Special Permit
40 Williston Road

Owners
Lauren Brooks
617.416.2609
David Brooks
617.817.6373

Lawyer
Rosenberg, Freeman &Lee
Laurence Lee
617.964.7000

Civil Engineer
PVI Site Design
Tim Power
339.206.1030

Survey Engineer
A.S. Elliott Associates
Elliott Paturzo
744.721.6062

Landscape Architect
RBLA Design
Rebecca Bachand
781.686.4486

Designer
SBW Design
617.416.3184

Structural Engineer
Stan Berdichevsky
508.308.9012

Existing Conditions Plan of Land

40 WILLISTON ROAD

NEWTON, MASSACHUSETTS

PREPARED FOR: LAUREN BROOKS   DATE: NOVEMBER 28, 2018

SCALE: 1" = 20'

A.S. Elliott & Associates
Professional Land Surveyors

P.O. BOX 85 ~ HOPEDALE, MASSACHUSETTS

(508) 634-0256

www.aselliott.com

PROFESSIONAL LAND SURVEYOR   DATE

FIELD: MRI/BMD
CALCS: EJP/SMI
DRAWN BY: SMI
FIELD EDIT: N/A
CHECKED: EJP
APPROVED:
JOB #: 181681

REVISIONS
DATE | DESCRIPTION

I CERTIFY THAT THIS PLAN IS BASED ON AN ACTUAL FIELD SURVEY PERFORMED ON THE GROUND ON NOVEMBER 28, 2018, AND THE LATEST PLANS AND DEEDS OF RECORD.

I CERTIFY THAT THE SUBJECT DWELLING SHOWN LIES IN A FLOOD ZONE "X" AS SHOWN ON MAP NUMBER 25017C0534E, HAVING AN EFFECTIVE DATE OF JUNE 4, 2010.

ZONING DESIGNATION:
CITY OF NEWTON ZONING DISTRICT
SINGLE RESIDENCE 3 (SR3)

ASSESSORS REFERENCE:
#43028 006

CITY OF NEWTON, MASSACHUSETTS INTENSITY REGULATIONS:
SINGLE RESIDENCE 3 (SR3)
(BEFORE 12/7/1953)

	REQUIRED	EXISTING
MINIMUM LOT AREA	7,000 S.F.	25,099± S.F.
MAXIMUM LOT COVERAGE	30%	13%
MINIMUM USABLE OPEN SPACE	50%	77%
MINIMUM LOT FRONTAGE	70'	130'
MINIMUM FRONT BUILDING SETBACK	25'	39.5'
MINIMUM SIDE BUILDING SETBACK	7.5'	9.9'
MINIMUM REAR BUILDING SETBACK	15'	72.9'
MAXIMUM BUILDING HEIGHT (SLOPED ROOF)	36'/2.5 STORIES	2.75 STORY/39.3'
MAXIMUM FLOOR AREA RATIO	0.36	TBD

REFERENCES

DEED REFERENCE: MIDDLESEX COUNTY REGISTRY OF DEEDS (SOUTHERN DISTRICT) BOOK 42049, PAGE 96

PLAN REFERENCES: PLAN ENTITLED "PLAN OF LAND ON WILLISTON ROAD, NEWTON, MA.", PREPARED FOR: G. WYLIE SYPHER, BY UNITED TECHNICAL DESIGN, INC., DATED JUNE 8, 1987, PLAN NUMBER 1379 OF 1987, BOOK 18594, PAGE 252

PLAN ENTITLED "PLAN OF LAND IN AUBURNDALE – MASS." PREPARED BY WILLIAM E. LEONARD, C.E., DATED JANUARY 5, 1995, PLAN NUMBER 77 OF 1955, BOOK 8397, PAGE 343

LEGEND

SBDH	STONE BOUND DRILL HOLE
IR W/CAP	IRON ROD WITH CAP
EOP	EDGE OF PAVEMENT
x107.1	SPOT ELEVATION
SMH	SEWER MANHOLE
GG	GAS GATE
CB	CATCH BASIN
UP	UTILITY POLE
OHW	OVERHEAD WIRES
FFE	FIRST FLOOR ELEVATION
LST	LANDSCAPE TIMBERS
	TREE

NOTES

1. SUBJECT TO ANY STATEMENT OF FACT AN UP-TO-DATE ABSTRACT OF TITLE WOULD DISCLOSE.

2. SUBJECT TO ALL RIGHTS, EASEMENTS, COVENANTS OR RESTRICTIONS OF RECORD.

3. UNDERGROUND UTILITIES, STRUCTURES AND FACILITIES, IF ANY, HAVE BEEN SHOWN FROM SURFACE LOCATIONS AND MEASUREMENTS OBTAINED FROM A FIELD SURVEY AND RECORD LOCATIONS, THEREFORE THEIR LOCATIONS MUST BE CONSIDERED APPROXIMATE ONLY. THERE MAY BE OTHER UTILITIES WHICH THE EXISTENCE OF ARE NOT KNOWN. SIZE, TYPE AND LOCATION OF ALL UTILITIES AND STRUCTURES MUST BE VERIFIED BY PROPER AUTHORITIES PRIOR TO ANY AND ALL CONSTRUCTION. CALL TOLL FREE, DIG SAFE CALL CENTER AT 1-888-344-7233 SEVENTY-TWO HOURS PRIOR TO ANY EXCAVATION.

4. ELEVATIONS ON THIS PLAN ARE APPROXIMATE AND REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

5. PARCEL SHOWN HEREON DOES NOT CLOSE MATHEMATICALLY BY 0.07' (SEVEN HUNDREDTHS FEET) AND 0°01'53" AS DESCRIBED IN DEED BOOK 42029, PAGE 96 AND REFERENCE PLAN NUMBER 77 OF 1955.

---

40 WILLISTON RD.
NEWTON, MA
#43028 006
AREA=25,099
0.58 ACRES

40 WILLISTON RD.
2.75 STORY VICTORIAN

GARAGE 24.3'X41.2'

N/F FERNANDA M. MUSEN #43028 0011
N/F LAURA HOLBERGER #43028 0012
N/F ERIK S. & AMANDA KRETSCHMAR #43028 0013
N/F DENISE E. JOSEPH #43028 0007
N/F NADIR MINOCHER & EVELYN MAYNARD #43028 0005
N/F CHRISTOPHER P. GREELEY & KATHERINE RIDGE GREELEY #43026 0007
N/F WALTER R. BARRY, JR TR WALTER R. BARRY, JR TRUST #43026 0006
N/F SUSAN G. KATCHER & BRADFORD E. WHITE #43026 0007

S06°32'06"E (SURVEY) 102.77'
S06°33'59"E (REF. PLAN NO. 77 OF 1955) 102.07' (DEED)
S86°39'04"E 27.05'
S79°10'12"W 48.40'
N84°52'54"W 188.24'
N12°16'35"E 15.70'
S12°16'35"W 81.94'
S79°53'04"E 160.61'
N17°45'56"E 62.32'
N17°45'56"E 80.00'
N14°30'17°45'56"E

BENCHMARK #1 SBDH FOUND & HELD ELEV=110.86
BENCHMARK #2 BLOCK PATIO AT DRIVEWAY ELEV=111.65

Williston Road (Public ~ 33' Wide)

GARAGE SLAB ELEV=110.83
BLOCK PATIO
BIT. DRIVEWAY
BRICK WALK
BIT. WALK
PORCH
WOODEN FENCE (TYP.)
CHICKEN WIRE FENCE
CONC. RET. WALL
TREE LINE
LEDGE

Telephone
(617) 796-1060
Telefax
(617) 796-1086
TDD/TTY
(617) 796-1089
www.newtonma.gov

