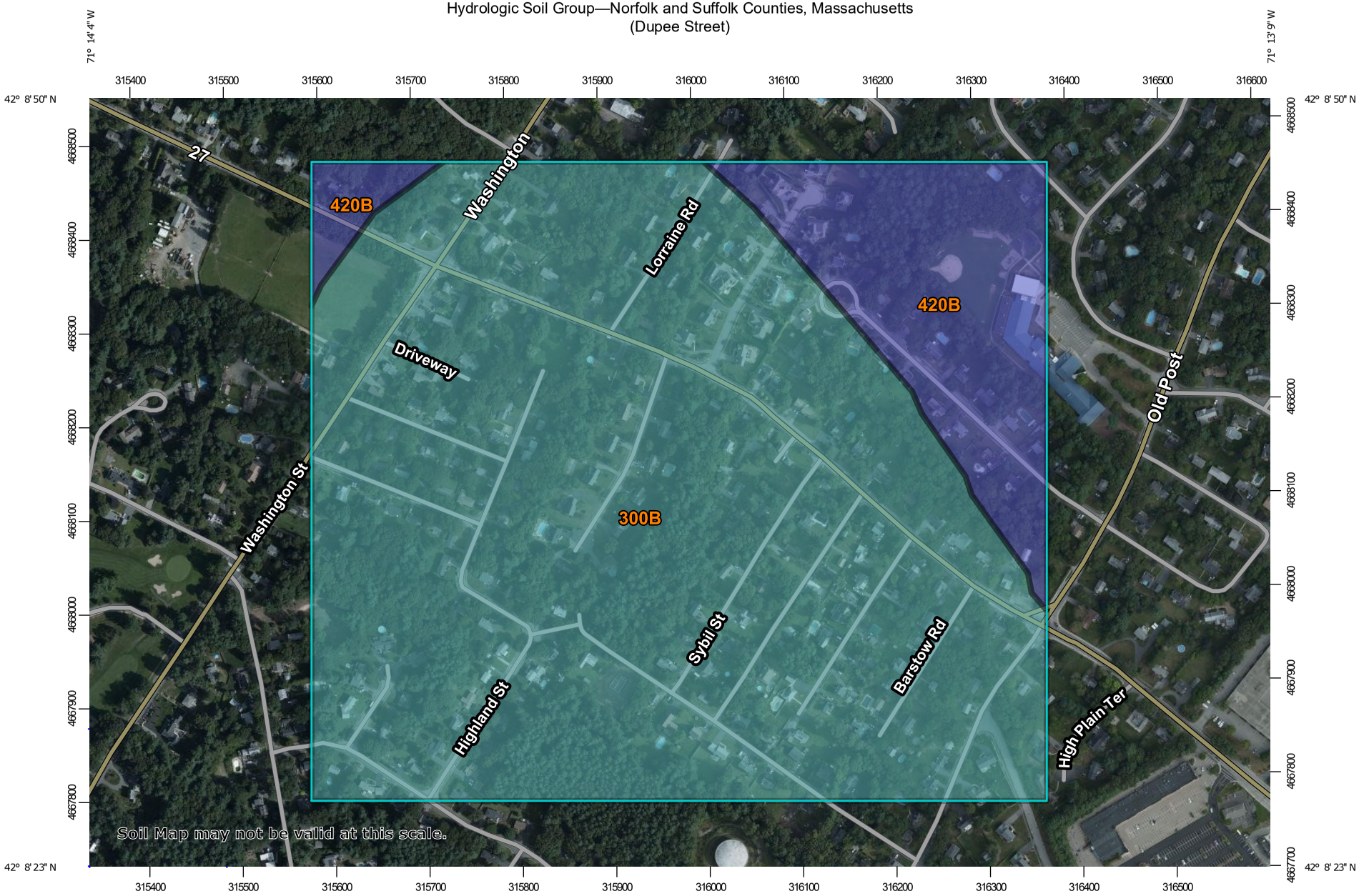
GN 1.49° W
MN 14.41° W

SCALE 1:7200

0 1000 2000

Feet

Hydrologic Soil Group—Norfolk and Suffolk Counties, Massachusetts
(Dupee Street)



Map Scale: 1:5,780 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 15, Sep 12, 2019

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

Date(s) aerial images were photographed: Aug 31, 2019—Sep 24, 2019

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
300B	Montauk fine sandy loam, 3 to 8 percent slopes	C	111.5	83.7%
420B	Canton fine sandy loam, 3 to 8 percent slopes	B	21.7	16.3%
Totals for Area of Interest			**133.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

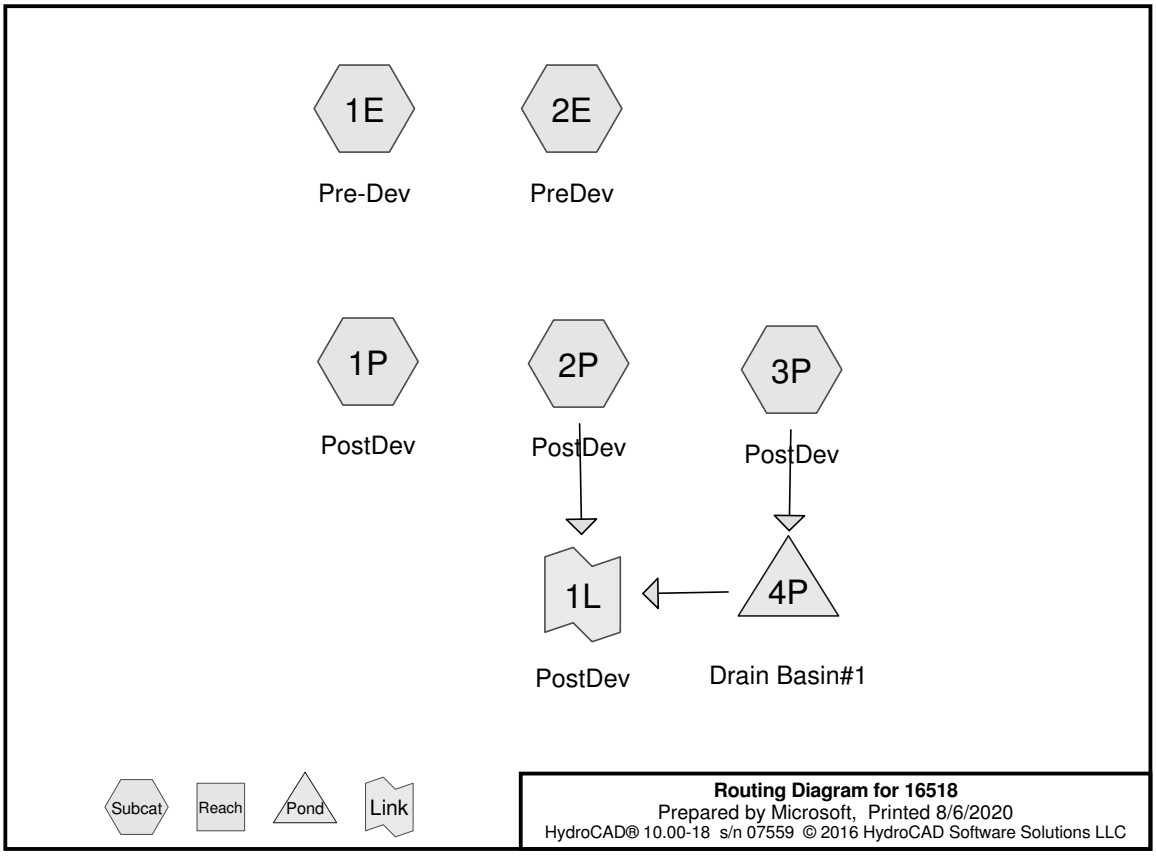
Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

APPENDIX – A

Calculations for Pre & Post Development

Standard 2:



Summary for Subcatchment 1E: Pre-Dev

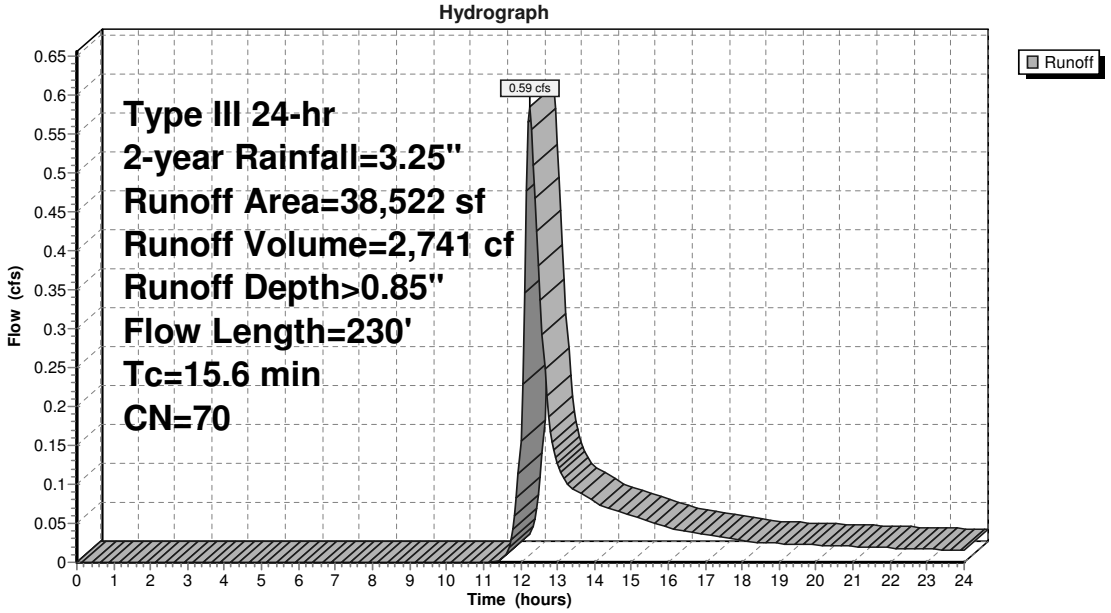
Runoff = 0.59 cfs @ 12.24 hrs, Volume= 2,741 cf, Depth> 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.25"

Area (sf)	CN	Description
38,522	70	Woods, Good, HSG C
38,522		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	50	0.0220	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
3.7	180	0.0270	0.82		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
15.6	230	Total			

Subcatchment 1E: Pre-Dev



Summary for Subcatchment 1P: PostDev

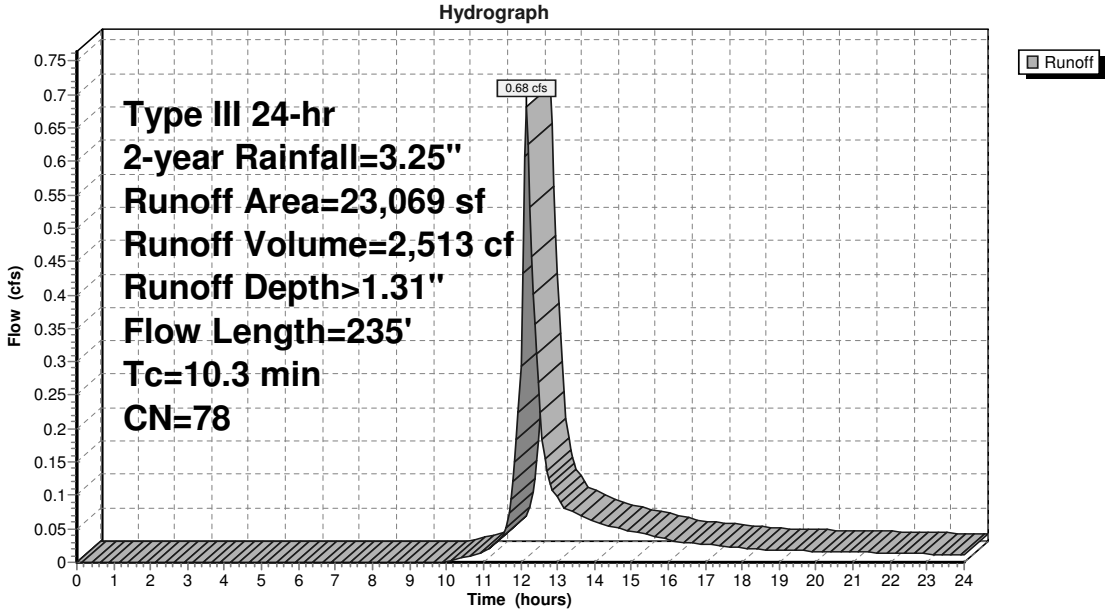
Runoff = 0.68 cfs @ 12.15 hrs, Volume= 2,513 cf, Depth> 1.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.25"

Area (sf)	CN	Description
3,375	98	Roofs, HSG C
1,526	98	Paved parking, HSG C
8,112	70	Woods, Good, HSG C
10,056	74	>75% Grass cover, Good, HSG C
23,069	78	Weighted Average
18,168		78.76% Pervious Area
4,901		21.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0150	0.09		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.1	25	0.0200	2.87		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.4	40	0.0100	1.50		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
0.6	120	0.0400	3.22		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
10.3	235	Total			

Subcatchment 1P: PostDev



Summary for Subcatchment 2E: PreDev

Runoff = 1.50 cfs @ 12.31 hrs, Volume= 7,345 cf, Depth> 1.07"

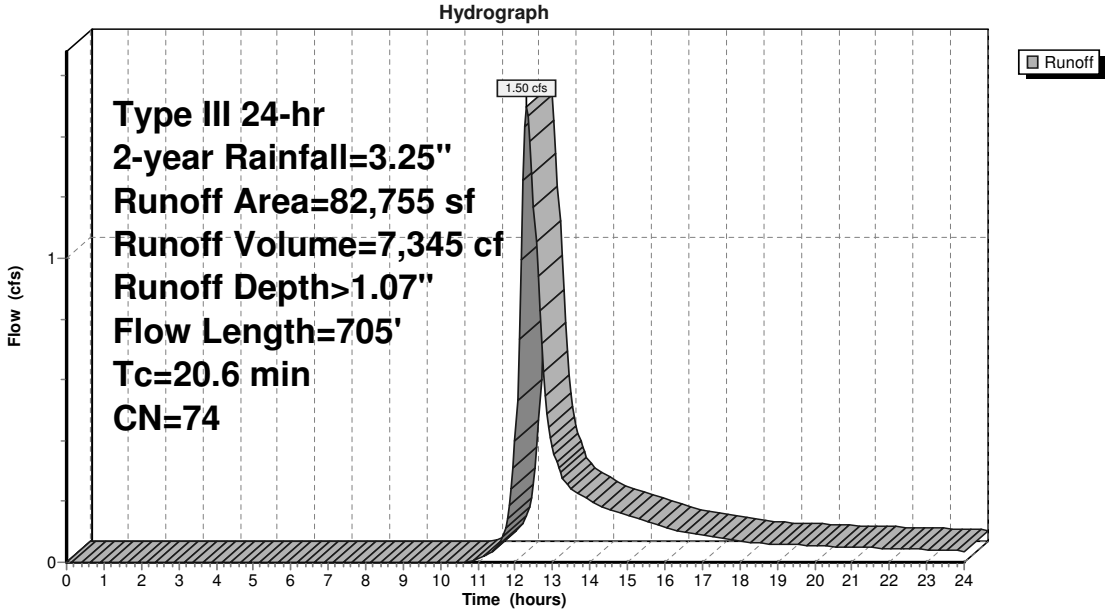
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.25"

Area (sf)	CN	Description
2,273	98	Paved parking, HSG C
2,877	98	Roofs, HSG C
4,352	96	Gravel surface, HSG C
28,594	74	>75% Grass cover, Good, HSG C
44,659	70	Woods, Good, HSG C
82,755	74	Weighted Average
77,605		93.78% Pervious Area
5,150		6.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	50	0.0220	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
6.6	345	0.0300	0.87		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.9	280	0.0240	2.49		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
0.2	30	0.0200	2.28		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
20.6	705	Total			

Subcatchment 2E: PreDev

Hydrograph



Summary for Subcatchment 2P: PostDev

Runoff = 1.36 cfs @ 12.21 hrs, Volume= 5,555 cf, Depth> 1.44"