City of Newton, Massachusetts

Department of Inspectional Services

1000 Commonwealth Avenue Newton, Massachusetts 02459
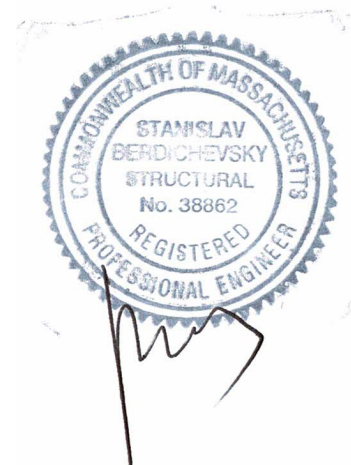
Setti D. Warren
Mayor

John Lojek
Commissioner

FLOOR AREA RATIO WORKSHEET

For Residential Single and Two Family Structures

Property address: _____40 Williston Road- Proposed Rear Lot_____

Zoning District: __SR3_____   **Lot Size:** __13949 SQ. FT._____

FAR Calculations for Regulations Effective As Of October 15, 2011	
Inputs (square feet)	
1. First story	1994.4 sqft
2. Attached garage	541.7 sqft
3. Second story	1165 sqft
4. Atria, open wells, and other vertical spaces (if not counted in first/second story)	NA
5. Certain floor area above the second story[1b]	46 sf >75 sf- NA
6. Enclosed porches[2b]	NA
7. Mass below first story[3b]	NA
8. Detached garage	NA
9. Area above detached garages with a ceiling height of 7' or greater	NA
10. Other detached accessory buildings (one detached building up to 120 sq. ft. is exempt)	NA
FAR of Proposed Structure(s)	
A. Total gross floor area (sum of rows 1-9 above)	3701.1 sqft
B. Lot size	13,949 sqft
C. FAR = A/B	.26
Allowed FAR	
Allowable FAR	.24
Bonus of .02 if eligible[4b]	NA
TOTAL Allowed FAR	3463.2 sqft

Telephone
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TDD/TTY
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www.newtonma.gov

City of Newton, Massachusetts

Department of Inspectional Services

1000 Commonwealth Avenue Newton, Massachusetts 02459

Setti D. Warren
Mayor

John Lojek
Commissioner

FLOOR AREA RATIO WORKSHEET

For Residential Single and Two Family Structures

**Property address:** 40 Williston Road, Auburndale, MA 02466   Proposed- front lot

Zoning District: SR3   **Lot Size:** 11,150 sqft

FAR Calculations for Regulations Effective As Of October 15, 2011	
Inputs (square feet)	
1. First story	1721 sqft
2. Attached garage	422 sqft
3. Second story	1160 sqft
4. Atria, open wells, and other vertical spaces (if not counted in first/second story)	NA
5. Certain floor area above the second story[1b]	1003 sqft
6. Enclosed porches[2b]	NA
7. Mass below first story[3b]	428 sqft
8. Detached garage	NA
9. Area above detached garages with a ceiling height of 7' or greater	NA
10. Other detached accessory buildings (one detached building up to 120 sq. ft. is exempt)	NA
FAR of Proposed Structure(s)	
A. Total gross floor area (sum of rows 1-9 above)	4734 sqft
B. Lot size	11,150 sqft
C. FAR = A/B	.42
Allowed FAR	
Allowable FAR	.41
Bonus of .02 if eligible[4b]	NA
TOTAL Allowed FAR	4571.5 sqft

Grade Plane Caclulation
41 Williston Rd
Updated: 10-28-2019

Segment	Elevation	Length	Grade Plane Average
A	119	24	11.37
B	119	6.7	3.17
C	118.65	27.7	13.01
D	117.2	5.3	2.47
E	117.2	5.3	2.48
F	117.8	26.1	12.27
G	118.25	15	7.07
H	118.5	41.4	19.54
I	118.5	18.8	8.89
J	119	14.7	7.03
K	121.25	27	12.92
L	119	39.1	18.53
		251.1	**118.75**
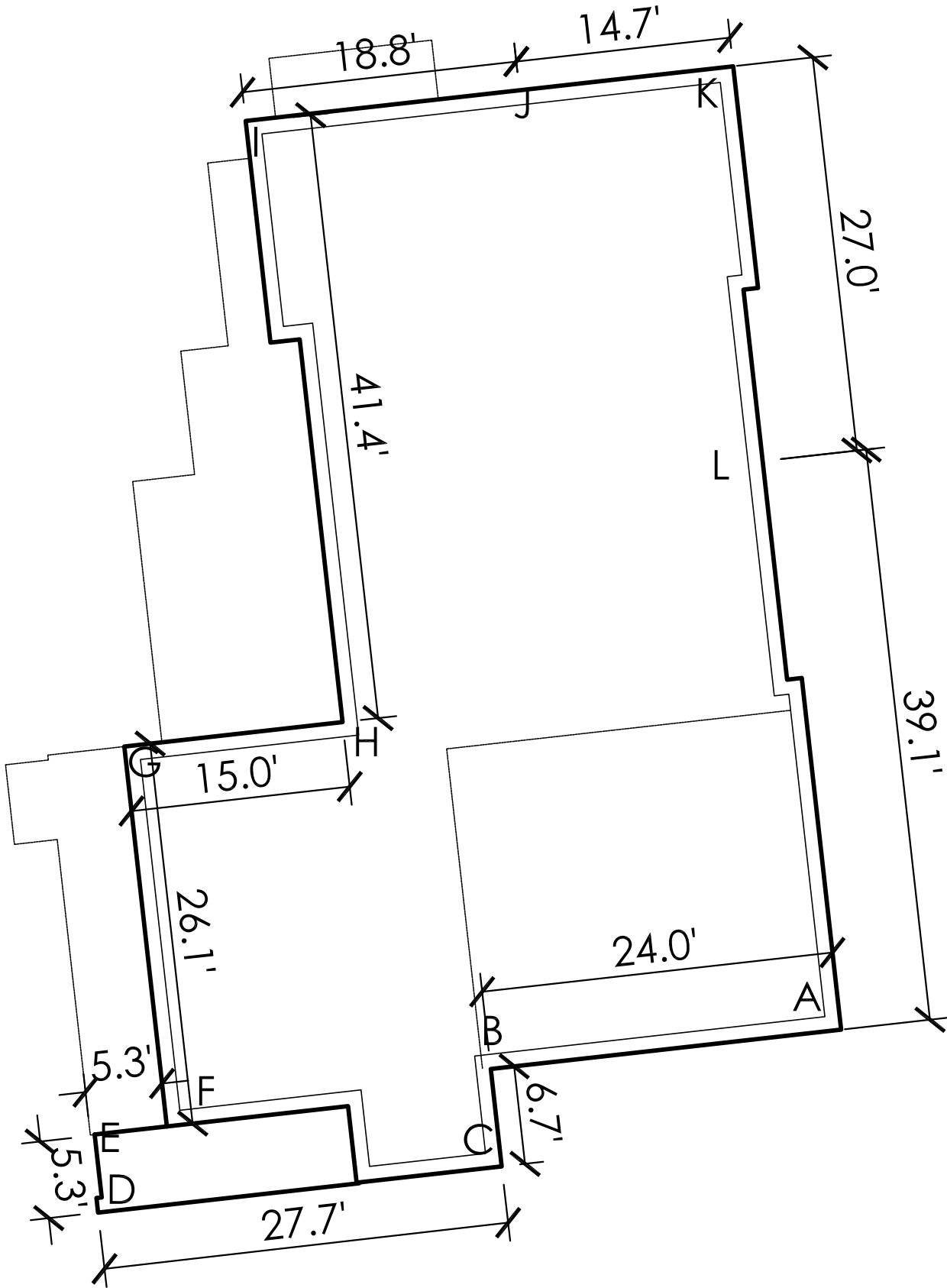
STORMWATER ANALYSIS NARRATIVE

PREPARED: NOVEMBER 20, 2019

APPLICANT:

LAUREN AND DAVID BROOKS
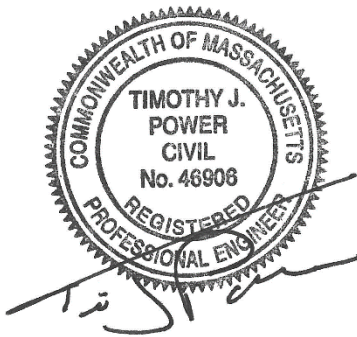
40 WILLISTON ROAD, NEWTON, MA

PROJECT:

PROPOSED SINGLE FAMILY HOUSE

40 WILLISTON ROAD, NEWTON, MA

PREPARED BY:

PVI SITE DESIGN, LLC

18 GLENDALE ROAD, NORWOOD, MA 02062

COMMONWEALTH OF MASSACHUSETTS
TIMOTHY J. POWER
CIVIL
No. 46906
REGISTERED
PROFESSIONAL ENGINEER

PVI
SITE DESIGN

PROJECT OVERVIEW

The project is a proposed subdivision of a single-family home lot into two lots and construction of a new single-family house located at 40 Williston Road, Newton, MA.   The proposed house will be constructed west of the existing house.   Construction will include a new curb cut, driveway, and utility services.   A new circular driveway will be constructed for the existing house to remain. The work results in a net increase of impervious area of greater than 400 square feet.   Per the City of Newton local ordinance, the project requires review of stormwater management.