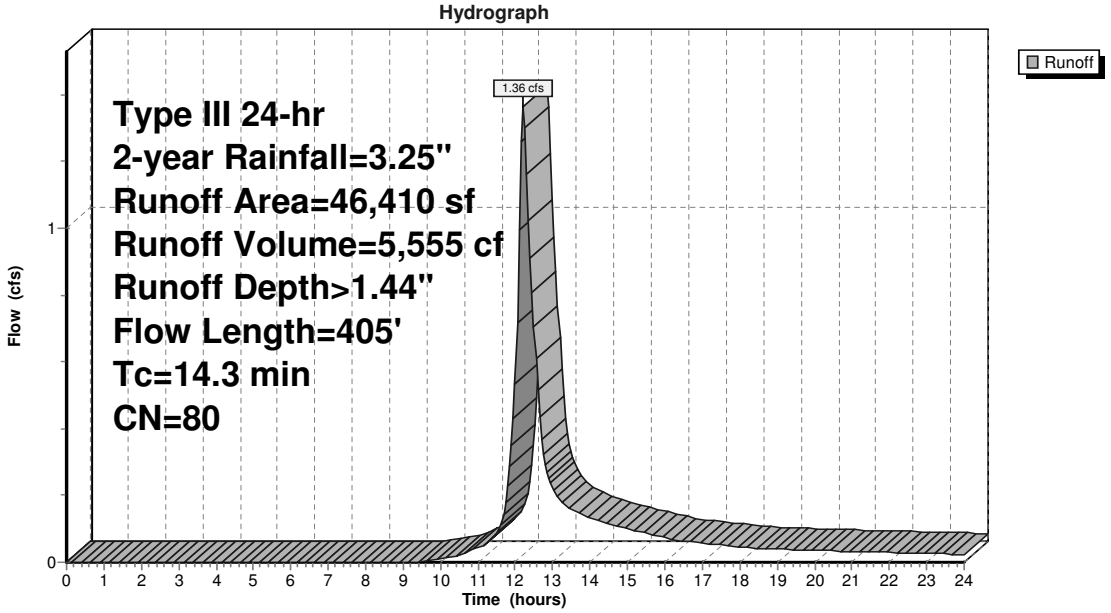
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.25"

Area (sf)	CN	Description
9,013	98	Paved parking, HSG C
2,877	98	Roofs, HSG C
2,115	70	Woods, Good, HSG C
32,405	74	>75% Grass cover, Good, HSG C
46,410	80	Weighted Average
34,520		74.38% Pervious Area
11,890		25.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	50	0.0220	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
2.2	325	0.0240	2.49		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.2	30	0.0240	2.49		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
14.3	405	Total			

Subcatchment 2P: PostDev

Hydrograph



Summary for Subcatchment 3P: PostDev

Runoff = 1.77 cfs @ 12.25 hrs, Volume= 7,745 cf, Depth> 1.79"

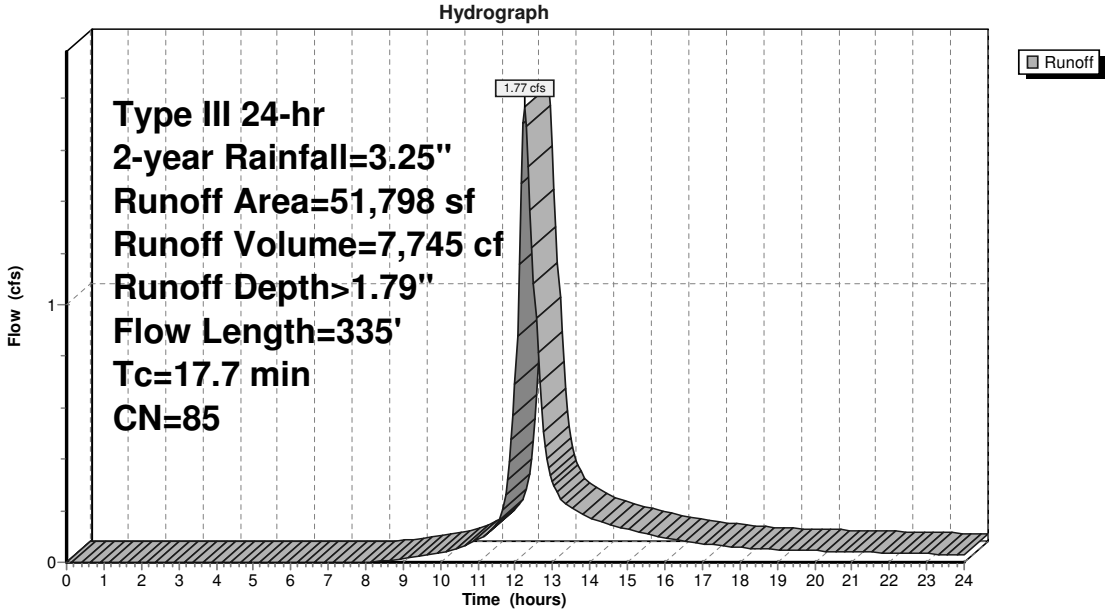
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.25"

Area (sf)	CN	Description
10,449	98	Roofs, HSG C
9,706	98	Paved roads , HSG C
4,035	98	Paved parking, HSG C
27,608	74	>75% Grass cover, Good, HSG C
51,798	85	Weighted Average
27,608		53.30% Pervious Area
24,190		46.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	50	0.0050	0.06		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
2.6	165	0.0050	1.06		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
0.8	120	0.0250	2.37		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
17.7	335	Total			

Subcatchment 3P: PostDev

Hydrograph



Summary for Pond 4P: Drain Basin#1

Inflow Area = 51,798 sf, 46.70% Impervious, Inflow Depth > 1.79" for 2-year event
Inflow = 1.77 cfs @ 12.25 hrs, Volume= 7,745 cf
Outflow = 0.49 cfs @ 12.77 hrs, Volume= 5,653 cf, Atten= 72%, Lag= 31.2 min
Discarded = 0.06 cfs @ 12.77 hrs, Volume= 1,997 cf
Primary = 0.43 cfs @ 12.77 hrs, Volume= 3,656 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 302.33' @ 12.77 hrs Surf.Area= 3,305 sf Storage= 3,430 cf

Plug-Flow detention time= 171.7 min calculated for 5,641 cf (73% of inflow)
Center-of-Mass det. time= 82.5 min (916.7 - 834.2)

Volume	Invert	Avail.Storage	Storage Description
#1	299.50'	11,387 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

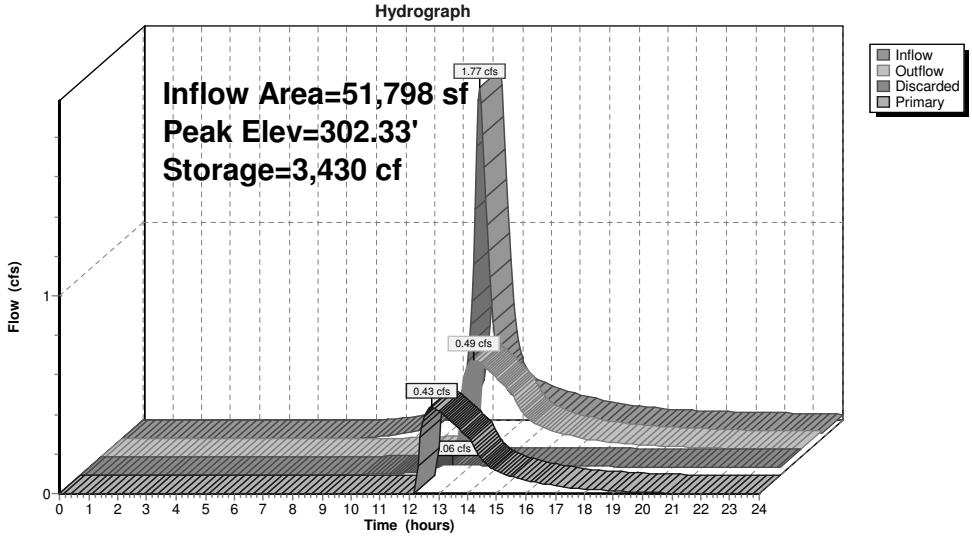
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
299.50	70	36.0	0	0	70
301.00	960	143.0	645	645	1,600
302.00	2,760	235.0	1,783	2,427	4,374
303.00	4,555	291.0	3,620	6,047	6,733
304.00	6,165	367.0	5,340	11,387	10,726

Device	Routing	Invert	Outlet Devices
#1	Discarded	299.50'	**0.270 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 299.00'
#2	Primary	299.00'	**12.0" Round Culvert** L= 300.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 299.00' / 287.80' S= 0.0373 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	301.90'	**5.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	302.30'	**7.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.06 cfs @ 12.77 hrs HW=302.33' (Free Discharge)
└**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.43 cfs @ 12.77 hrs HW=302.33' (Free Discharge)
└**2=Culvert** (Passes 0.43 cfs of 6.36 cfs potential flow)
├**3=Orifice/Grate** (Orifice Controls 0.43 cfs @ 3.16 fps)
└**4=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.60 fps)

Pond 4P: Drain Basin#1

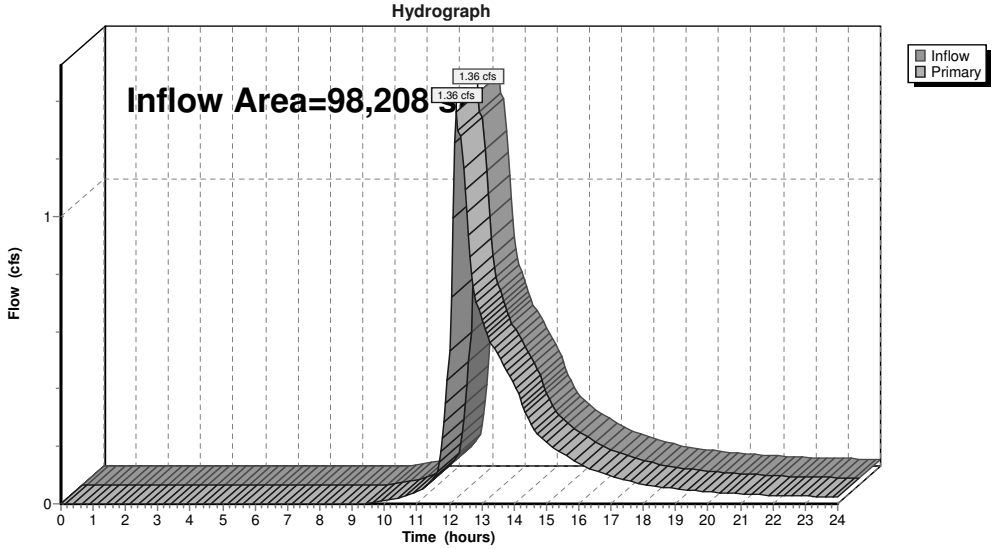


Summary for Link 1L: PostDev

Inflow Area = 98,208 sf, 36.74% Impervious, Inflow Depth > 1.13" for 2-year event
Inflow = 1.36 cfs @ 12.21 hrs, Volume= 9,211 cf
Primary = 1.36 cfs @ 12.21 hrs, Volume= 9,211 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: PostDev



Summary for Subcatchment 1E: Pre-Dev

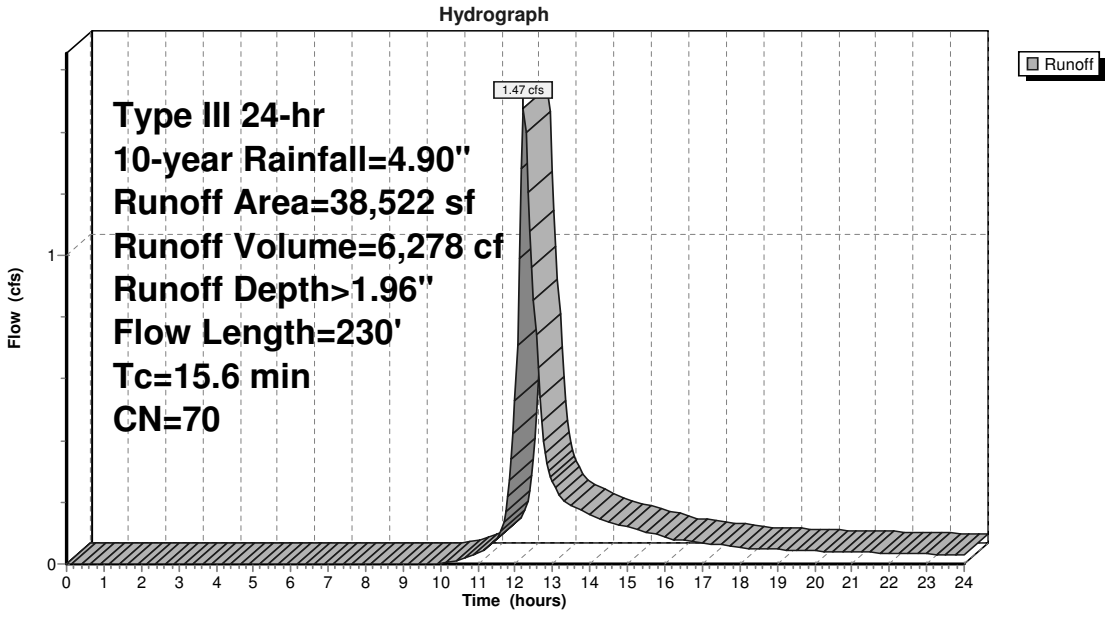
Runoff = 1.47 cfs @ 12.22 hrs, Volume= 6,278 cf, Depth> 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.90"

Area (sf)	CN	Description
38,522	70	Woods, Good, HSG C
38,522		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	50	0.0220	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
3.7	180	0.0270	0.82		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
15.6	230	Total			

Subcatchment 1E: Pre-Dev



Summary for Subcatchment 1P: PostDev

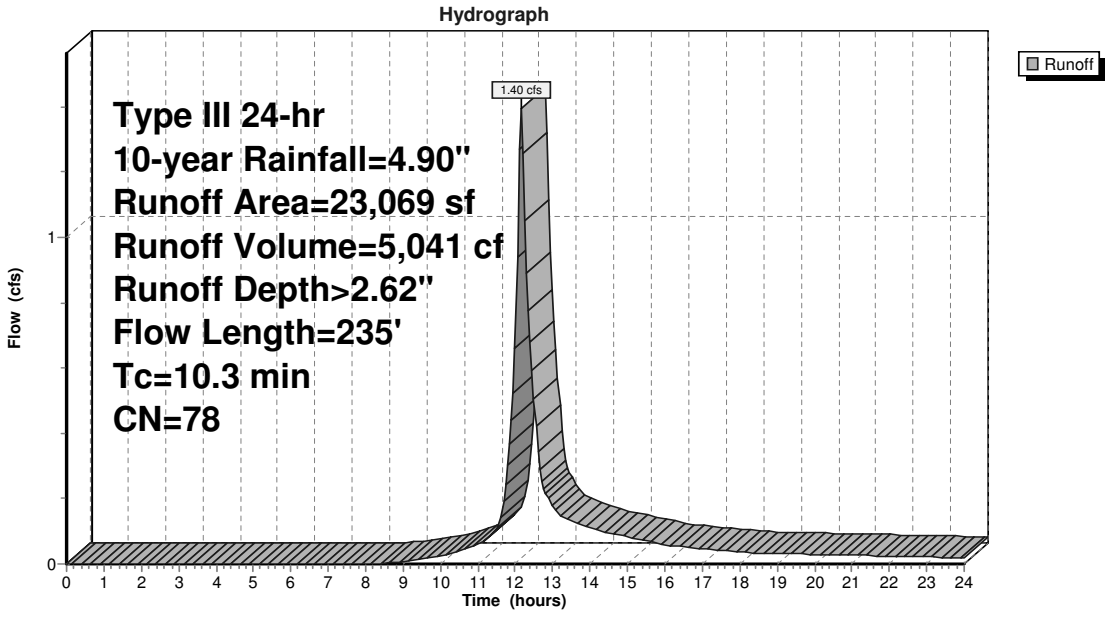
Runoff = 1.40 cfs @ 12.15 hrs, Volume= 5,041 cf, Depth> 2.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.90"