In order to mitigate the increase in stormwater runoff, the project will utilize a set of underground infiltration chambers and leaching basins. The following is a summary of existing and proposed drainage characteristics for the property.

EXISTING CONDITIONS

The existing property is located on the east side of Williston Road and slopes up away from the road. The property is typical for a suburban lot with mostly lawn area, some plant beds, and tree cover.

There is an existing 3 story home and detached garage on the property.   All building downspouts discharge directly onto the ground. There are no evident stormwater management controls.

For the purposes of this analysis, the property line shall represent the watershed area. The area totals 25,098 square feet, and the design point is the southwest corner of the lot at Williston Road.   There is an existing catchbasin in Williston Road that collects the majority of the runoff from the property.

The drainage calculations included with this narrative provide a quantitative description of the various cover types, curve numbers, etc.As summary of existing flows and runoff volumes are noted in Table 1.

TABLE 1 – EXISTING RUNOFF

Design Point		2-YEAR	10-YEAR	100-YEAR
DP-1	Flow (cfs)	0.06	0.39	2.18
	Vol. (cf)	441	1,457	6,392

Soils

The existing soil material has been identified from the NRCS Soils Maps. A copy of the soils maps are included with this narrative.   Soils on the property are described in the table below:

TABLE 2 – SOIL TYPES

NRCS MAP UNIT	MAP UNIT NAME	HYDROLOGIC SOIL GROUP
626B	Merrimac-Urban land complex	A

In addition to the soil map, a deep hole soil observation was performed on the property in the area of the proposed stormwater recharge system. The results of the test are detailed on the proposed site plan, and determined the soils to be a loose Sand, well suited for infiltration best management practices.

PROPOSED CONDITIONS

In the proposed conditions, the overall watershed has been broken down into smaller subcatchment areas to adequately size proposed stormwater best management practices (BMPs). These areas are described below:

PW-1a

This area includes the southern portion of the new driveway, front yard areas, and a portion of the roof for the existing house. This area represents the subcatchment area for proposed Leaching Basin LB-2.

PW-1b

This area includes the northern portion of the new driveway, front yard areas, and a portion of the roof for the existing house. This area represents the subcatchment area for proposed Leaching Basin LB-3.

PW-2a

This area is a small landscaped area that discharges overland directly to Williston Road.

PW-2b

This area represents the side and rear yards of the existing house. Surface types include the remainder of the roof top area that discharges directly to the ground, patio areas, and new lawn areas. Runoff from this watershed flow overland directly to Williston Road.

PW-3a

This area consists of the roof of the proposed house and the landscaped area behind the new house. Runoff from this area is captured via a pipe network and routed into a series of underground chambers. The chambers are designed with an overflow to proposed Leaching Basin LB-1. In the event that LB-1 surcharges, it will further overflow to Williston Road.

PW-3b

This area includes the proposed driveway and some adjacent landscaped areas. Runoff from this area is collected by Leaching Bains LB-1. In larger storms, the calculations demonstrate that LB-1 may surcharge and have some discharge to the design point, Williston Road.

The following two tables compare existing runoff flows and volumes to proposed flows and volumes

TABLE 3 – RUNOFF FLOW (CFS) COMPARISON

Design Point		2-YEAR	10-YEAR	100-YEAR
DP-1	*Existing*	*0.06*	*0.39*	*2.18*
	Proposed	**0.01**	**0.18**	**2.17**

TABLE 4 – RUNOFF VOLUME (CF) COMPARISON

Design Point		2-YEAR	10-YEAR	100-YEAR
DP-1	*Existing*	*441*	*1,457*	*6,392*
	Proposed	**108**	**495**	**3,936**

METHEDOLOGY

The stormwater design was prepared in accordance with the City of Newton, Requirements for On-Site Drainage (Stormwater Management) 2018

HYDROLOGIC MODEL DESCRIPTION

The peak rate of runoff and sizing of detention BMP's was determined using techniques and data found in the following:

1. Urban Hydrology for Small Watersheds – Technical Release 55 by the United States Department of Agriculture Soils Conservation Service, June 1986. Runoff curve numbers and 24-hour precipitation values were obtained from this reference.

2. HydroCAD© Stormwater Modeling System by HydroCAD Software Solutions LLC, version 10.0. The HydroCAD program was used to generate the runoff hydrographs for the watershed areas, to determine discharge/stage/storage characteristics for the infiltration systems, to perform drainage routing and to combine the results of the runoff hydrographs. This software is based on the Soil Conservation Service (SCS) TR-20 program

DESIGN STORMS & RAINFALL INTENSITY

Rainfall data for the 2, 10, and 100- year frequency rainfall events (for a 24-hour precipitation) was taken from the City of Newton's Requirements for On-Site Drainage (Stormwater Management) guidelines.
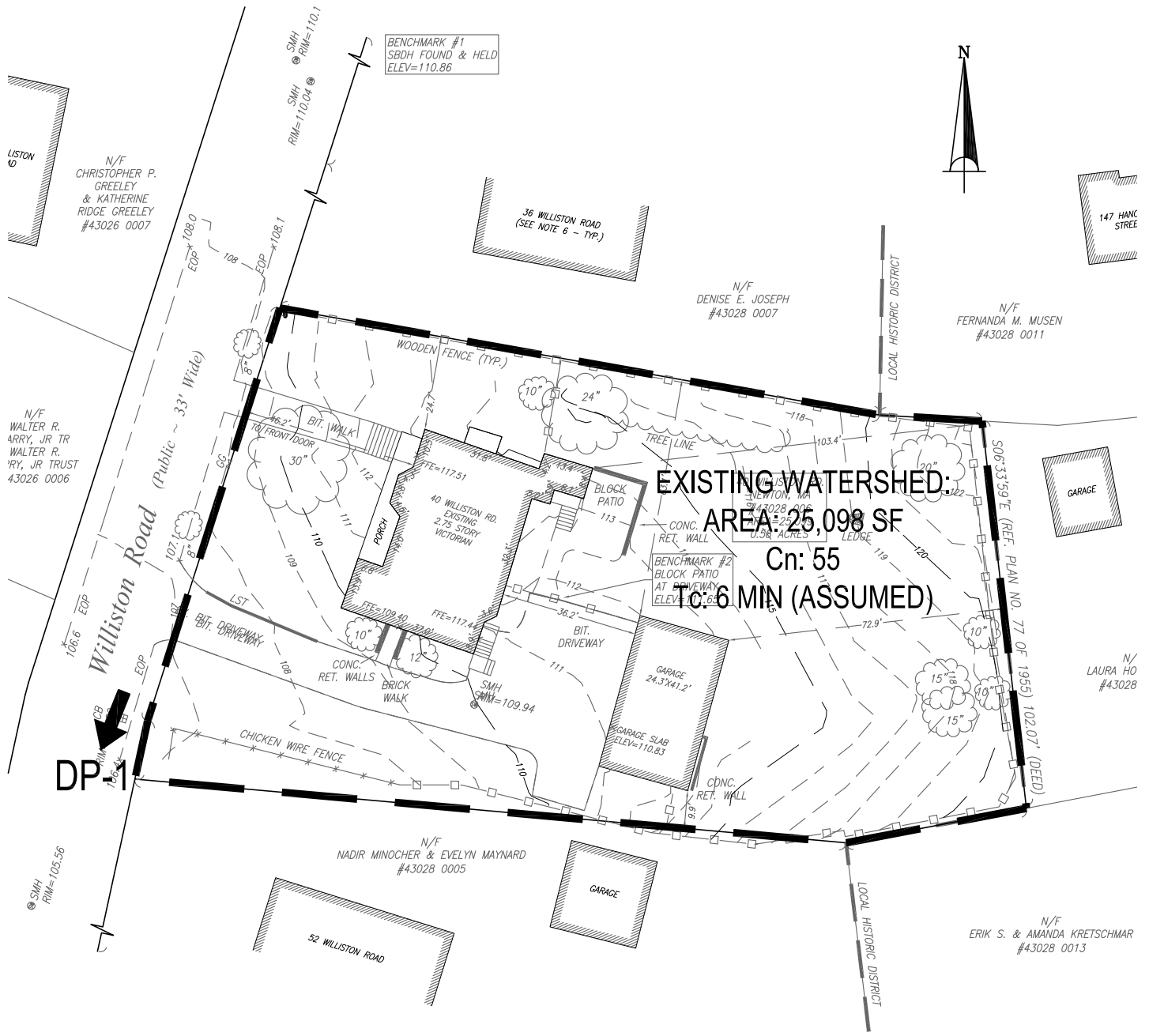
TIME OF CONCENTRATION

The 'time of concentration' (Tc) for each watershed was determined by finding the time necessary for runoff to travel from the hydraulically most distant point in the watershed to the point of concentration. The travel path was drawn based on the topography and the time was calculated using the TR-55 Method and HydroCAD. In accordance with TR-55, a minimum Tc of 0.1 hours (6.0 minutes) was used.