Area (sf)	CN	Description
3,375	98	Roofs, HSG C
1,526	98	Paved parking, HSG C
8,112	70	Woods, Good, HSG C
10,056	74	>75% Grass cover, Good, HSG C
23,069	78	Weighted Average
18,168		78.76% Pervious Area
4,901		21.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0150	0.09		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.1	25	0.0200	2.87		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.4	40	0.0100	1.50		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
0.6	120	0.0400	3.22		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
10.3	235	Total			

Subcatchment 1P: PostDev



Summary for Subcatchment 2E: PreDev

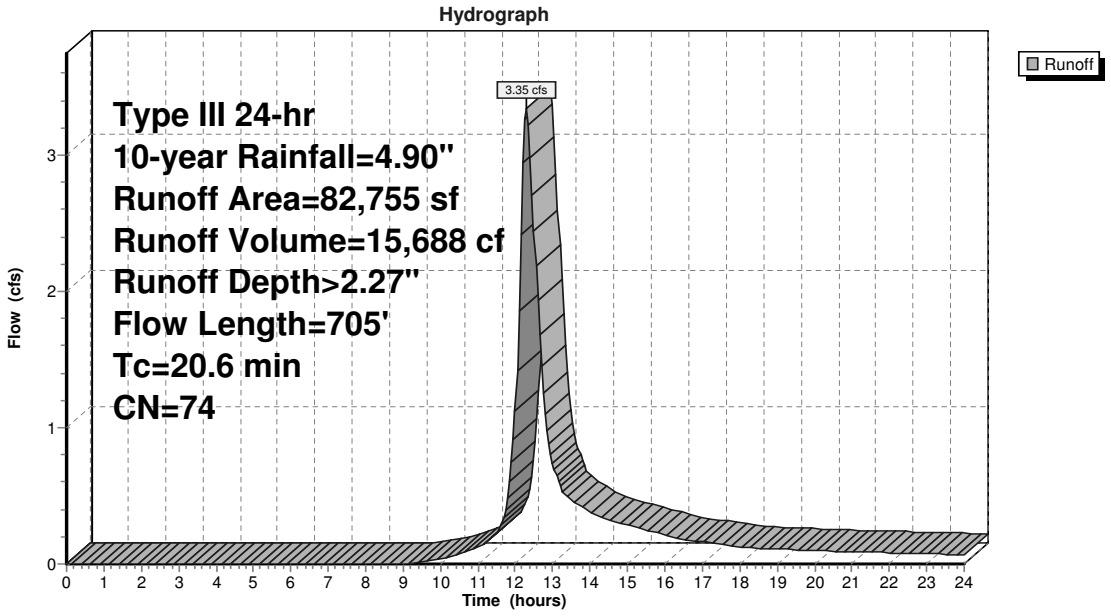
Runoff = 3.35 cfs @ 12.29 hrs, Volume= 15,688 cf, Depth> 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.90"

Area (sf)	CN	Description
2,273	98	Paved parking, HSG C
2,877	98	Roofs, HSG C
4,352	96	Gravel surface, HSG C
28,594	74	>75% Grass cover, Good, HSG C
44,659	70	Woods, Good, HSG C
82,755	74	Weighted Average
77,605		93.78% Pervious Area
5,150		6.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	50	0.0220	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
6.6	345	0.0300	0.87		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.9	280	0.0240	2.49		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
0.2	30	0.0200	2.28		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
20.6	705	Total			

Subcatchment 2E: PreDev



Summary for Subcatchment 2P: PostDev

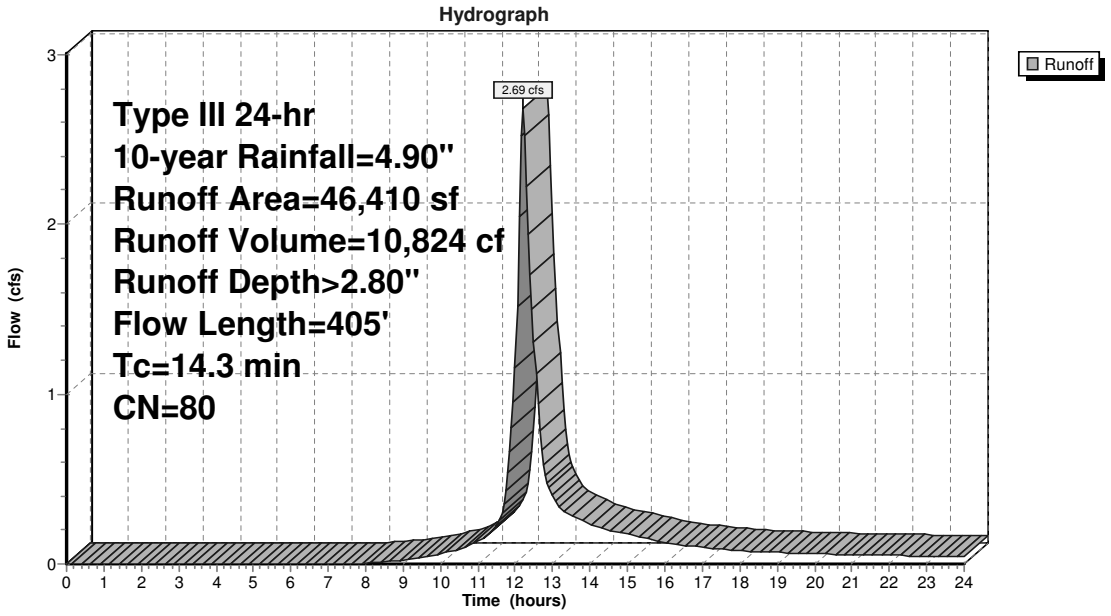
Runoff = 2.69 cfs @ 12.20 hrs, Volume= 10,824 cf, Depth> 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.90"

Area (sf)	CN	Description
9,013	98	Paved parking, HSG C
2,877	98	Roofs, HSG C
2,115	70	Woods, Good, HSG C
32,405	74	>75% Grass cover, Good, HSG C
46,410	80	Weighted Average
34,520		74.38% Pervious Area
11,890		25.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	50	0.0220	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
2.2	325	0.0240	2.49		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.2	30	0.0240	2.49		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
14.3	405	Total			

Subcatchment 2P: PostDev



Summary for Subcatchment 3P: PostDev

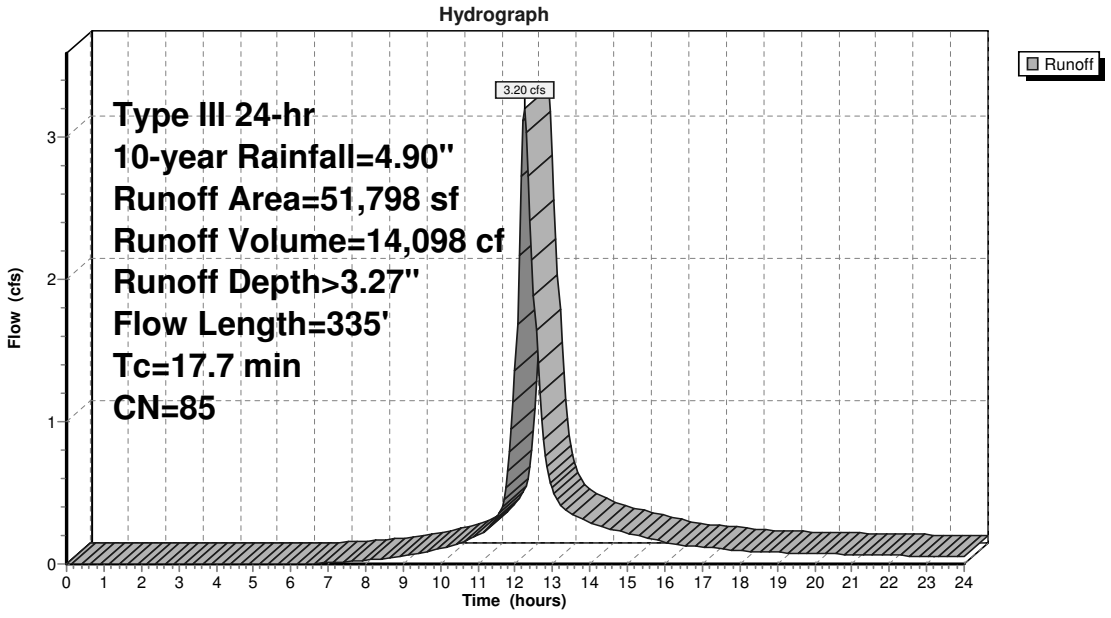
Runoff = 3.20 cfs @ 12.24 hrs, Volume= 14,098 cf, Depth> 3.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.90"

Area (sf)	CN	Description
10,449	98	Roofs, HSG C
9,706	98	Paved roads , HSG C
4,035	98	Paved parking, HSG C
27,608	74	>75% Grass cover, Good, HSG C
51,798	85	Weighted Average
27,608		53.30% Pervious Area
24,190		46.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	50	0.0050	0.06		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
2.6	165	0.0050	1.06		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
0.8	120	0.0250	2.37		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
17.7	335	Total			

Subcatchment 3P: PostDev



Summary for Pond 4P: Drain Basin#1

Inflow Area = 51,798 sf, 46.70% Impervious, Inflow Depth > 3.27" for 10-year event
Inflow = 3.20 cfs @ 12.24 hrs, Volume= 14,098 cf
Outflow = 1.42 cfs @ 12.60 hrs, Volume= 11,900 cf, Atten= 56%, Lag= 21.5 min
Discarded = 0.07 cfs @ 12.60 hrs, Volume= 2,309 cf
Primary = 1.34 cfs @ 12.60 hrs, Volume= 9,590 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 302.88' @ 12.60 hrs Surf.Area= 4,316 sf Storage= 5,515 cf

Plug-Flow detention time= 127.1 min calculated for 11,900 cf (84% of inflow)
Center-of-Mass det. time= 62.6 min (879.9 - 817.3)

Volume	Invert	Avail.Storage	Storage Description
#1	299.50'	11,387 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

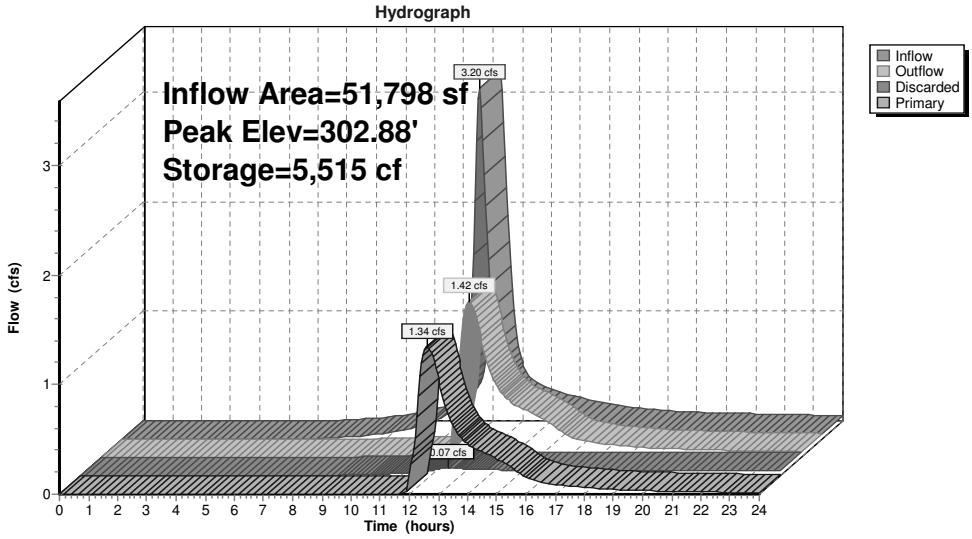
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
299.50	70	36.0	0	0	70
301.00	960	143.0	645	645	1,600
302.00	2,760	235.0	1,783	2,427	4,374
303.00	4,555	291.0	3,620	6,047	6,733
304.00	6,165	367.0	5,340	11,387	10,726

Device	Routing	Invert	Outlet Devices
#1	Discarded	299.50'	**0.270 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 299.00'
#2	Primary	299.00'	**12.0" Round Culvert** L= 300.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 299.00' / 287.80' S= 0.0373 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	301.90'	**5.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	302.30'	**7.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.07 cfs @ 12.60 hrs HW=302.88' (Free Discharge)
└**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=1.34 cfs @ 12.60 hrs HW=302.88' (Free Discharge)
└**2=Culvert** (Passes 1.34 cfs of 6.95 cfs potential flow)
  └**3=Orifice/Grate** (Orifice Controls 0.65 cfs @ 4.77 fps)
  └**4=Orifice/Grate** (Orifice Controls 0.69 cfs @ 2.59 fps)

Pond 4P: Drain Basin#1

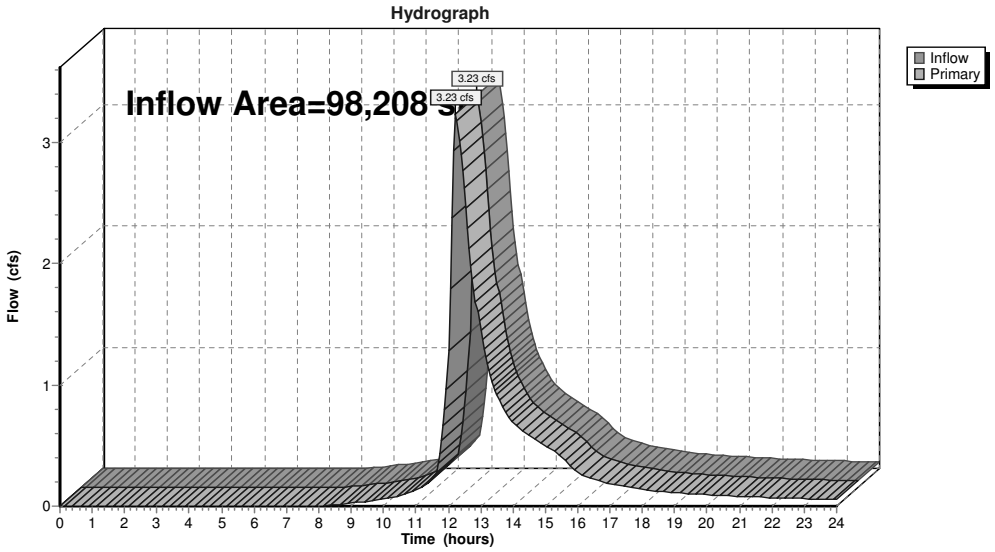


Summary for Link 1L: PostDev

Inflow Area = 98,208 sf, 36.74% Impervious, Inflow Depth > 2.49" for 10-year event
Inflow = 3.23 cfs @ 12.23 hrs, Volume= 20,414 cf
Primary = 3.23 cfs @ 12.23 hrs, Volume= 20,414 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: PostDev



Summary for Subcatchment 1E: Pre-Dev

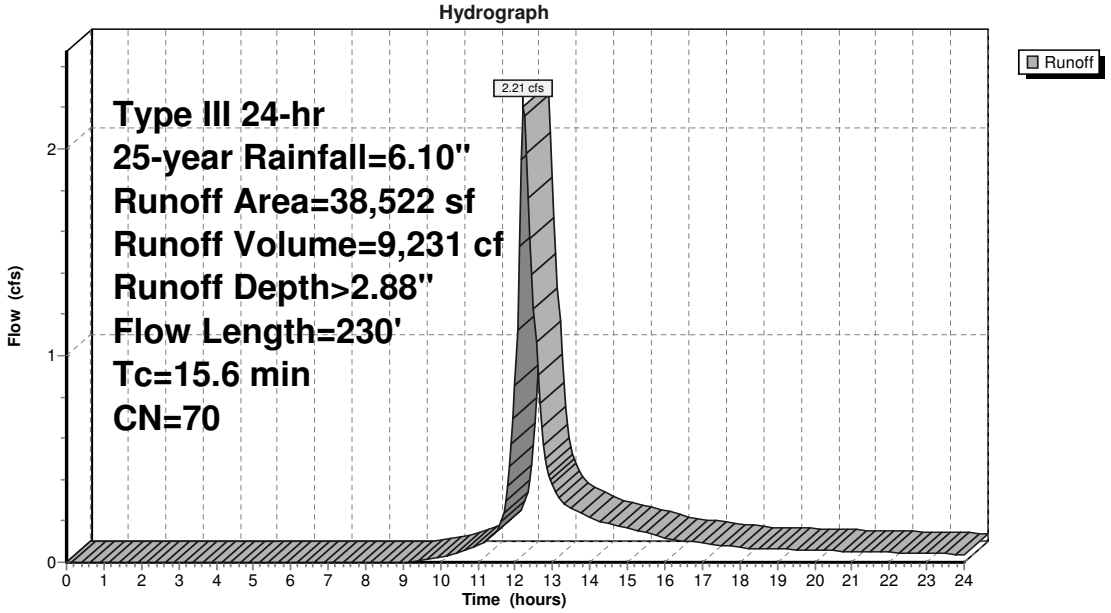
Runoff = 2.21 cfs @ 12.22 hrs, Volume= 9,231 cf, Depth> 2.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.10"

Area (sf)	CN	Description
38,522	70	Woods, Good, HSG C
38,522		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	50	0.0220	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
3.7	180	0.0270	0.82		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
15.6	230	Total			

Subcatchment 1E: Pre-Dev



Summary for Subcatchment 1P: PostDev

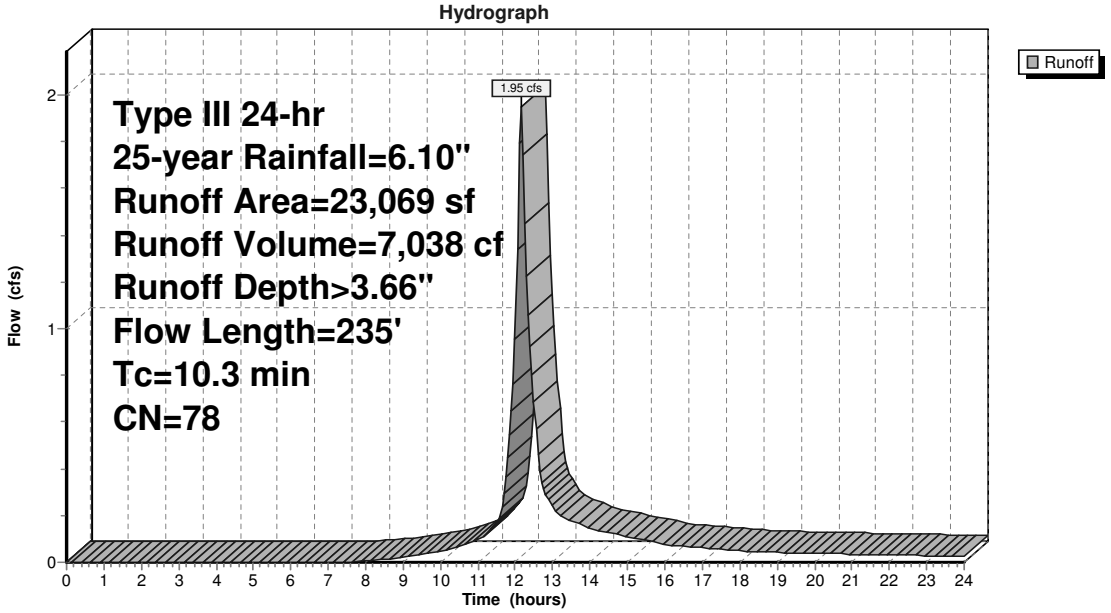
Runoff = 1.95 cfs @ 12.15 hrs, Volume= 7,038 cf, Depth> 3.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.10"

Area (sf)	CN	Description
3,375	98	Roofs, HSG C
1,526	98	Paved parking, HSG C
8,112	70	Woods, Good, HSG C
10,056	74	>75% Grass cover, Good, HSG C
23,069	78	Weighted Average
18,168		78.76% Pervious Area
4,901		21.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0150	0.09		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.1	25	0.0200	2.87		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.4	40	0.0100	1.50		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
0.6	120	0.0400	3.22		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
10.3	235	Total			

Subcatchment 1P: PostDev



Summary for Subcatchment 2E: PreDev

Runoff = 4.83 cfs @ 12.29 hrs, Volume= 22,454 cf, Depth> 3.26"

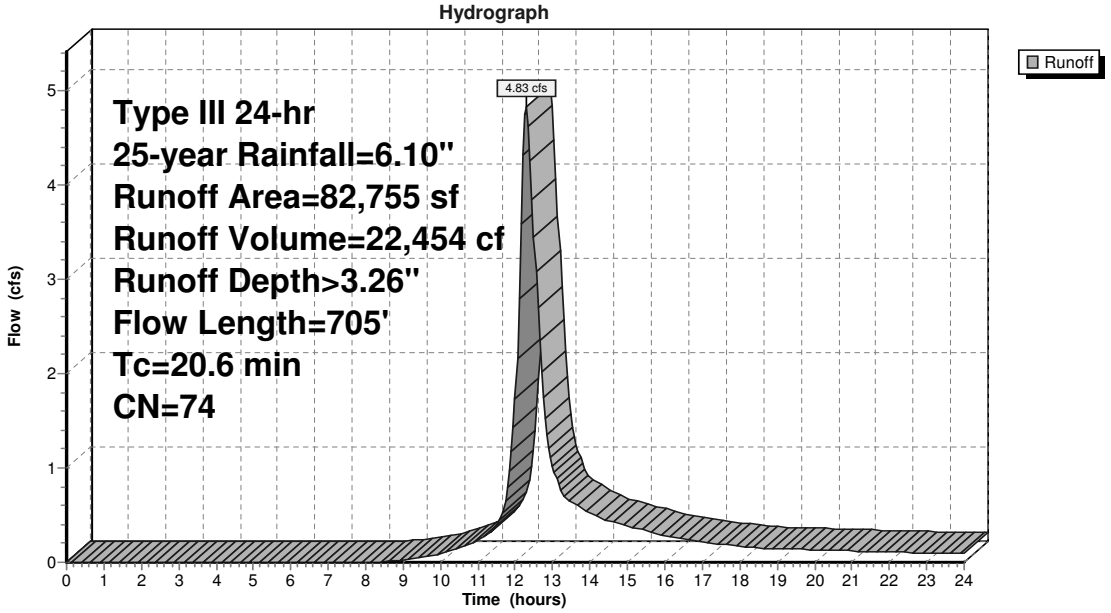
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.10"

Area (sf)	CN	Description
2,273	98	Paved parking, HSG C
2,877	98	Roofs, HSG C
4,352	96	Gravel surface, HSG C
28,594	74	>75% Grass cover, Good, HSG C
44,659	70	Woods, Good, HSG C
82,755	74	Weighted Average
77,605		93.78% Pervious Area
5,150		6.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	50	0.0220	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
6.6	345	0.0300	0.87		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.9	280	0.0240	2.49		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
0.2	30	0.0200	2.28		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
20.6	705	Total			

Subcatchment 2E: PreDev

Hydrograph



Summary for Subcatchment 2P: PostDev

Runoff = 3.69 cfs @ 12.20 hrs, Volume= 14,937 cf, Depth> 3.86"

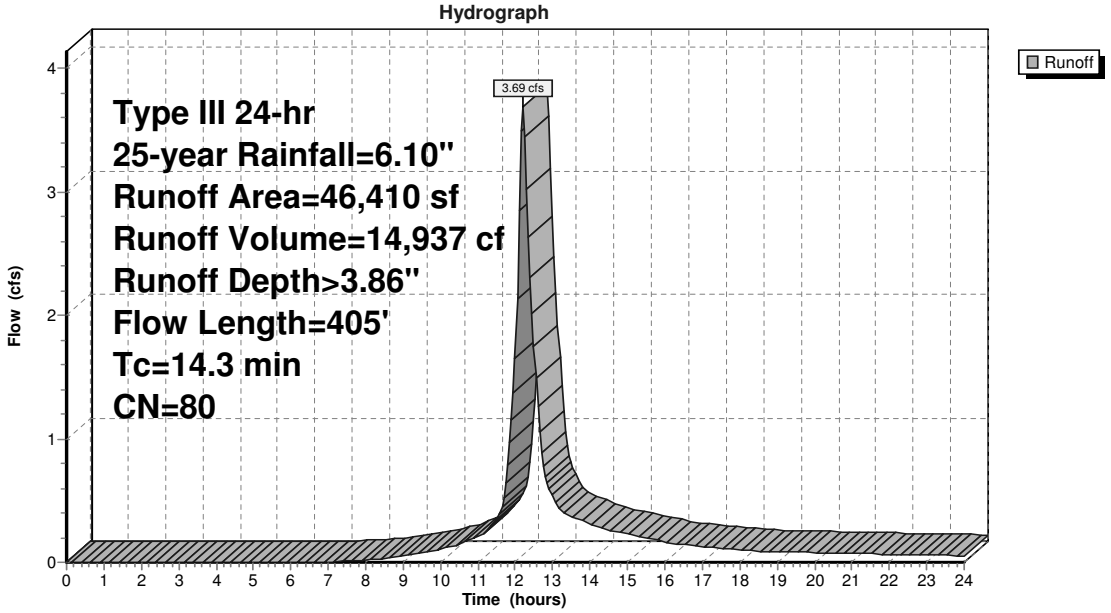
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.10"

Area (sf)	CN	Description
9,013	98	Paved parking, HSG C
2,877	98	Roofs, HSG C
2,115	70	Woods, Good, HSG C
32,405	74	>75% Grass cover, Good, HSG C
46,410	80	Weighted Average
34,520		74.38% Pervious Area
11,890		25.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	50	0.0220	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
2.2	325	0.0240	2.49		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.2	30	0.0240	2.49		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
14.3	405	Total			

Subcatchment 2P: PostDev

Hydrograph



Summary for Subcatchment 3P: PostDev

Runoff = 4.26 cfs @ 12.24 hrs, Volume= 18,926 cf, Depth> 4.38"

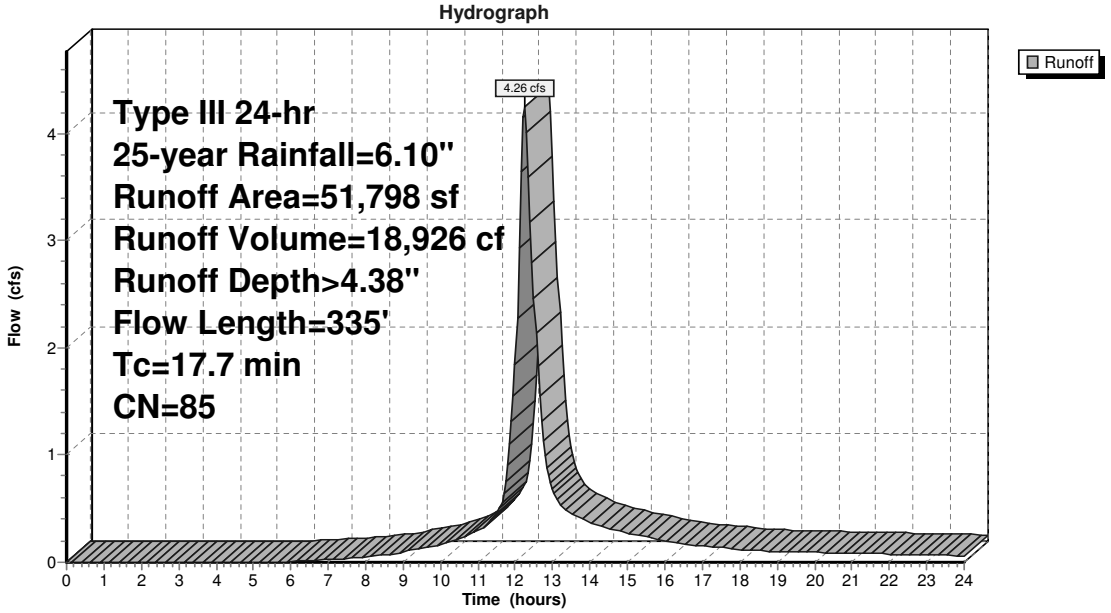
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.10"

Area (sf)	CN	Description
10,449	98	Roofs, HSG C
9,706	98	Paved roads , HSG C
4,035	98	Paved parking, HSG C
27,608	74	>75% Grass cover, Good, HSG C
51,798	85	Weighted Average
27,608		53.30% Pervious Area
24,190		46.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	50	0.0050	0.06		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
2.6	165	0.0050	1.06		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
0.8	120	0.0250	2.37		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
17.7	335	Total			

Subcatchment 3P: PostDev

Hydrograph



Summary for Pond 4P: Drain Basin#1

Inflow Area = 51,798 sf, 46.70% Impervious, Inflow Depth > 4.38" for 25-year event
Inflow = 4.26 cfs @ 12.24 hrs, Volume= 18,926 cf
Outflow = 1.86 cfs @ 12.60 hrs, Volume= 16,688 cf, Atten= 56%, Lag= 21.5 min
Discarded = 0.09 cfs @ 12.60 hrs, Volume= 2,539 cf
Primary = 1.77 cfs @ 12.60 hrs, Volume= 14,149 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 303.22' @ 12.60 hrs Surf.Area= 4,888 sf Storage= 7,085 cf

Plug-Flow detention time= 112.8 min calculated for 16,653 cf (88% of inflow)
Center-of-Mass det. time= 59.8 min (868.8 - 809.1)

Volume	Invert	Avail.Storage	Storage Description
#1	299.50'	11,387 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

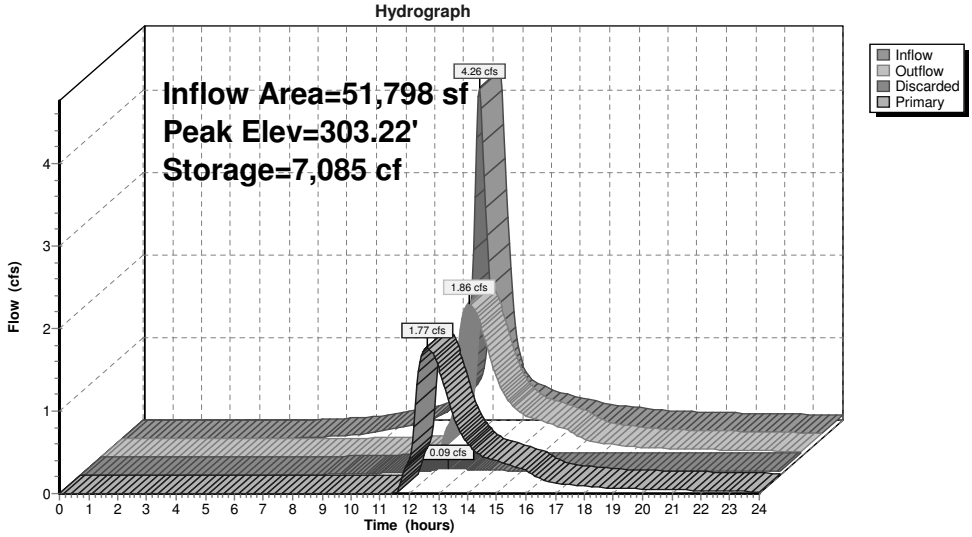
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
299.50	70	36.0	0	0	70
301.00	960	143.0	645	645	1,600
302.00	2,760	235.0	1,783	2,427	4,374
303.00	4,555	291.0	3,620	6,047	6,733
304.00	6,165	367.0	5,340	11,387	10,726

Device	Routing	Invert	Outlet Devices
#1	Discarded	299.50'	**0.270 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 299.00'
#2	Primary	299.00'	**12.0" Round Culvert** L= 300.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 299.00' / 287.80' S= 0.0373 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	301.90'	**5.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	302.30'	**7.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.09 cfs @ 12.60 hrs HW=303.22' (Free Discharge)
└**1=Exfiltration** (Controls 0.09 cfs)

Primary OutFlow Max=1.77 cfs @ 12.60 hrs HW=303.22' (Free Discharge)
└**2=Culvert** (Passes 1.77 cfs of 7.24 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 0.75 cfs @ 5.53 fps)
  └**4=Orifice/Grate** (Orifice Controls 1.02 cfs @ 3.82 fps)