CURVE NUMBERS

Curve numbers were developed for each of the different use categories and hydrologic soil group types within each watershed. The curve numbers were based on the SCS TR-55 method and are included in the drainage calculations.

ENCLOSURES:

- Watershed Maps (Existing AND Proposed)
- NRCS Soils Map AND DESCRIPTION
- HydroCAD Calculations

N

BENCHMARK #1
SBDH FOUND & HELD
ELEV=110.86

SMH ⊕ RIM=110.1

SMH ⊕ RIM=110.04

N/F
CHRISTOPHER P. GREELEY
& KATHERINE
RIDGE GREELEY
#43026 0007

LISTON
D

EOP 108.0

EOP ×108.1

108

36 WILLISTON ROAD
(SEE NOTE 6 – TYP.)

147 HANC
STREE

N/F
DENISE E. JOSEPH
#43028 0007

LOCAL HISTORIC DISTRICT

N/F
FERNANDA M. MUSEN
#43028 0011

Williston Road (Public ~ 33' Wide)

WOODEN FENCE (TYP.)

24.1'

10"

24"

TREE LINE

118

103.4'

S06°33'59"E (REF. PLAN NO. 77 OF 1955) 102.07' (DEED)

GARAGE

N/F
WALTER R.
ARRY, JR TR
WALTER R.
RY, JR TRUST
43026 0006

GS

BIT. WALK

16.2'
TO FRONT DOOR

30"

112

111

110

109

108

107.4'

FFE=109.40

FFE=117.51
40 WILLISTON RD.
EXISTING
2.75 STORY
VICTORIAN

FFE=117.4

13.1'

BLOCK PATIO

113

CONC. RET. WALL

BENCHMARK #2
BLOCK PATIO
AT DRIVEWAY
ELEV

112

36.2'

EXISTING WATERSHED:
AREA: 25,098 SF
Cn: 55
Tc: 6 MIN (ASSUMED)

N/F
NEWTON, MA
#43028 0006
0.58± ACRES

LEDGE

119

120

122

120

10"

15"

18"

10"

15"

N/
LAURA HO
#43028

106.6' EOP

LST

BIT. DRIVEWAY
BIT. DRIVEWAY

107.4' EOP

EOP

CB
RIM

PORCH

CONC.
RET. WALLS

BRICK
WALK

10"

12

SMH
RIM=109.94

BIT.
DRIVEWAY

37.0'

111

GARAGE
24.3'X41.2'

GARAGE SLAB
ELEV=110.83

72.9'

CONC.
RET. WALL

6.9'

DP-1

CHICKEN WIRE FENCE

110

N/F
NADIR MINOCHER & EVELYN MAYNARD
#43028 0005

GARAGE

CONC.
RET. WALL

LOCAL HISTORIC DISTRICT

N/F
ERIK S. & AMANDA KRETSCHMAR
#43028 0013

SMH
RIM=105.56

52 WILLISTON ROAD

NOTES:
1. REFER TO THE DRAINAGE PLAN PREPARED
   AND THE DESIGN CALCULATIONS BY PVI
   SITE DESIGN DATED JULY 5 FOR DETAILS
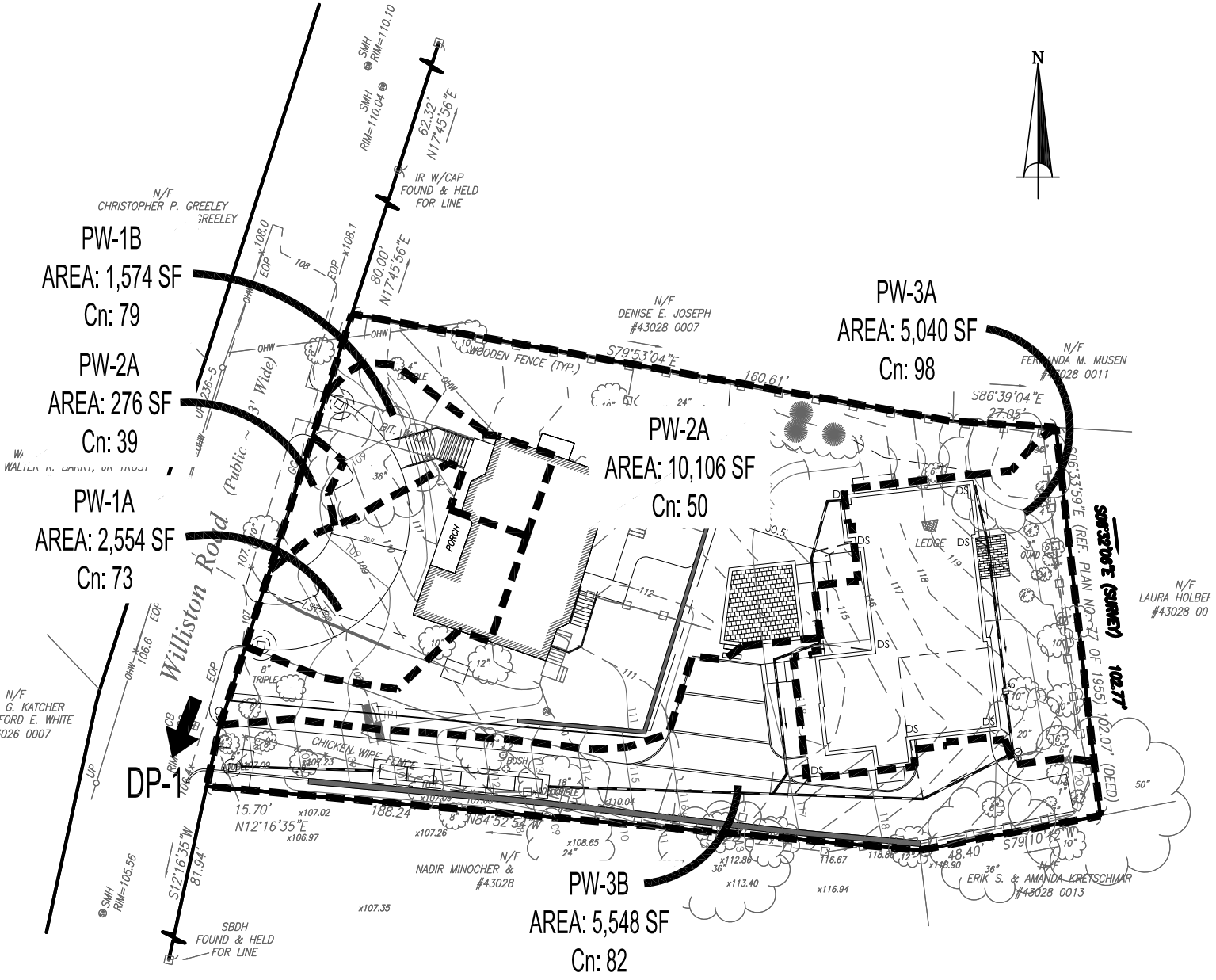   ABOUT THE PROPOSED DRAINAGE SYSTEM.