Pond 4P: Drain Basin#1

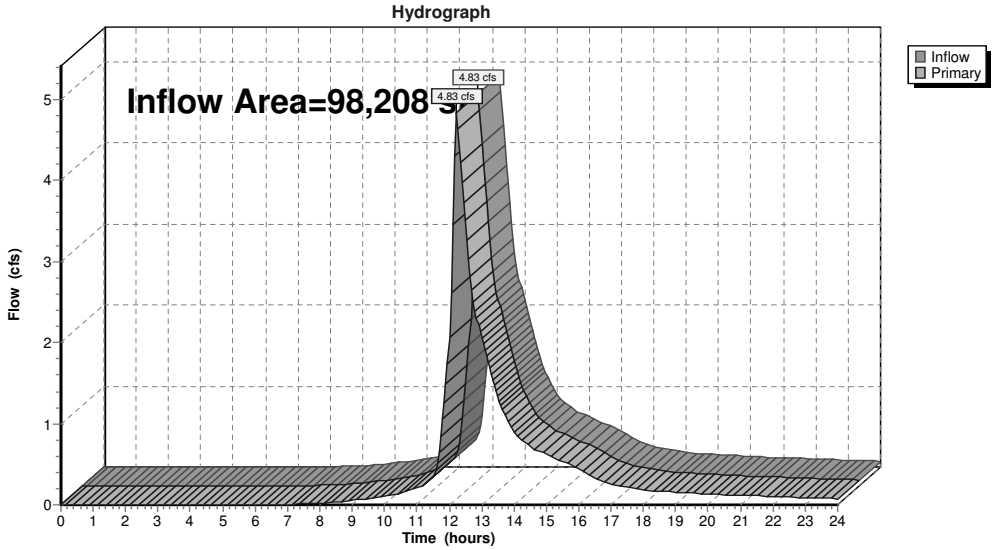


Summary for Link 1L: PostDev

Inflow Area = 98,208 sf, 36.74% Impervious, Inflow Depth > 3.55" for 25-year event
Inflow = 4.83 cfs @ 12.22 hrs, Volume= 29,087 cf
Primary = 4.83 cfs @ 12.22 hrs, Volume= 29,087 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: PostDev



Summary for Subcatchment 1E: Pre-Dev

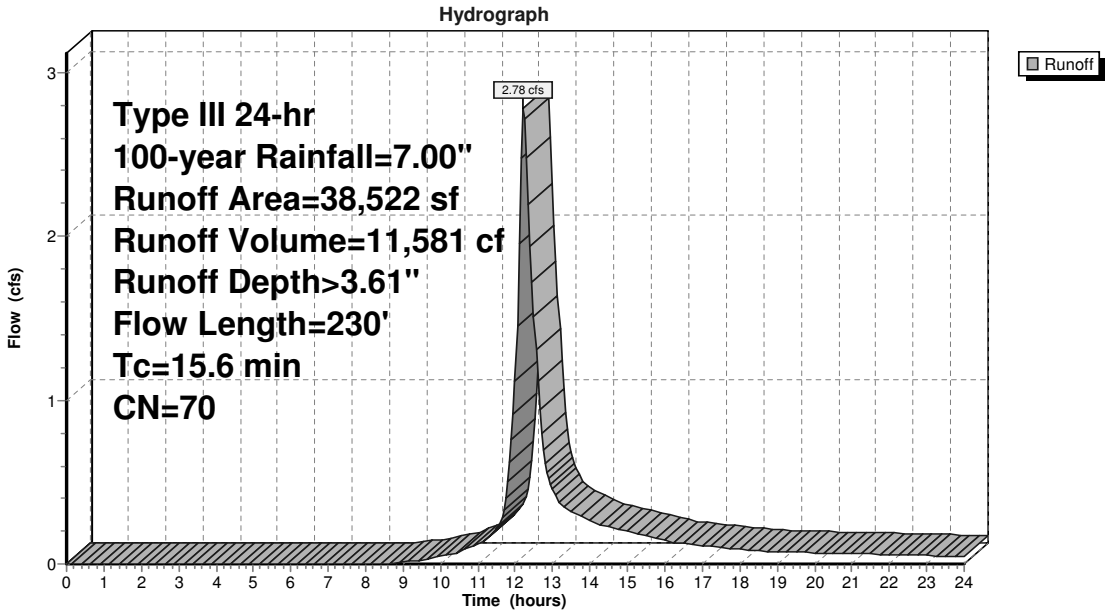
Runoff = 2.78 cfs @ 12.22 hrs, Volume= 11,581 cf, Depth> 3.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
38,522	70	Woods, Good, HSG C
38,522		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	50	0.0220	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
3.7	180	0.0270	0.82		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
15.6	230	Total			

Subcatchment 1E: Pre-Dev



Summary for Subcatchment 1P: PostDev

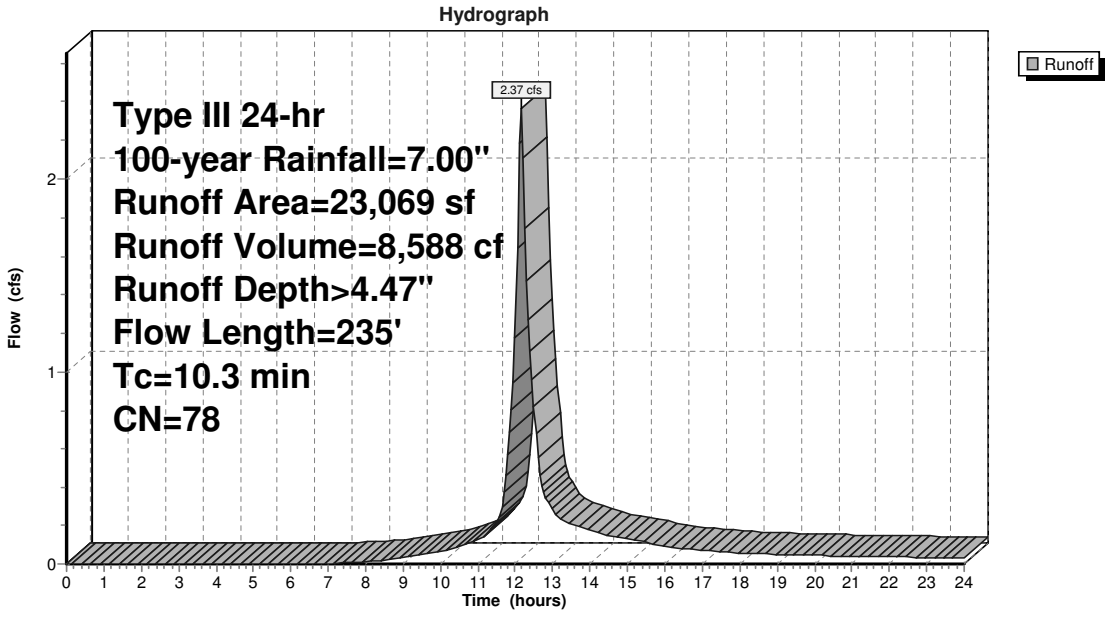
Runoff = 2.37 cfs @ 12.15 hrs, Volume= 8,588 cf, Depth> 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
3,375	98	Roofs, HSG C
1,526	98	Paved parking, HSG C
8,112	70	Woods, Good, HSG C
10,056	74	>75% Grass cover, Good, HSG C
23,069	78	Weighted Average
18,168		78.76% Pervious Area
4,901		21.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0150	0.09		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
0.1	25	0.0200	2.87		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.4	40	0.0100	1.50		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
0.6	120	0.0400	3.22		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
10.3	235	Total			

Subcatchment 1P: PostDev



Summary for Subcatchment 2E: PreDev

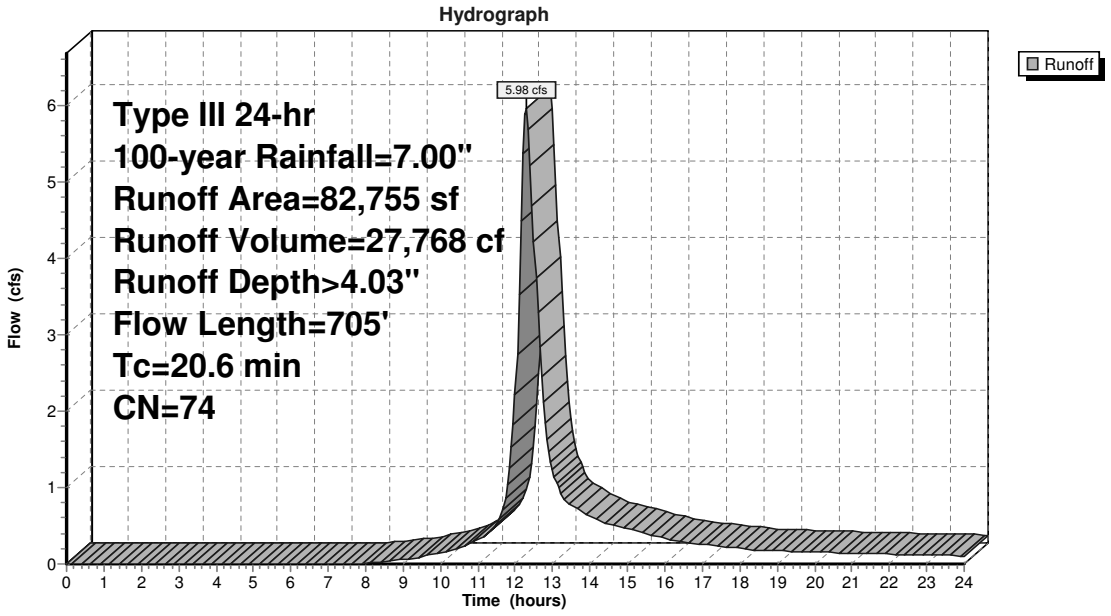
Runoff = 5.98 cfs @ 12.29 hrs, Volume= 27,768 cf, Depth> 4.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
2,273	98	Paved parking, HSG C
2,877	98	Roofs, HSG C
4,352	96	Gravel surface, HSG C
28,594	74	>75% Grass cover, Good, HSG C
44,659	70	Woods, Good, HSG C
82,755	74	Weighted Average
77,605		93.78% Pervious Area
5,150		6.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	50	0.0220	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
6.6	345	0.0300	0.87		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.9	280	0.0240	2.49		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
0.2	30	0.0200	2.28		**Shallow Concentrated Flow, D-E** Unpaved Kv= 16.1 fps
20.6	705	Total			

Subcatchment 2E: PreDev



Summary for Subcatchment 2P: PostDev

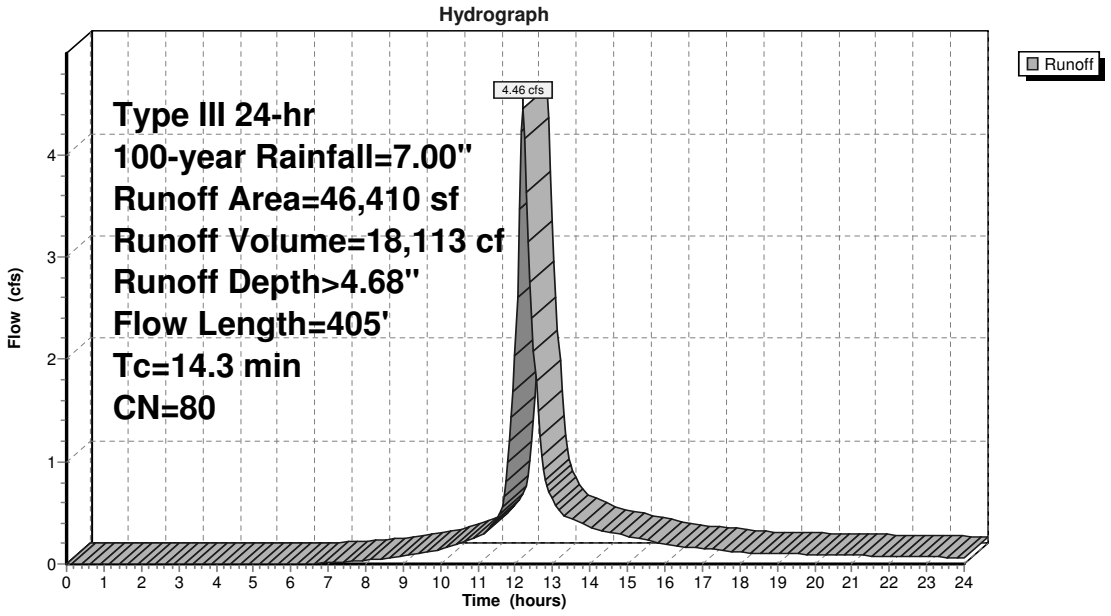
Runoff = 4.46 cfs @ 12.20 hrs, Volume= 18,113 cf, Depth> 4.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
9,013	98	Paved parking, HSG C
2,877	98	Roofs, HSG C
2,115	70	Woods, Good, HSG C
32,405	74	>75% Grass cover, Good, HSG C
46,410	80	Weighted Average
34,520		74.38% Pervious Area
11,890		25.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	50	0.0220	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.20"
2.2	325	0.0240	2.49		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.2	30	0.0240	2.49		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
14.3	405	Total			

Subcatchment 2P: PostDev



Summary for Subcatchment 3P: PostDev

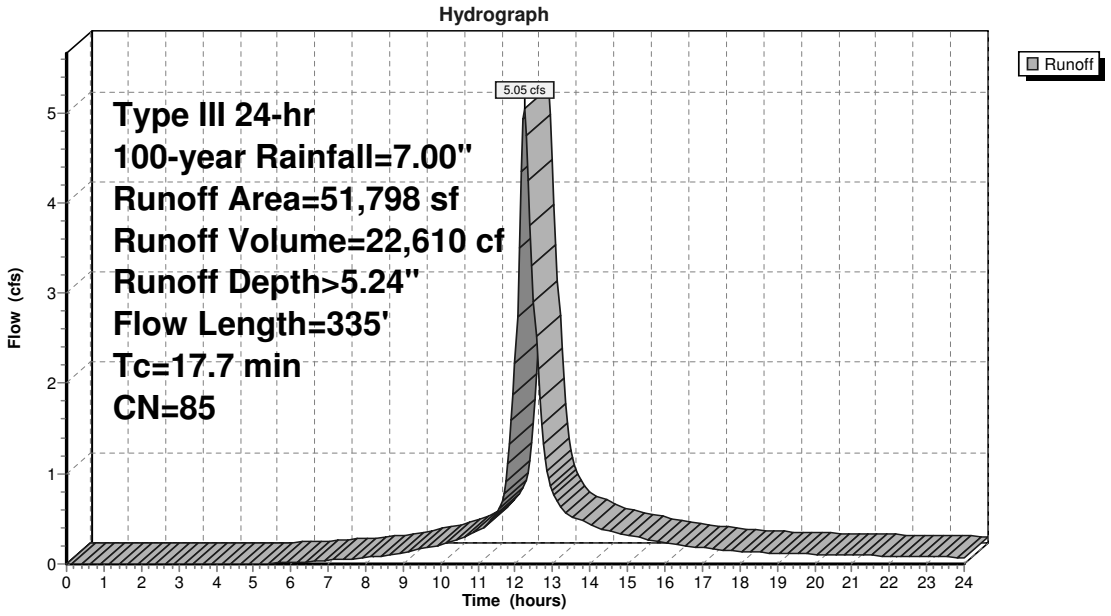
Runoff = 5.05 cfs @ 12.24 hrs, Volume= 22,610 cf, Depth> 5.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=7.00"

Area (sf)	CN	Description
10,449	98	Roofs, HSG C
9,706	98	Paved roads , HSG C
4,035	98	Paved parking, HSG C
27,608	74	>75% Grass cover, Good, HSG C
51,798	85	Weighted Average
27,608		53.30% Pervious Area
24,190		46.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	50	0.0050	0.06		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.20"
2.6	165	0.0050	1.06		**Shallow Concentrated Flow, B-C** Grassed Waterway Kv= 15.0 fps
0.8	120	0.0250	2.37		**Shallow Concentrated Flow, C-D** Grassed Waterway Kv= 15.0 fps
17.7	335	Total			

Subcatchment 3P: PostDev



Summary for Pond 4P: Drain Basin#1

Inflow Area = 51,798 sf, 46.70% Impervious, Inflow Depth > 5.24" for 100-year event
Inflow = 5.05 cfs @ 12.24 hrs, Volume= 22,610 cf
Outflow = 2.11 cfs @ 12.61 hrs, Volume= 20,354 cf, Atten= 58%, Lag= 22.2 min
Discarded = 0.10 cfs @ 12.61 hrs, Volume= 2,715 cf
Primary = 2.02 cfs @ 12.61 hrs, Volume= 17,640 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 303.46' @ 12.61 hrs Surf.Area= 5,262 sf Storage= 8,292 cf

Plug-Flow detention time= 107.1 min calculated for 20,354 cf (90% of inflow)
Center-of-Mass det. time= 59.5 min (863.7 - 804.2)

Volume	Invert	Avail.Storage	Storage Description
#1	299.50'	11,387 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

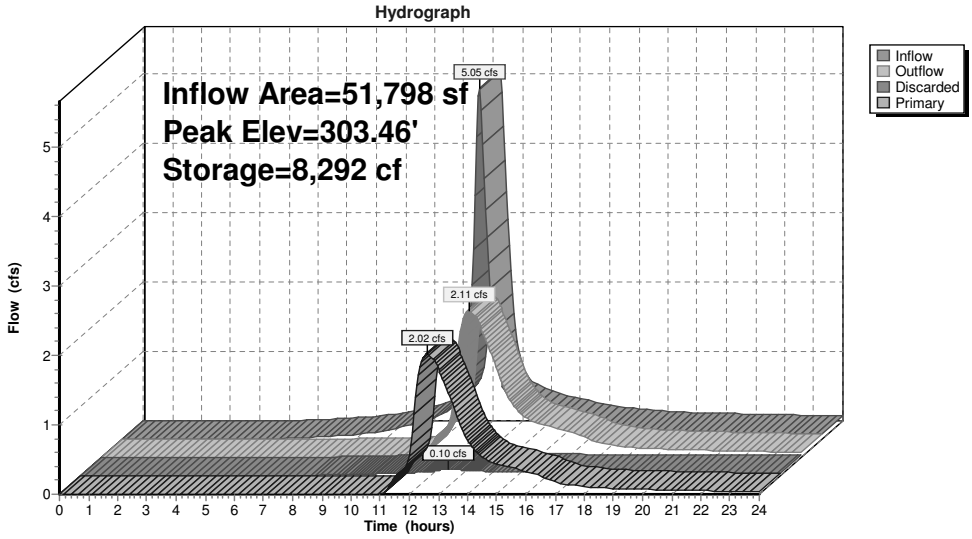
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
299.50	70	36.0	0	0	70
301.00	960	143.0	645	645	1,600
302.00	2,760	235.0	1,783	2,427	4,374
303.00	4,555	291.0	3,620	6,047	6,733
304.00	6,165	367.0	5,340	11,387	10,726

Device	Routing	Invert	Outlet Devices
#1	Discarded	299.50'	**0.270 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 299.00'
#2	Primary	299.00'	**12.0" Round Culvert** L= 300.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 299.00' / 287.80' S= 0.0373 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	301.90'	**5.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	302.30'	**7.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.10 cfs @ 12.61 hrs HW=303.46' (Free Discharge)
└**1=Exfiltration** (Controls 0.10 cfs)

Primary OutFlow Max=2.02 cfs @ 12.61 hrs HW=303.46' (Free Discharge)
└**2=Culvert** (Passes 2.02 cfs of 7.30 cfs potential flow)
  └**3=Orifice/Grate** (Orifice Controls 0.82 cfs @ 6.01 fps)
  └**4=Orifice/Grate** (Orifice Controls 1.20 cfs @ 4.48 fps)

Pond 4P: Drain Basin#1

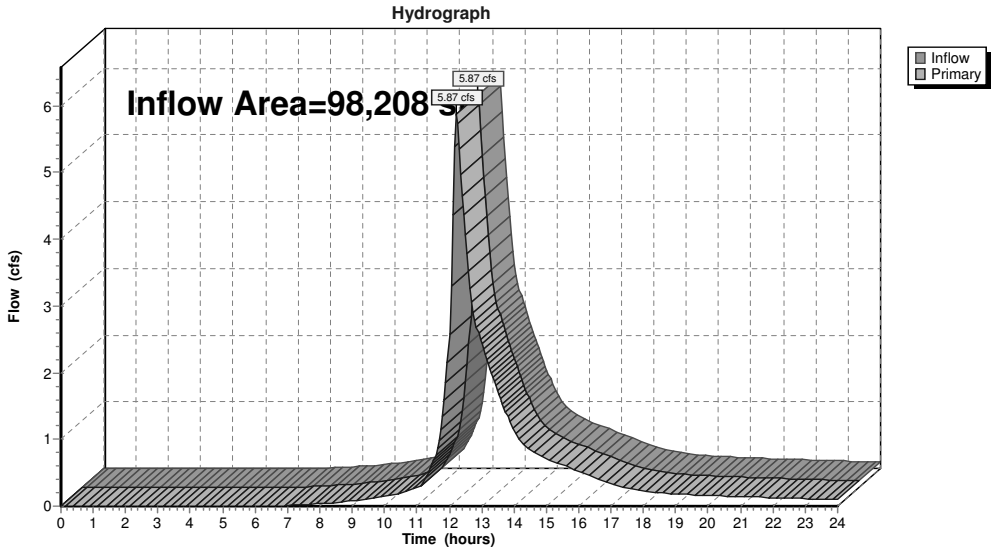


Summary for Link 1L: PostDev

Inflow Area = 98,208 sf, 36.74% Impervious, Inflow Depth > 4.37" for 100-year event
Inflow = 5.87 cfs @ 12.21 hrs, Volume= 35,753 cf
Primary = 5.87 cfs @ 12.21 hrs, Volume= 35,753 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: PostDev



APPENDIX – B

Stormwater Recharge Calculations & Water Quality Volumes
Groundwater Mounding Calculations
TSS Removal Calculations
Soil Tests logs
Standards 3 & 4

APPENDIX – B
Stormwater Recharge & Water Quality Volume Calculations
Standard 3:

Project:
Diamond Hill Estates
Walpole MA
Revised: August 5, 2020

Water Quality Volume (WQV): Based on 0.5 inch rainfall
Recharge Volume(Rv): Based on Soil Classification

Rv = F * Impervious Area
Rv = Required Recharge Volume
F = Depth Factor
Soil Type C – 0.25 inch

Total Impervious Area:

Roof:	13,824 sf
Paved:	15,267 sf
Total:	29,091 sf

Impervious Area to Recharge Basin: 24,190 s.f.
Impervious Area to bypassing Basin: 4,901 s.f.
Total Impervious Area to infiltration: 29,091 s.f.
Total Impervious to Recharge Basin: 50,039 s.f.
Total Impervious Area Uncaptured: 5,610 s.f.
Capture Adjustment:
24,190 s.f. / 29,091 s.f. = 83% > 65%
29,091 s.f. / 24,190 s.f. = 1.2 capture adjustment

Rv = F * Impervious Area
Rv = Required Recharge Volume
F = Depth Factor

Hydrologic Soils Group Map indicates that the soils in the recharge areas are Montauk fine sandy loam. Witnessed on-site soil testing revealed the substratum soils in the areas of the infiltration facilities consisting of medium to coarse sands. The required recharge volume was calculated utilizing Hydrologic Soil Group "C".
Soil Type C – Depth Factor = 0.25 inch

Drainage Recharge Basin:
Water Quality Volume:
Imp. Area Pavement: 15,267 s.f.
WQV = (15,267 sf * 0.5 in)/12 = 636 c.f.

Recharge Volume Required: (Soil Type C – 0.25 inch)
Tot. Imp Area to Recharge Basin: 24,190 s.f.
Rv = (24,190 sf * 0.25 in)/12 = 504 c.f. x Capture Adjustment (1.2) = 605 c.f.

Pretreatment provided with Proprietary Unit (Stormceptor or equal)

Recharge Volume Provided: (Below outlet)

Elev.	Area	Avg.	Depth	Vol.
299.5	70			
300.0	253	162	0.5	81
301.0	960	607	1.0	607
301.9	2538	1749	0.9	1574
				2,262 c.f.

2,262 c.f. > 605 c.f.

Time to drain(Static Method):
Drawdown time = Volume/(K*Bottom Area)
Volume = 605 cf
K = 0.27 in/hr = 0.023 ft/hr (Soil Type C)
Bottom Area = 597 sf

Drawdown time = 605 c.f./(0.023 ft/hr x 960 sf)
Drawdown time = 27 hr < 72 hr ***ok***

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: OUTLET

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
DEEP SUMP CATCH BASIN	0.25	1.00	0.25	0.75
CDS UNIT	0.80	0.75	0.60	0.15

Total TSS Removal = 85%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: DUPEE

Prepared By: RST

Date: 8/5/20

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

Diamond Hill Estates
Basin Mounding Calculation
August 5, 2020

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Input Values		
0.6000	***R***	**Recharge (infiltration) rate (feet/day)**
0.320	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
0.54	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
20.000	**x**	**1/2 length of basin (x direction, in feet)**
46.000	**y**	**1/2 width of basin (y direction, in feet)**
1.000	**t**	**duration of infiltration period (days)**
50.000	**hi(0)**	**initial thickness of saturated zone (feet)**

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00

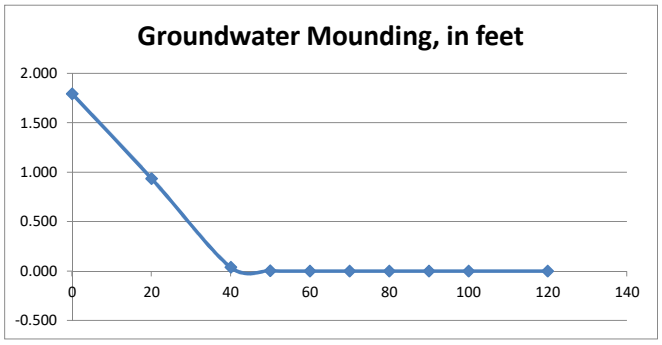
hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

51.795	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
1.795	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
1.795	0
0.937	20
0.039	40
0.005	50
0.001	60
0.001	70
0.001	80
0.001	90
0.001	100
0.001	120

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

APPENDIX – C

Hydraulic Analysis & Pipe Sizing

STORM DRAINAGE CALCULATIONS

Pipe Flow Calculations - Manning's Equation

i = Rainfall Intensity at 25 Year Storm

Date: 8/5/20
Revised:
Job No: 16,518
Calc. by: rst

Project: Diamond Hill Estates
Town: Walpole, MA

Line		Length	Drain Area	Total Area	Runoff	Time of Concentration (min.)			Rainfall i	Required Capacity Q(cfs)		Pipe Diameter	Slope	Design Conditions		Invert Elevation		Rim Elev.	n
From	To	(Feet)	(Ac)	(Ac)	"C"	Upper End	In Pipe	Total	(in./hr.)	Inlet	Pipe	(in.)	(ft./ft.)	Depth (in.)	Velocity (f.p.s.)	Upper	Lower	Upper	
CB 1	DMH 3	26	0.10		0.74	6.44	0.13	6.57	5.97	0.45		12	0.012	2.80	3.30	302.40	302.10	305.52	0.013
CB 2	DMH 3	16	0.49		0.77	12.45	0.05	12.49	4.79	1.78		12	0.019	5.00	5.80	302.40	302.10	305.52	0.013
DMH 3	F.E.	34		0.59	0.76	6.57	0.14	6.71	5.93	2.65		12	0.006	9.40	4.00	302.00	301.80	305.50	0.013

OVERLAND FLOW TRAVEL TIME

STORM RUNOFF DATA

Date: **5/7/20**
Revised:

Project: **Diamond Hill Estates**
Town: **Walpole, MA**

Job No: **16,518**
Calc. by: **rst**

Structure	Impervious			Lawn			Wooded			Total
	Length (ft)	Slope ('/')	Time (min.)	Length (ft)	Slope ('/')	Time (min.)	Length (ft)	Slope ('/')	Time (min.)	Travel Time (min.)
1	325	0.080	1.77	5	0.010	4.67				6.44
2	300	0.080	1.67	30	0.010	10.78				12.45

AVERAGE 'c' VALUE FOR STRUCTURES

STORM RUNOFF DATA

Date: **5/13/20**
Revised:

Project: **Diamond Hill Estates**
Town: **Walpole, MA**

Job No: **16,518**
Calc. by: **RST**

Structure	Total Area (SF)	Ground Cover	Area (SF)	c	Σ(Area*c)	Average c	Total Area (Ac)
CB#1	4,432	imp	2,970	0.95	2,821.50	0.74	0.102
		lawn	1,462	0.30	438.60		
		wooded	0	0.20	0.00		
CB#2	21,173	imp	15,185	0.95	14,425.75	0.77	0.486
		lawn	5,988	0.30	1,796.40		
		wooded	0	0.20	0.00		

APPENDIX – D

Stormwater Operations & Maintenance Plan

Standard 9

Stormwater Management Operation and Maintenance Plan

Maintenance Agreement
Diamond Hill Estates
Off Dupee Street
Walpole, Massachusetts

August 5, 2020

In accordance with Standard 9 of the Massachusetts Department of Environmental Protection Stormwater Handbook (February 2008), the attached on-site maintenance program for the proposed stormwater management system has been developed to ensure the Best Management Practices (BMP's) in place will remain functioning as designed. The Plan contains both construction period operations and maintenance as well as post construction responsibilities that shall "run" with the property if ownership is transferred.

Land Owner/Operator:

Wall Street Development Corp.
Attn: Lou Petrozzi
P.O. Box 272
Walpole, MA 02090
Phone: 781-326-0306

_____ _____
Date

Construction Period Operation and Maintenance:

- It should be noted that the US EPA mandated NPDES stormwater program requires construction site operators engaged in clearing, grading, and excavating activities that disturb 1 acre or more, including smaller sites in a larger common plan of development or sale, to obtain coverage under an NPDES permit for their stormwater discharges. The Project is subject to this permit and therefore, a Stormwater Pollution Prevention Plan (SWPPP) will be prepared prior to commencement of construction. The SWPPP will contain additional construction period and post construction erosion control requirements.

Erosion Control Barriers:

Compost filter socks shall be installed where indicated on the plans and in other appropriate locations where warranted. These barriers shall be installed prior to the commencement of any work on-site and in accordance with the construction plans. A supply of filter socks and compost filter material shall be kept on-site to replace and/or repair barriers that are damaged or degraded. The barriers shall be observed and maintained on a weekly basis during construction.

Construction Entrances:

The purpose of stabilizing entrances to a construction site is to minimize the amount of sediment leaving the area as mud and sediment attached to vehicles. The entrances shall be sized according to the Massachusetts DEP and US EPA guidelines and will be maintained on a weekly basis during construction. A Detail is included in the Site Plans prepared for the Project.

Sediment Traps/Basins:

Sediment basins and rock dams can be used to capture sediment from stormwater runoff before it leaves a construction site. Both structures allow a pool to form in an excavated or natural depression, where sediment can settle. The pool is dewatered through a single riser and drainage hole leading to a suitable outlet on the downstream side of the embankment or through the gravel of the rock dam. Design a sediment trap to maximize the surface area for infiltration and sediment settling. This increases the effectiveness of the trap and decreases the likelihood of backup during and after periods of high runoff intensity. Site conditions dictate specific design criteria, but the minimum storage capacity should be 1,800 ft^3 per acre of total drainage area (Smolen et al., 1988). The volume of a natural sediment trap can be approximated using the following equation (Smolen et al., 1988): *Volume (ft^3) = 0.4 x surface area (ft^2) x maximum pool depth (ft).* Sediment traps have a useful life of about 18 to 24 months (USEPA, 1993), but their effectiveness depends on the amount and intensity of rainfall and erosion, and proper maintenance.