LEGEND

━━━ ━━ ━━ ━━   WATERSHED BOUNDARY

DP-1 ➡   DESIGN POINT

CIVIL ENGINEER:	TITLE:	SHEET NO.:

PVI
SITE DESIGN
PVI SITE DESIGN, LLC
18 GLENDALE ROAD
NORWOOD, MA 02062
339.206.1030

EXISTING WATERSHED PLAN

DATE:	11.20.2019
SCALE:	1"=40'
PROJECT:	015-006
FILE:	015-006-EWS.DWG
DRAWN:	TJP

PROJECT:
PROPOSED HOUSE
40 WILLISTON ST, NEWTON, MA

FIG-1

PW-1B
AREA: 1,574 SF
Cn: 79

PW-2A
AREA: 276 SF
Cn: 39

PW-1A
AREA: 2,554 SF
Cn: 73

PW-3A
AREA: 5,040 SF
Cn: 98

PW-2A
AREA: 10,106 SF
Cn: 50

PW-3B
AREA: 5,548 SF
Cn: 82

DP-1

NOTES:
1. REFER TO THE PROPOSED SITE PLAN AND THE DESIGN CALCULATIONS PREPARED BY PVI SITE DESIGN DATED NOV.20, 2019 FOR DETAILS ABOUT THE PROPOSED DRAINAGE SYSTEM.

LEGEND

━ ━ ━ ━ ━ ━   WATERSHED BOUNDARY

DP-1 ➡   DESIGN POINT

CIVIL ENGINEER:	TITLE:	SHEET NO.:
PVI SITE DESIGN PVI SITE DESIGN, LLC 18 GLENDALE ROAD NORWOOD, MA 02062 339.206.1030	PROPOSED WATERSHED PLAN	FIG-2

DATE: 11.20.2019	PROJECT:
SCALE: 1"=40'	PROPOSED HOUSE
PROJECT: 015-006	40 WILLISTON ST, NEWTON, MA
FILE: 015-006-EWS.DWG	
DRAWN: TJP	

Soil Map—Middlesex County, Massachusetts

626B

Hancock

Grove

Virginia Rd

Williston Rd

Soil Map may not be valid at this scale.

Map Scale: 1:1,040 if printed on A landscape (11" × 8.5") sheet.

Meters
0   15   30   60   90

Feet
0   50   100   200   300

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

Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

USDA

MAP LEGEND

Area of Interest (AOI)
☐ Area of Interest (AOI)

Soils
☐ Soil Map Unit Polygons
〜 Soil Map Unit Lines
■ Soil Map Unit Points

Special Point Features
๏ Blowout
⊠ Borrow Pit
✴ Clay Spot
◇ Closed Depression
✕ Gravel Pit
∴ Gravelly Spot
๏ Landfill
∢ Lava Flow
⚒ Marsh or swamp
⚒ Mine or Quarry
◉ Miscellaneous Water
○ Perennial Water
〉 Rock Outcrop
✛ Saline Spot
∴ Sandy Spot
▮ Severely Eroded Spot
◇ Sinkhole
⋏ Slide or Slip
⌀ Sodic Spot

▥ Spoil Area
๏ Stony Spot
⊗ Very Stony Spot
⬢ Wet Spot
◁ Other

▪ Special Line Features

Water Features
〜 Streams and Canals

Transportation
╫ Rails
〜 Interstate Highways
〜 US Routes
〜 Major Roads
〜 Local Roads

Background
▦ Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 19, 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: Sep 11, 2019—Oct 5, 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.

Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

11/20/2019
Page 2 of 3

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	4.1	100.0%
Totals for Area of Interest		**4.1**	**100.0%**

Middlesex County, Massachusetts

626B—Merrimac-Urban land complex, 0 to 8 percent slopes

Map Unit Setting
National map unit symbol: 2tyr9
Elevation: 0 to 820 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition
Merrimac and similar soils: 45 percent
Urban land: 40 percent
Minor components: 15 percent
*Estimates are based on observations, descriptions, and transects of
    the mapunit.*

Description of Merrimac

Setting
Landform: Moraines, outwash plains, kames, eskers, outwash
    terraces
Landform position (two-dimensional): Backslope, footslope,
    summit, shoulder
Landform position (three-dimensional): Side slope, crest, riser,
    tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite,
    schist, and gneiss over sandy and gravelly glaciofluvial
    deposits derived from granite, schist, and gneiss

Typical profile
Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities
Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat):
    Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline (0.0 to 1.4 mmhos/cm)

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Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Hydric soil rating: No

Description of Urban Land

Typical profile

M - 0 to 10 inches: cemented material

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very
    low (0.00 to 0.00 in/hr)
Available water storage in profile: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: Unranked

Minor Components

Windsor

Percent of map unit: 5 percent
Landform: Deltas, outwash plains, dunes, outwash terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Sudbury

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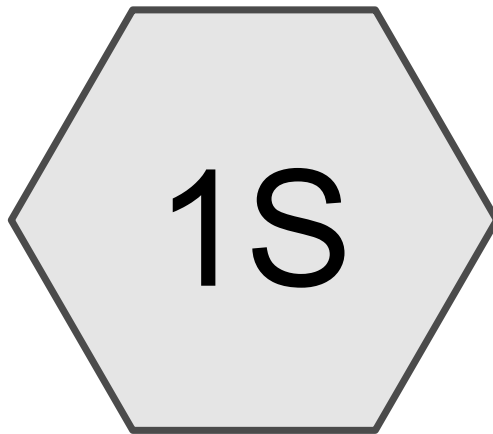*Across-slope shape:* Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Deltas, outwash plains, kames, eskers
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, crest, head
    slope, side slope, rise
Down-slope shape: Convex
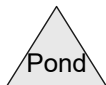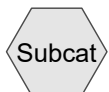*Across-slope shape:* Convex, linear

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Hydric soil rating: No

Data Source Information

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 19, Sep 12, 2019

1S

Existing Watershed

Summary for Subcatchment 1S: Existing Watershed

Runoff = 0.06 cfs @ 12.33 hrs, Volume= 441 cf, Depth> 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
3,102	98	Roofs, HSG A
3,552	98	Paved parking, HSG A
18,444	39	>75% Grass cover, Good, HSG A
25,098	55	Weighted Average
18,444		73.49% Pervious Area
6,654		26.51% Impervious Area

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

Summary for Subcatchment 1S: Existing Watershed

Runoff   =   0.39 cfs @ 12.11 hrs, Volume=   1,457 cf, Depth> 0.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
3,102	98	Roofs, HSG A
3,552	98	Paved parking, HSG A
18,444	39	>75% Grass cover, Good, HSG A
25,098	55	Weighted Average
18,444		73.49% Pervious Area
6,654		26.51% Impervious Area

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

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Williston Road, Newton
Type III 24-hr 100-Year Rainfall=8.78"
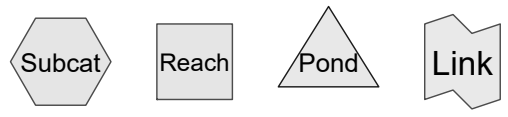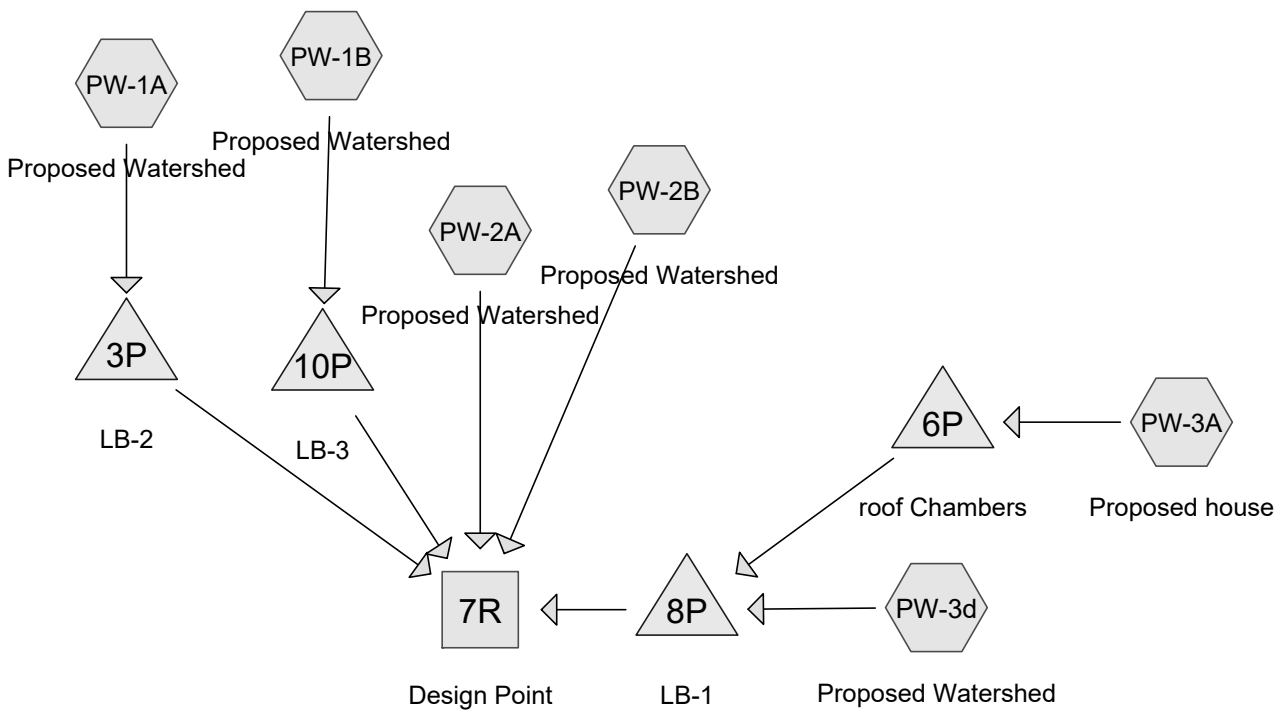Printed 11/20/2019
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Summary for Subcatchment 1S: Existing Watershed