Dust Control:

Soils information for the site indicates that it is comprised of sandy soils. Therefore, Dust control BMPs to reduce surface activities and air movement that causes dust to be generated from disturbed soil surfaces will be required. The preferred measure for dust control is sprinkling/irrigation. This is an on-going/as-needed requirement until surfaces have been stabilized. There shall be a water truck on-site available as needed.

Diversions:

Temporary diversion swales and mounds will be constructed to divert stormwater away from areas under construction to limit sediment transport. These diversions will be relocated as construction progresses. Stone check dams will be installed in swales as necessary to limit scour and sediment transport.

Catch Basin Protection:

Temporary inlet protection barriers consisting of Silt Sacks® will be placed within all constructed inlets to prevent inflow of sediments into the constructed drainage system. The barriers shall remain in place until a permanent cover is established or diversions away from the inlets are constructed. The barriers shall be observed and maintained as necessary on a weekly basis and after every rainfall of 0.5 inches or more.

Infiltration Basin:

Rope or fence off the area selected for the infiltration basin. Never allow construction equipment to drive across the area intended to serve as an infiltration basin. During Construction, the basin shall be observed during and after all storm events to ensure there is no sediment accumulation or degradation of infiltrative surfaces. Never use infiltration basin as temporary sediment traps for construction activities. To limit smearing or compacting soils, never construct the basin in winter or when it's raining. If the basin floor becomes compacted or smeared during construction, the area shall be tilled to a depth of 12 inches to restore infiltration rates prior to final grading. The Infiltration Basin shall be maintained by the Homeowners association of the subdivision.

Spill Control:

A contingency plan to address the spillage/release of petroleum products and any hazardous materials will be implemented for the site during construction. The plan will include the following measures:

- Equipment necessary to quickly attend to inadvertent spills or leaks shall be on-site in a secure but accessible location. Such equipment will include, but not be limited to, the following: urethane drain cover seals (mats), a spill containment kit which includes sand and shovels, suitable absorbent materials, storage containers, safety goggles, chemically resistant gloves and overshoe boots, water and chemical fire extinguishers, and first aid equipment.
- Spills or leaks will be treated properly according to material type, volume of spillage and location of spill. Mitigation will include preventing further spillage, containing any spilled material to the smallest practical area, removing spilled material in a safe and environmentally friendly manner, and remediating any damage to the environment.
- The contractor shall be familiar with the reporting requirements of the Massachusetts Contingency Plan (310 CMR 40.00) as issued by the Massachusetts Department of Environmental Protection (DEP); specifically Subpart C Notification of Releases and Threats of Release of Oil and Hazardous Materials and Subpart D Preliminary Response Activities and Risk Reduction Measures.
- For any large spills. The Massachusetts DEP Hazardous Waste Incident Response Group shall be notified immediately at 1-617-792-7653 and an emergency response contractor will be called in.

Post-Construction Period Operation and Maintenance:

Catch Basin and Manhole Maintenance:

Activity	Inspection Frequency
Inspect Units	2 Times per year
Clean Units	Whenever the depth of deposits is greater than ½ the sump depth (1 time per yr minimum)

Street Sweeping:

Activity	Inspection Frequency
Sweeping Paved surfaces	2 time per yr (spring & fall). Sweeping along South Street shall be done when necessary (no tracking of materials onto the street shall be allowed)

CDS Treatment Unit:

Activity	Inspection Frequency
Inspect Inlet and Outlet	2 time per yr. After a heavy rain event 1" storm or larger
Inspect Access Ports for Sediment buildup & Cleanup	2 times per yr. Accumulated sediment buildup shall be Vacuumed cleaned as necessary

Retention Basin:

Activity	Inspection Frequency
Sediment Removal	Inspect Monthly Remove accumulated sediment buildup Grass Mowing during growing season (Keep grasses no greater than 6 inches & no lower than 3 to 4 inches)

Stormwater Outlet Structure:

Activity	Inspection Frequency
Inspect Outlet	1 time per yr. Remove accumulated sediment buildup at outlet and overgrown vegetation around the outlet.

Stormwater Construction Site Inspection Report

General Information			
Project Name	Diamond Hill Estates		
MA DEP File No.		**Location**	Dupee Street, Walpole, MA
Date of Inspection		**Start/End Time**	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Inspector's Qualifications			
Describe present phase of construction			
Type of Inspection: ❑ Regular ❑ Pre-storm event ❑ During storm event ❑ Post-storm event			
Weather Information			
Has there been a storm event since the last inspection? ❑Yes ❑No **If yes, provide:** Storm Start Date & Time: Storm Duration (hrs): Approximate Amount of Precipitation (in):			
Weather at time of this inspection? ❑ Clear ❑Cloudy ❑ Rain ❑ Sleet ❑ Fog ❑ Snowing ❑ High Winds ❑ Other: Temperature:			
Have any discharges occurred since the last inspection? ❑Yes ❑No **If yes, describe:**			
Are there any discharges at the time of inspection? ❑Yes ❑No **If yes, describe:**			

Site-specific BMPs

- *Number the structural and non-structural BMPs identified in your SWPPP on your site map and list them below (add as many BMPs as necessary). Carry a copy of the numbered site map with you during your inspections. This list will ensure that you are inspecting all required BMPs at your site.*
- *Describe corrective actions initiated, date completed, and note the person that completed the work in the Corrective Action Log.*

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
1		❑Yes ❑No	❑Yes ❑No	
2		❑Yes ❑No	❑Yes ❑No	
3		❑Yes ❑No	❑Yes ❑No	
4		❑Yes ❑No	❑Yes ❑No	
5		❑Yes ❑No	❑Yes ❑No	
6		❑Yes ❑No	❑Yes ❑No	
7		❑Yes ❑No	❑Yes ❑No	
8		❑Yes ❑No	❑Yes ❑No	
9		❑Yes ❑No	❑Yes ❑No	
10		❑Yes ❑No	❑Yes ❑No	
11		❑Yes ❑No	❑Yes ❑No	

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
12		❑Yes ❑No	❑Yes ❑No	
13		❑Yes ❑No	❑Yes ❑No	
14		❑Yes ❑No	❑Yes ❑No	
15		❑Yes ❑No	❑Yes ❑No	
16		❑Yes ❑No	❑Yes ❑No	
17		❑Yes ❑No	❑Yes ❑No	
18		❑Yes ❑No	❑Yes ❑No	
19		❑Yes ❑No	❑Yes ❑No	
20		❑Yes ❑No	❑Yes ❑No	

Overall Site Issues

Below are some general site issues that should be assessed during inspections. Customize this list as needed for conditions at your site.

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	❑Yes ❑No	❑Yes ❑No	
2	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	❑Yes ❑No	❑Yes ❑No	
3	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	❑Yes ❑No	❑Yes ❑No	
4	Are discharge points and receiving waters free of any sediment deposits?	❑Yes ❑No	❑Yes ❑No	
5	Are storm drain inlets properly protected?	❑Yes ❑No	❑Yes ❑No	
6	Is the construction exit preventing sediment from being tracked into the street?	❑Yes ❑No	❑Yes ❑No	
7	Is trash/litter from work areas collected and placed in covered dumpsters?	❑Yes ❑No	❑Yes ❑No	
8	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	❑Yes ❑No	❑Yes ❑No	

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
9	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	❑Yes ❑No	❑Yes ❑No	
10	Are materials that are potential stormwater contaminants stored inside or under cover?	❑Yes ❑No	❑Yes ❑No	
11	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	❑Yes ❑No	❑Yes ❑No	
12	(Other)	❑Yes ❑No	❑Yes ❑No	

Non-Compliance

Describe any incidents of non-compliance not described above:

CERTIFICATION STATEMENT

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Print name and title: _____

Signature:_____ **Date:**_____

CONTECH®
ENGINEERED SOLUTIONS

CDS® Inspection and Maintenance Guide

CDS TECHNOLOGIES

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.3	3.0	0.9	1.3	1.0
CDS2020	5	1.3	3.5	1.1	1.3	1.0
CDS2025	5	1.3	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, earth stabilization and wastewater treament products. For information, visit www.ContechES.com or call 800.338.1122

CONTECH®
ENGINEERED SOLUTIONS
800.925.5240
www.ContechES.com

CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

APPENDIX – E

Illicit Discharge Statement

Standard 10

Illicit Discharge Compliance Statement

Diamond Hill Estates
Walpole, Massachusetts

August 5, 2020

This statement is provided in accordance with the provisions of the Massachusetts Stormwater Management Standard #10.

To the best of the applicant's/owners knowledge there are no illicit discharges to the site's stormwater manangement system.

All proposed uses on the site will not generate, store or discharge any pollutants to the groundwater and/or wetland resource areas.

Any illicit discharges identified during or after construction will be terminated immediately.

Applicant/Owner:

Wall Street Development Corp.
Attn: Lou Petrozzi
P.O Box 272
Westwood, MA 02090
Phone: 508-326-0360

_____ _____

Lou Petrozzi Date

APPENDIX - F

Stormwater Pollution Prevention Plan

(to be submitted prior to construction)

APPENDIX – G

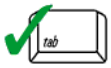
Checklist for Stormwater Report

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

8-7-2020

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☐ No disturbance to any Wetland Resource Areas

☒ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☒ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☒ Grass Channel

☐ Green Roof

☐ Other (describe): _____

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☒ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

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

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

APPENDIX – H

Pre-Development Subcatchment Areas
Post-Development Subcatchment Areas
Hydraulic Subcatchment Areas

LEGEND:

--186--	EXISTING CONTOUR
163x2	EXISTING SPOT ELEVATION
WG	EXISTING WATER GATE
— W —	EXISTING WATER LINE
	EXISTING TREE LINE
	EXISTING SEWER MANHOLE
TP 1	EXISTING TEST PIT LOCATION
202	PROPOSED CONTOUR
301.0	PROPOSED SPOT ELEVATION
	PROPOSED HYDRANT
— W —	PROPOSED WATER LINE
	PROPOSED DRAIN MANHOLE
	PROPOSED CATCH BASIN
— D —	PROPOSED DRAIN LINE
— S —	PROPOSED SEWER LINE
	PROPOSED SEWER MANHOLE
	PROPOSED TREE LINE

ZONING DATA:

RESIDENCE–B (RB)

	REQUIRED	PROVIDED
LOT AREA:	20,000 S.F.	52,238 ± S.F. (1.2± AC)
FRONTAGE:	125 FT.	641.05 FT. (DUPEE STREET)
SETBACKS:		
FRONT:	30 FT.	29.0 FT.
SIDE:	15 FT.	22.0 FT.
REAR:	30 FT.	30.0 FT.
MAXIMUM BUILDING HGHT	35 FT	35 FT
MAXIMUM STORIES	2.5	2.5

LOT COVERAGE:	ALLOWED	PROPOSED
BUILDING:	25% (13,059 sf)	27.4% (14,320 sf)
TOTAL IMPERVIOUS (Buildings & Imp)	40% (20,895 sf)	45.1% (23,580 sf)

ASSESSOR'S REFERENCE:
MAP 35, PARCEL 380–1

DEED REFERENCE:
NORFOLK COUNTY REGISTRY OF DEEDS
Bk. 20779, Pg. 209

PLAN REFERENCE:
NORFOLK REGISTRY OF DEEDS
FILE IN PLAN BOOK 77, PLAN 3721

OWNER OF RECORD:
DIAMOND BROOK REALTY TRUST
P.O. BOX 31
SO. WALPOLE, MA

ZONING CLASSIFICATION:
RESIDENCE B – RB
LOT AREA: 20,000 S.F.
FRONTAGE: 125 FT.
SETBACKS:
FRONT: 30'
SIDE: 15'
REAR: 30'

NOTES:

1. THE LOCATION OF EXISTING UTILITIES IS APPROXIMATE, THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL UTILITIES IN THE FIELD PRIOR TO THE START OF CONSTRUCTION. NOTIFY "DIG SAFE" AT 1–888–344–7233 AT THE 72 HOURS PRIOR TO ANY SITE EXCAVATION.
2. EXISTING STRUCTURES SHOWN ARE APPROXIMATE, THE LOCATION OF THE BUILDINGS WHERE COMPILED FROM EXISTING PLANS OF RECORD AND TOWN OF WALPOLE GIS INFORMATION.

APPROVED BY THE
WALPOLE ZONING BOARD
OF APPEALS:

_____

_____

_____

_____

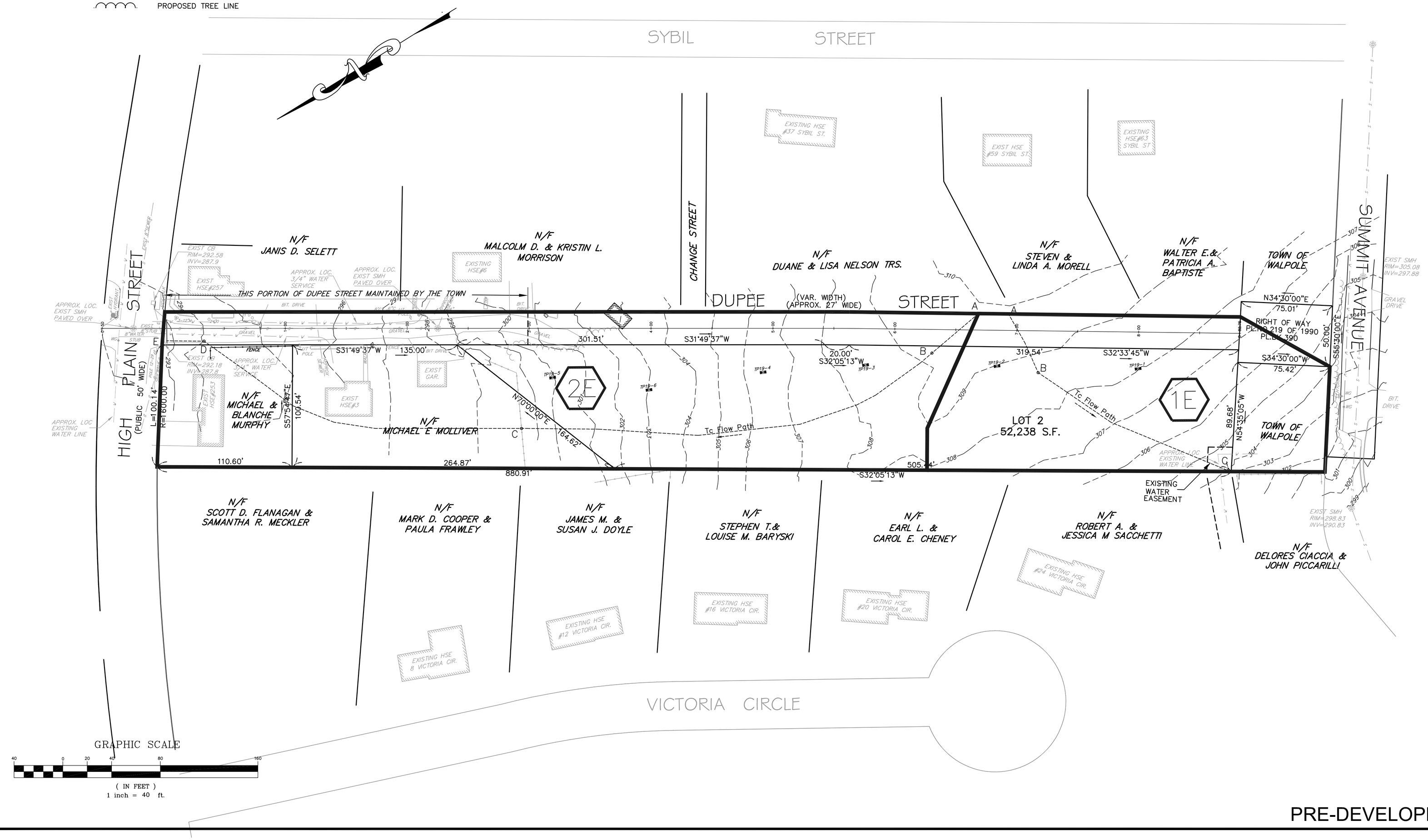
_____

DATE APPROVED: _____

DATE ENDORSED: _____

I TOWN CLERK OF THE TOWN OF WALPOLE RECEIVED & RECORDED FROM THE ZONING BOARD OF APPEALS, APPROVAL OF THIS PLAN AND NO APPEAL HAS BEEN TAKEN FOR TWENTY DAYS NEXT AFTER RECEIPT AND RECORDING OF SAME.

_____ _____
TOWN CLERK DATE



GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

PRE-DEVELOPMENT

No.	DATE	REVISIONS DESCRIPTION
1	6/02/20	ZONING BOARD COMMENTS
2	8/05/20	DRAINAGE ANALYSIS

SITE DEVELOPMENT PLAN
A COMPREHENSIVE PERMIT M.G.L.c. 40B
"DIAMOND HILL ESTATES"
WALPOLE, MASSACHUSETTS

PREPARED FOR:
WALL STREET DEVELOPMENT CORP.
P.O. BOX 272
WESTWOOD, MA 02090

GLM Engineering Consultants, Inc.
19 EXCHANGE STREET
HOLLISTON, MA 01746
P: 508–429–1100
F: 508–429–7160
www.GLMengineering.com

JOB No.	16,518
DATE:	FEB. 20, 2020
SCALE:	1"=40'
SHEET:	1 OF 3
PLAN #:	27,321

LEGEND:

--186--	EXISTING CONTOUR
163x2	EXISTING SPOT ELEVATION
WG	EXISTING WATER GATE
— W —	EXISTING WATER LINE
	EXISTING TREE LINE
	EXISTING SEWER MANHOLE
TP 1	EXISTING TEST PIT LOCATION
202	PROPOSED CONTOUR
301.0	PROPOSED SPOT ELEVATION
	PROPOSED HYDRANT
— W —	PROPOSED WATER LINE
	PROPOSED DRAIN MANHOLE
	PROPOSED CATCH BASIN
— D —	PROPOSED DRAIN LINE
— S —	PROPOSED SEWER LINE
	PROPOSED SEWER MANHOLE
	PROPOSED TREE LINE

ZONING DATA:

RESIDENCE–B (RB)

	REQUIRED	PROVIDED
LOT AREA:	20,000 S.F.	52,238 ± S.F. (1.2± AC)
FRONTAGE:	125 FT.	641.05 FT. (DUPEE STREET)
SETBACKS:		
FRONT:	30 FT.	29.0 FT.
SIDE:	15 FT.	22.0 FT.
REAR:	30 FT.	30.0 FT.
MAXIMUM BUILDING HGHT	35 FT	35 FT
MAXIMUM STORIES	2.5	2.5

LOT COVERAGE:	ALLOWED	PROPOSED
BUILDING:	25% (13,059 sf)	27.4% (14,320 sf)
TOTAL IMPERVIOUS (Buildings & Imp)	40% (20,895 sf)	45.1% (23,580 sf)

ASSESSOR'S REFERENCE:
MAP 35, PARCEL 380–1

DEED REFERENCE:
NORFOLK COUNTY REGISTRY OF DEEDS
Bk. 20779, Pg. 209

PLAN REFERENCE:
NORFOLK REGISTRY OF DEEDS
FILE IN PLAN BOOK 77, PLAN 3721

OWNER OF RECORD:
DIAMOND BROOK REALTY TRUST
P.O. BOX 31
SO. WALPOLE, MA

ZONING CLASSIFICATION:
RESIDENCE B – RB
LOT AREA: 20,000 S.F.
FRONTAGE: 125 FT.
SETBACKS:
FRONT: 30'
SIDE: 15'
REAR: 30'

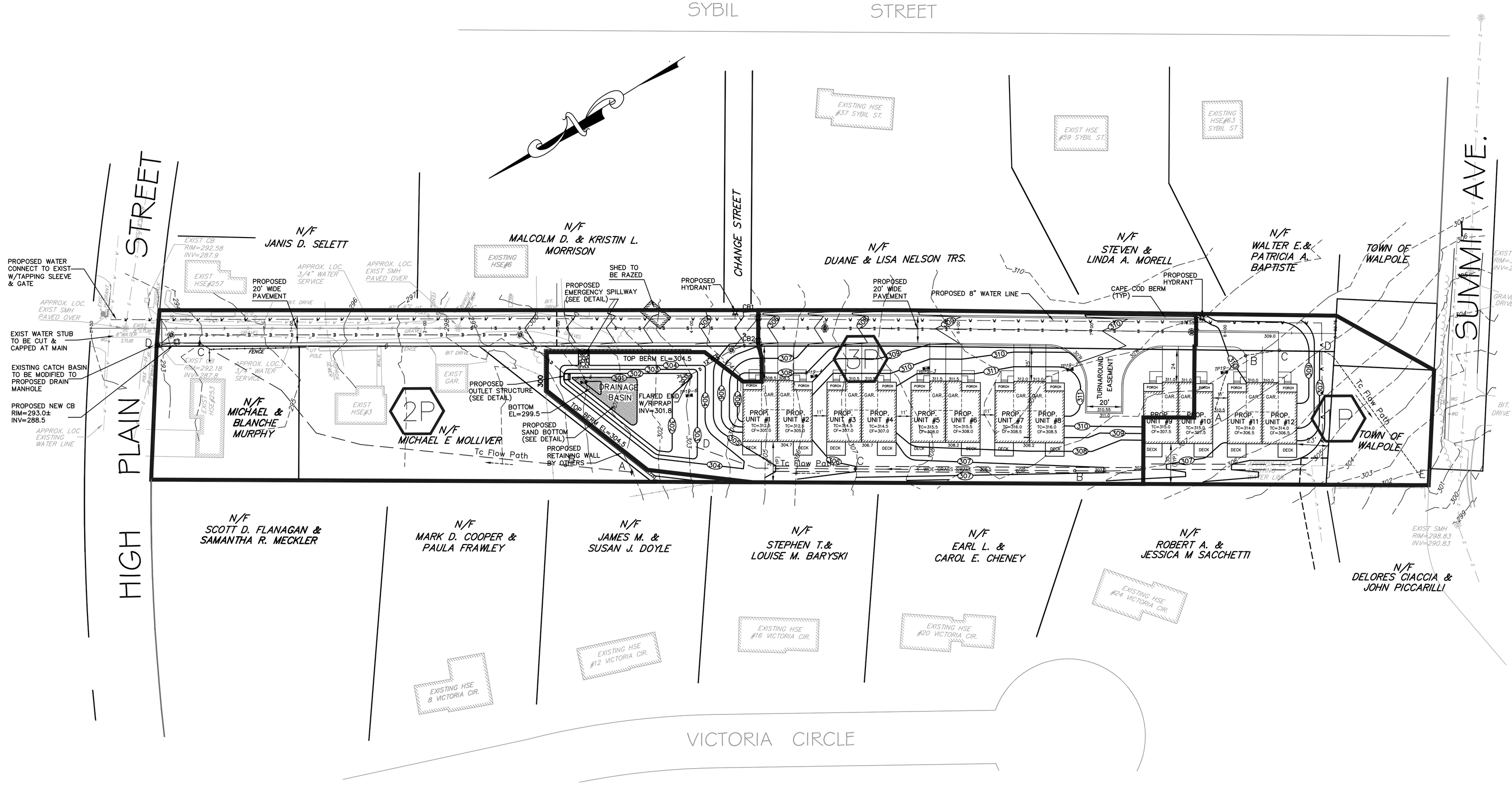
APPROVED BY THE
WALPOLE ZONING BOARD
OF APPEALS:

DATE APPROVED: _____

DATE ENDORSED: _____

I TOWN CLERK OF THE TOWN OF WALPOLE RECEIVED & RECORDED FROM THE ZONING BOARD OF APPEALS, APPROVAL OF THIS PLAN AND NO APPEAL HAS BEEN TAKEN FOR TWENTY DAYS NEXT AFTER RECEIPT AND RECORDING OF SAME.

TOWN CLERK _____ DATE _____



POST-DEVELOPMENT

No.	DATE	REVISIONS DESCRIPTION
1	6/02/20	ZONING BOARD COMMENTS
2	8/05/20	DRAINAGE ANALYSIS

SITE DEVELOPMENT PLAN
A COMPREHENSIVE PERMIT M.G.L.c. 40B
"DIAMOND HILL ESTATES"
WALPOLE, MASSACHUSETTS

PREPARED FOR:
WALL STREET DEVELOPMENT CORP.
P.O. BOX 272
WESTWOOD, MA 02090

GLM Engineering Consultants, Inc.
19 EXCHANGE STREET
HOLLISTON, MA 01746
P: 508–429–1100
F: 508–429–7160
www.GLMengineering.com

JOB No.	16,518
DATE:	FEB. 26, 2020
SCALE:	1"=40'
SHEET:	2 OF 3
PLAN #:	27,321

LEGEND:

—186—	EXISTING CONTOUR
163x2	EXISTING SPOT ELEVATION
WG⊕	EXISTING WATER GATE
—W—	EXISTING WATER LINE
	EXISTING TREE LINE
	EXISTING SEWER MANHOLE
TP 1	EXISTING TEST PIT LOCATION
(202)	PROPOSED CONTOUR
301.0	PROPOSED SPOT ELEVATION
	PROPOSED HYDRANT
—W—	PROPOSED WATER LINE
	PROPOSED DRAIN MANHOLE
	PROPOSED CATCH BASIN
—D—	PROPOSED DRAIN LINE
—S—	PROPOSED SEWER LINE
	PROPOSED SEWER MANHOLE
	PROPOSED TREE LINE

ZONING DATA:

RESIDENCE–B (RB)

	REQUIRED	PROVIDED
LOT AREA:	20,000 S.F.	52,238 ± S.F. (1.2± AC)
FRONTAGE:	125 FT.	641.05 FT. (DUPEE STREET)
SETBACKS:		
FRONT:	30 FT.	29.0 FT.
SIDE:	15 FT.	22.0 FT.
REAR:	30 FT.	30.0 FT.
MAXIMUM BUILDING HGHT	35 FT	35 FT
MAXIMUM STORIES	2.5	2.5

LOT COVERAGE:	ALLOWED	PROPOSED
BUILDING:	25% (13,059 sf)	27.4% (14,320 sf)
TOTAL IMPERVIOUS (Buildings & Imp)	40% (20,895 sf)	45.1% (23,580 sf)

ASSESSOR'S REFERENCE:
MAP 35, PARCEL 380–1

DEED REFERENCE:
NORFOLK COUNTY REGISTRY OF DEEDS
Bk. 20779, Pg. 209

PLAN REFERENCE:
NORFOLK REGISTRY OF DEEDS
FILE IN PLAN BOOK 77, PLAN 3721

OWNER OF RECORD:
DIAMOND BROOK REALTY TRUST
P.O. BOX 31
SO. WALPOLE, MA

ZONING CLASSIFICATION:
RESIDENCE B – RB
LOT AREA: 20,000 S.F.
FRONTAGE: 125 FT.
SETBACKS:
FRONT: 30'
SIDE: 15'
REAR: 30'

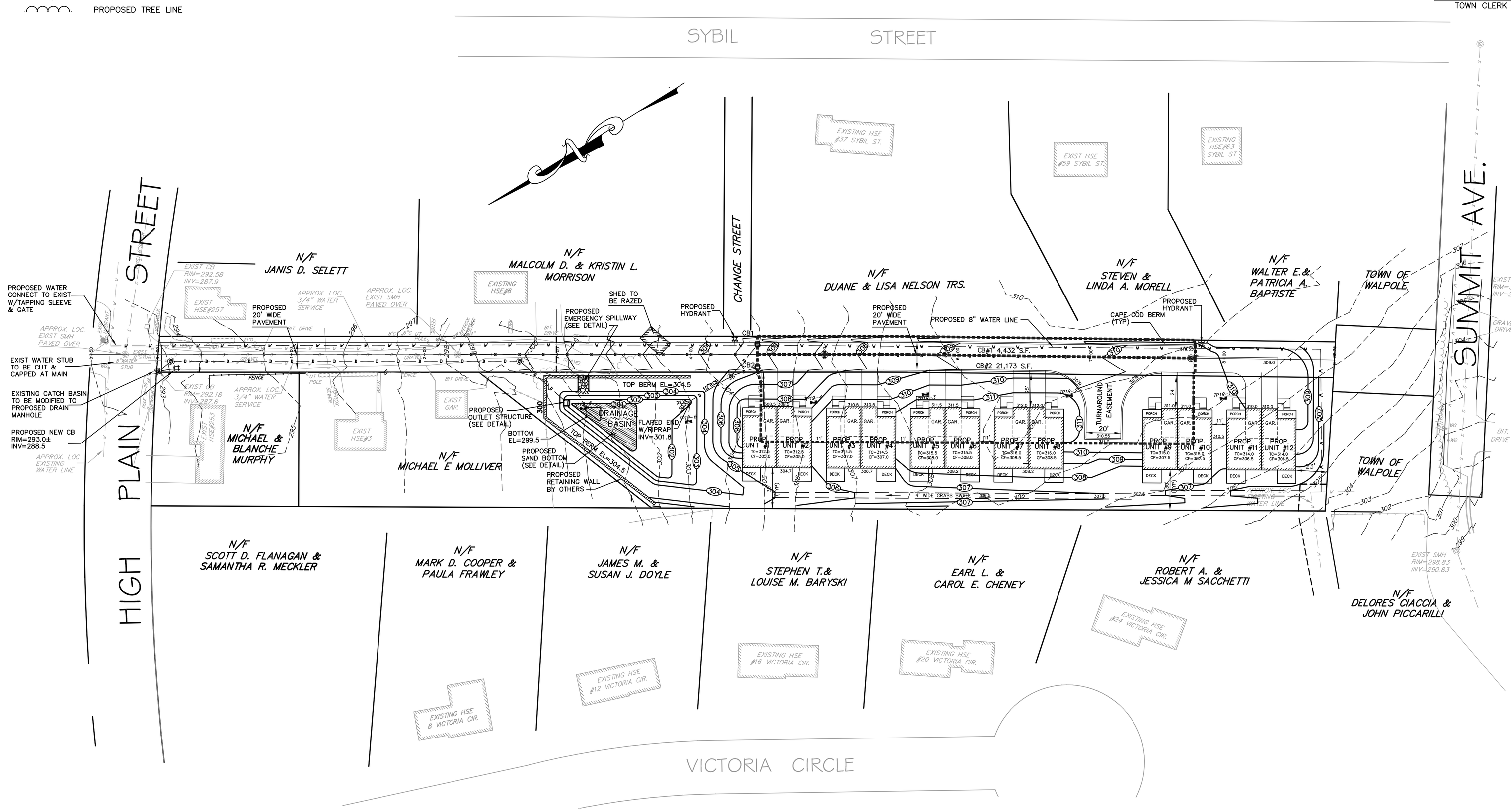
APPROVED BY THE
WALPOLE ZONING BOARD
OF APPEALS:

DATE APPROVED: _____

DATE ENDORSED: _____

I TOWN CLERK OF THE TOWN OF WALPOLE RECEIVED & RECORDED FROM THE ZONING BOARD OF APPEALS, APPROVAL OF THIS PLAN AND NO APPEAL HAS BEEN TAKEN FOR TWENTY DAYS NEXT AFTER RECEIPT AND RECORDING OF SAME.

TOWN CLERK _____ DATE _____



GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

CB RATIONAL METHOD AREA

No.	DATE	REVISIONS DESCRIPTION
1	6/02/20	ZONING BOARD COMMENTS
2	8/05/20	DRAINAGE ANALYSIS

SITE DEVELOPMENT PLAN
A COMPREHENSIVE PERMIT M.G.L.c. 40B
"DIAMOND HILL ESTATES"
WALPOLE, MASSACHUSETTS

PREPARED FOR:
WALL STREET DEVELOPMENT CORP.
P.O. BOX 272
WESTWOOD, MA 02090

GLM Engineering Consultants, Inc.
19 EXCHANGE STREET
HOLLISTON, MA 01746
P: 508–429–1100
F: 508–429–7160
www.GLMengineering.com

JOB No.	16,518
DATE:	FEB. 26, 2020
SCALE:	1"=40'
SHEET:	3 OF 3
PLAN #:	27,321