Runoff   =   2.18 cfs @ 12.09 hrs, Volume=   6,392 cf, Depth> 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=8.78"

Area (sf)	CN	Description
3,102	98	Roofs, HSG A
3,552	98	Paved parking, HSG A
18,444	39	>75% Grass cover, Good, HSG A
25,098	55	Weighted Average
18,444		73.49% Pervious Area
6,654		26.51% Impervious Area

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

PW-1A

PW-1B

Proposed Watershed

Proposed Watershed

PW-2B

PW-2A

Proposed Watershed

Proposed Watershed

3P

10P

6P

PW-3A

LB-2

LB-3

roof Chambers

Proposed house

7R

8P

PW-3d

Design Point

LB-1

Proposed Watershed

Subcat   Reach   Pond   Link

Summary for Subcatchment PW-1A: Proposed Watershed

Runoff   =   0.03 cfs @   12.10 hrs, Volume=   121 cf, Depth> 0.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.50"

Area (sf)	CN	Description
628	98	Roofs, HSG A
828	98	Paved parking, HSG A
1,098	39	>75% Grass cover, Good, HSG A
2,554	73	Weighted Average
1,098		42.99% Pervious Area
1,456		57.01% Impervious Area

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

Summary for Subcatchment PW-1B: Proposed Watershed

Runoff   =   0.03 cfs @   12.10 hrs, Volume=   110 cf, Depth> 0.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.50"

Area (sf)	CN	Description
466	98	Roofs, HSG A
596	98	Paved parking, HSG A
512	39	>75% Grass cover, Good, HSG A
1,574	79	Weighted Average
512		32.53% Pervious Area
1,062		67.47% Impervious Area

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

Summary for Subcatchment PW-2A: Proposed Watershed

Runoff   =   0.00 cfs @   0.00 hrs, Volume=   0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.50"

Area (sf)	CN	Description
276	39	>75% Grass cover, Good, HSG A
276		100.00% Pervious Area

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

Summary for Subcatchment PW-2B: Proposed Watershed

Runoff   =   0.00 cfs @ 16.70 hrs, Volume=   20 cf, Depth> 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.50"

Area (sf)	CN	Description
1,007	98	Roofs, HSG A
838	98	Paved parking, HSG A
8,261	39	>75% Grass cover, Good, HSG A
10,106	50	Weighted Average
8,261		81.74% Pervious Area
1,845		18.26% Impervious Area

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

Summary for Subcatchment PW-3A: Proposed house

Runoff   =   0.09 cfs @ 12.10 hrs, Volume=   291 cf, Depth> 0.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.50"

Area (sf)	CN	Description
3,201	98	Roofs, HSG A
1,839	39	>75% Grass cover, Good, HSG A
5,040	76	Weighted Average
1,839		36.49% Pervious Area
3,201		63.51% Impervious Area

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

Summary for Subcatchment PW-3d: Proposed Watershed

Runoff = 0.15 cfs @ 12.09 hrs, Volume= 461 cf, Depth> 1.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.50"

Area (sf)	CN	Description
4,016	98	Paved parking, HSG A
1,532	39	>75% Grass cover, Good, HSG A
5,548	82	Weighted Average
1,532		27.61% Pervious Area
4,016		72.39% Impervious Area

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

Summary for Reach 7R: Design Point

Inflow Area = 25,098 sf, 46.14% Impervious, Inflow Depth > 0.01" for 1-Year event
Inflow = 0.00 cfs @ 16.70 hrs, Volume= 20 cf
Outflow = 0.00 cfs @ 16.70 hrs, Volume= 20 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond 3P: LB-2

Inflow Area = 2,554 sf, 57.01% Impervious, Inflow Depth > 0.57" for 1-Year event
Inflow = 0.03 cfs @ 12.10 hrs, Volume= 121 cf
Outflow = 0.01 cfs @ 12.44 hrs, Volume= 120 cf, Atten= 59%, Lag= 20.1 min
Discarded = 0.01 cfs @ 12.44 hrs, Volume= 120 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 101.51' @ 12.44 hrs Surf.Area= 64 sf Storage= 17 cf

Plug-Flow detention time= 9.0 min calculated for 120 cf (100% of inflow)
Center-of-Mass det. time= 8.0 min (890.7 - 882.6)

Volume	Invert	Avail.Storage	Storage Description
#1	102.25'	141 cf	**6.00'D x 5.00'H Vertical Cone/Cylinder** Inside #2
#2	101.25'	243 cf	**8.00'W x 8.00'L x 6.00'H Prismatoid**
			384 cf Overall - 141 cf Embedded = 243 cf
		384 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.25'	**8.270 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 99.00'
#2	Primary	105.75'	**24.0" Horiz. Orifice/Grate** C= 0.600

Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 12.44 hrs HW=101.51' (Free Discharge)
└─**1=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=101.25' (Free Discharge)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 6P: roof Chambers

Inflow Area = 5,040 sf, 63.51% Impervious, Inflow Depth > 0.69" for 1-Year event
Inflow = 0.09 cfs @ 12.10 hrs, Volume= 291 cf
Outflow = 0.06 cfs @ 12.20 hrs, Volume= 291 cf, Atten= 33%, Lag= 6.2 min
Discarded = 0.06 cfs @ 12.20 hrs, Volume= 291 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 103.66' @ 12.20 hrs Surf.Area= 290 sf Storage= 14 cf

Plug-Flow detention time= 1.4 min calculated for 291 cf (100% of inflow)
Center-of-Mass det. time= 1.3 min (871.8 - 870.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	103.50'	243 cf	**6.25'W x 46.34'L x 3.75'H Field A**
			1,086 cf Overall - 276 cf Embedded = 810 cf x 30.0% Voids
#2A	104.25'	276 cf	**ADS_StormTech SC-740 +Cap** x 6 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		519 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.50'	**8.270 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 98.75'
#2	Primary	106.25'	**6.0" Round Culvert**
			L= 35.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 106.25' / 104.00' S= 0.0643 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Primary	107.00'	**24.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads

Discarded OutFlow Max=0.06 cfs @ 12.20 hrs HW=103.66' (Free Discharge)
└─**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.50' TW=106.00' (Fixed TW Elev= 106.00')
├─**2=Culvert** (Controls 0.00 cfs)
└─**3=Orifice/Grate** (Controls 0.00 cfs)

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Type III 24-hr 1-Year Rainfall=2.50"
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Summary for Pond 8P: LB-1

Inflow Area =   10,588 sf, 68.16% Impervious, Inflow Depth > 0.52"   for 1-Year event
Inflow   =   0.15 cfs @ 12.09 hrs, Volume=   461 cf
Outflow   =   0.06 cfs @ 12.37 hrs, Volume=   461 cf, Atten= 60%, Lag= 16.8 min
Discarded =   0.06 cfs @ 12.37 hrs, Volume=   461 cf
Primary   =   0.00 cfs @   0.00 hrs, Volume=   0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 102.04' @ 12.37 hrs Surf.Area= 100 sf Storage= 82 cf

Plug-Flow detention time= 9.8 min calculated for 461 cf (100% of inflow)
Center-of-Mass det. time= 9.6 min (857.7 - 848.1)

Volume	Invert	Avail.Storage	Storage Description
#1	101.00'	141 cf	**6.00'D x 5.00'H Vertical Cone/Cylinder** Inside #2
#2	100.00'	138 cf	**10.00'W x 10.00'L x 6.00'H Prismatoid**
			600 cf Overall - 141 cf Embedded = 459 cf x 30.0% Voids
		279 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.00'	**8.270 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 99.00'
#2	Primary	105.75'	**24.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads

Discarded OutFlow Max=0.06 cfs @ 12.37 hrs HW=102.04' (Free Discharge)
└─**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=100.00' (Free Discharge)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 10P: LB-3

Inflow Area =   1,574 sf, 67.47% Impervious, Inflow Depth > 0.84"   for 1-Year event
Inflow   =   0.03 cfs @ 12.10 hrs, Volume=   110 cf
Outflow   =   0.01 cfs @ 12.40 hrs, Volume=   110 cf, Atten= 61%, Lag= 18.4 min
Discarded =   0.01 cfs @ 12.40 hrs, Volume=   110 cf
Primary   =   0.00 cfs @   0.00 hrs, Volume=   0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 102.77' @ 12.40 hrs Surf.Area= 64 sf Storage= 17 cf

Plug-Flow detention time= 9.4 min calculated for 109 cf (100% of inflow)
Center-of-Mass det. time= 8.5 min (867.7 - 859.2)

Volume	Invert	Avail.Storage	Storage Description
#1	103.50'	141 cf	**6.00'D x 5.00'H Vertical Cone/Cylinder** Inside #2
#2	102.50'	243 cf	**8.00'W x 8.00'L x 6.00'H Prismatoid**
			384 cf Overall - 141 cf Embedded = 243 cf
		384 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	102.50'	**8.270 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 99.00'
#2	Primary	105.75'	**24.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 12.40 hrs HW=102.77' (Free Discharge)
└─**1=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=102.50' (Free Discharge)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Subcatchment PW-1A: Proposed Watershed

Runoff   =   0.06 cfs @ 12.10 hrs, Volume=   209 cf, Depth> 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
628	98	Roofs, HSG A
828	98	Paved parking, HSG A
1,098	39	>75% Grass cover, Good, HSG A
2,554	73	Weighted Average
1,098		42.99% Pervious Area
1,456		57.01% Impervious Area

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

Summary for Subcatchment PW-1B: Proposed Watershed

Runoff   =   0.06 cfs @ 12.09 hrs, Volume=   175 cf, Depth> 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
466	98	Roofs, HSG A
596	98	Paved parking, HSG A
512	39	>75% Grass cover, Good, HSG A
1,574	79	Weighted Average
512		32.53% Pervious Area
1,062		67.47% Impervious Area

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

Summary for Subcatchment PW-2A: Proposed Watershed

Runoff   =   0.00 cfs @ 24.00 hrs, Volume=   0 cf, Depth> 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

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Type III 24-hr 2-Year Rainfall=3.20"
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Area (sf)	CN	Description
276	39	>75% Grass cover, Good, HSG A
276		100.00% Pervious Area

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

Summary for Subcatchment PW-2B: Proposed Watershed

Runoff   =   0.01 cfs @   12.47 hrs, Volume=   108 cf, Depth> 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
1,007	98	Roofs, HSG A
838	98	Paved parking, HSG A
8,261	39	>75% Grass cover, Good, HSG A
10,106	50	Weighted Average
8,261		81.74% Pervious Area
1,845		18.26% Impervious Area

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

Summary for Subcatchment PW-3A: Proposed house

Runoff   =   0.15 cfs @   12.09 hrs, Volume=   483 cf, Depth> 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
3,201	98	Roofs, HSG A
1,839	39	>75% Grass cover, Good, HSG A
5,040	76	Weighted Average
1,839		36.49% Pervious Area
3,201		63.51% Impervious Area

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

Williston Road, Newton

Proposed Conditions
Type III 24-hr 2-Year Rainfall=3.20"
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Summary for Subcatchment PW-3d: Proposed Watershed

Runoff   =   0.23 cfs @ 12.09 hrs, Volume=   710 cf, Depth> 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.20"

Area (sf)	CN	Description
4,016	98	Paved parking, HSG A
1,532	39	>75% Grass cover, Good, HSG A
5,548	82	Weighted Average
1,532		27.61% Pervious Area
4,016		72.39% Impervious Area

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

Summary for Reach 7R: Design Point

Inflow Area =   25,098 sf, 46.14% Impervious, Inflow Depth > 0.05"   for 2-Year event
Inflow   =   0.01 cfs @ 12.47 hrs, Volume=   108 cf
Outflow   =   0.01 cfs @ 12.47 hrs, Volume=   108 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond 3P: LB-2

Inflow Area =   2,554 sf, 57.01% Impervious, Inflow Depth > 0.98"   for 2-Year event
Inflow   =   0.06 cfs @ 12.10 hrs, Volume=   209 cf
Outflow   =   0.02 cfs @ 12.53 hrs, Volume=   209 cf, Atten= 74%, Lag= 25.8 min
Discarded   =   0.02 cfs @ 12.53 hrs, Volume=   209 cf
Primary   =   0.00 cfs @   0.00 hrs, Volume=   0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 102.00' @ 12.53 hrs   Surf.Area= 64 sf   Storage= 48 cf

Plug-Flow detention time= 20.9 min calculated for 208 cf (100% of inflow)
Center-of-Mass det. time= 20.0 min (884.5 - 864.5)

Volume	Invert	Avail.Storage	Storage Description
#1	102.25'	141 cf	**6.00'D x 5.00'H Vertical Cone/Cylinder** Inside #2
#2	101.25'	243 cf	**8.00'W x 8.00'L x 6.00'H Prismatoid**
			384 cf Overall - 141 cf Embedded = 243 cf
		384 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.25'	**8.270 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 99.00'
#2	Primary	105.75'	**24.0" Horiz. Orifice/Grate** C= 0.600

Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.53 hrs HW=102.00' (Free Discharge)
└─**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=101.25' (Free Discharge)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 6P: roof Chambers

Inflow Area =   5,040 sf, 63.51% Impervious, Inflow Depth > 1.15" for 2-Year event
Inflow   =   0.15 cfs @ 12.09 hrs, Volume=   483 cf
Outflow   =   0.06 cfs @ 12.36 hrs, Volume=   483 cf, Atten= 58%, Lag= 16.2 min
Discarded =   0.06 cfs @ 12.36 hrs, Volume=   483 cf
Primary   =   0.00 cfs @ 0.00 hrs, Volume=   0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 104.19' @ 12.36 hrs Surf.Area= 290 sf Storage= 60 cf

Plug-Flow detention time= 5.0 min calculated for 483 cf (100% of inflow)
Center-of-Mass det. time= 4.8 min (859.5 - 854.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	103.50'	243 cf	**6.25'W x 46.34'L x 3.75'H Field A**
			1,086 cf Overall - 276 cf Embedded = 810 cf x 30.0% Voids
#2A	104.25'	276 cf	**ADS_StormTech SC-740 +Cap** x 6 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		519 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.50'	**8.270 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 98.75'
#2	Primary	106.25'	**6.0" Round Culvert**
			L= 35.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 106.25' / 104.00' S= 0.0643 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Primary	107.00'	**24.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads

Discarded OutFlow Max=0.06 cfs @ 12.36 hrs HW=104.19' (Free Discharge)
└─**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.50' TW=106.00' (Fixed TW Elev= 106.00')
├─**2=Culvert** (Controls 0.00 cfs)
└─**3=Orifice/Grate** (Controls 0.00 cfs)

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Summary for Pond 8P: LB-1

Inflow Area =   10,588 sf, 68.16% Impervious, Inflow Depth > 0.80"   for 2-Year event
Inflow   =   0.23 cfs @ 12.09 hrs, Volume=   710 cf
Outflow   =   0.08 cfs @ 12.38 hrs, Volume=   710 cf, Atten= 63%, Lag= 17.6 min
Discarded =   0.08 cfs @ 12.38 hrs, Volume=   710 cf
Primary   =   0.00 cfs @   0.00 hrs, Volume=   0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 103.39' @ 12.38 hrs   Surf.Area= 100 sf   Storage= 149 cf

Plug-Flow detention time= 13.9 min calculated for 710 cf (100% of inflow)
Center-of-Mass det. time= 13.7 min (849.2 - 835.5)

Volume	Invert	Avail.Storage	Storage Description
#1	101.00'	141 cf	**6.00'D x 5.00'H Vertical Cone/Cylinder** Inside #2
#2	100.00'	138 cf	**10.00'W x 10.00'L x 6.00'H Prismatoid** 600 cf Overall - 141 cf Embedded = 459 cf x 30.0% Voids
		279 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.00'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 99.00'
#2	Primary	105.75'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.08 cfs @ 12.38 hrs HW=103.39'   (Free Discharge)
└─**1=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=100.00'   (Free Discharge)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 10P: LB-3

Inflow Area =   1,574 sf, 67.47% Impervious, Inflow Depth > 1.33"   for 2-Year event
Inflow   =   0.06 cfs @ 12.09 hrs, Volume=   175 cf
Outflow   =   0.01 cfs @ 12.50 hrs, Volume=   175 cf, Atten= 74%, Lag= 24.5 min
Discarded =   0.01 cfs @ 12.50 hrs, Volume=   175 cf
Primary   =   0.00 cfs @   0.00 hrs, Volume=   0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 103.13' @ 12.50 hrs   Surf.Area= 64 sf   Storage= 40 cf

Plug-Flow detention time= 18.9 min calculated for 175 cf (100% of inflow)
Center-of-Mass det. time= 18.1 min (863.3 - 845.2)

Volume	Invert	Avail.Storage	Storage Description
#1	103.50'	141 cf	**6.00'D x 5.00'H Vertical Cone/Cylinder** Inside #2
#2	102.50'	243 cf	**8.00'W x 8.00'L x 6.00'H Prismatoid**
			384 cf Overall - 141 cf Embedded = 243 cf
		384 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	102.50'	**8.270 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 99.00'
#2	Primary	105.75'	**24.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 12.50 hrs HW=103.13' (Free Discharge)
└─**1=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=102.50' (Free Discharge)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

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Summary for Subcatchment PW-1A: Proposed Watershed

Runoff   =   0.13 cfs @ 12.09 hrs, Volume=   419 cf, Depth> 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
628	98	Roofs, HSG A
828	98	Paved parking, HSG A
1,098	39	>75% Grass cover, Good, HSG A
2,554	73	Weighted Average
1,098		42.99% Pervious Area
1,456		57.01% Impervious Area

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

Summary for Subcatchment PW-1B: Proposed Watershed

Runoff   =   0.10 cfs @ 12.09 hrs, Volume=   322 cf, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
466	98	Roofs, HSG A
596	98	Paved parking, HSG A
512	39	>75% Grass cover, Good, HSG A
1,574	79	Weighted Average
512		32.53% Pervious Area
1,062		67.47% Impervious Area

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

Summary for Subcatchment PW-2A: Proposed Watershed

Runoff   =   0.00 cfs @ 14.58 hrs, Volume=   3 cf, Depth> 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Proposed Conditions

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Area (sf)	CN	Description
276	39	>75% Grass cover, Good, HSG A
276		100.00% Pervious Area

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

Summary for Subcatchment PW-2B: Proposed Watershed

Runoff = 0.08 cfs @ 12.14 hrs, Volume= 451 cf, Depth> 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
1,007	98	Roofs, HSG A
838	98	Paved parking, HSG A
8,261	39	>75% Grass cover, Good, HSG A
10,106	50	Weighted Average
8,261		81.74% Pervious Area
1,845		18.26% Impervious Area

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

Summary for Subcatchment PW-3A: Proposed house

Runoff = 0.30 cfs @ 12.09 hrs, Volume= 927 cf, Depth> 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
3,201	98	Roofs, HSG A
1,839	39	>75% Grass cover, Good, HSG A
5,040	76	Weighted Average
1,839		36.49% Pervious Area
3,201		63.51% Impervious Area

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

Summary for Subcatchment PW-3d: Proposed Watershed

Runoff   =   0.41 cfs @ 12.09 hrs, Volume=   1,258 cf, Depth> 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
4,016	98	Paved parking, HSG A
1,532	39	>75% Grass cover, Good, HSG A
5,548	82	Weighted Average
1,532		27.61% Pervious Area
4,016		72.39% Impervious Area

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

Summary for Reach 7R: Design Point

Inflow Area =   25,098 sf, 46.14% Impervious, Inflow Depth > 0.24"   for 10-Year event
Inflow   =   0.18 cfs @ 12.20 hrs, Volume=   495 cf
Outflow   =   0.18 cfs @ 12.20 hrs, Volume=   495 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond 3P: LB-2

Inflow Area =   2,554 sf, 57.01% Impervious, Inflow Depth > 1.97"   for 10-Year event
Inflow   =   0.13 cfs @ 12.09 hrs, Volume=   419 cf
Outflow   =   0.02 cfs @ 12.59 hrs, Volume=   418 cf, Atten= 82%, Lag= 29.7 min
Discarded   =   0.02 cfs @ 12.59 hrs, Volume=   418 cf
Primary   =   0.00 cfs @   0.00 hrs, Volume=   0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 103.33' @ 12.59 hrs   Surf.Area= 64 sf   Storage= 133 cf

Plug-Flow detention time= 50.2 min calculated for 418 cf (100% of inflow)
Center-of-Mass det. time= 49.4 min (892.9 - 843.5)

Volume	Invert	Avail.Storage	Storage Description
#1	102.25'	141 cf	**6.00'D x 5.00'H Vertical Cone/Cylinder** Inside #2
#2	101.25'	243 cf	**8.00'W x 8.00'L x 6.00'H Prismatoid**
			384 cf Overall - 141 cf Embedded = 243 cf
		384 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.25'	**8.270 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 99.00'
#2	Primary	105.75'	**24.0" Horiz. Orifice/Grate** C= 0.600

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Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.59 hrs HW=103.33' (Free Discharge)
⌐**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=101.25' (Free Discharge)
⌐**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 6P: roof Chambers

Inflow Area = 5,040 sf, 63.51% Impervious, Inflow Depth > 2.21" for 10-Year event
Inflow = 0.30 cfs @ 12.09 hrs, Volume= 927 cf
Outflow = 0.07 cfs @ 12.50 hrs, Volume= 927 cf, Atten= 75%, Lag= 24.8 min
Discarded = 0.07 cfs @ 12.50 hrs, Volume= 927 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 105.03' @ 12.50 hrs Surf.Area= 290 sf Storage= 217 cf

Plug-Flow detention time= 18.1 min calculated for 926 cf (100% of inflow)
Center-of-Mass det. time= 17.9 min (853.4 - 835.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	103.50'	243 cf	**6.25'W x 46.34'L x 3.75'H Field A**
			1,086 cf Overall - 276 cf Embedded = 810 cf x 30.0% Voids
#2A	104.25'	276 cf	**ADS_StormTech SC-740 +Cap** x 6 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		519 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.50'	**8.270 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 98.75'
#2	Primary	106.25'	**6.0" Round Culvert**
			L= 35.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 106.25' / 104.00' S= 0.0643 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Primary	107.00'	**24.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads

Discarded OutFlow Max=0.07 cfs @ 12.50 hrs HW=105.03' (Free Discharge)
⌐**1=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.50' TW=106.00' (Fixed TW Elev= 106.00')
⌐**2=Culvert** (Controls 0.00 cfs)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 8P: LB-1

Inflow Area =		10,588 sf, 68.16% Impervious, Inflow Depth > 1.43" for 10-Year event
Inflow	=	0.41 cfs @ 12.09 hrs, Volume= 1,258 cf
Outflow	=	0.24 cfs @ 12.20 hrs, Volume= 1,258 cf, Atten= 40%, Lag= 6.9 min
Discarded	=	0.13 cfs @ 12.20 hrs, Volume= 1,216 cf
Primary	=	0.11 cfs @ 12.20 hrs, Volume= 41 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 105.78' @ 12.20 hrs Surf.Area= 100 sf Storage= 268 cf

Plug-Flow detention time= 17.7 min calculated for 1,257 cf (100% of inflow)
Center-of-Mass det. time= 17.6 min (836.7 - 819.1)

Volume	Invert	Avail.Storage	Storage Description
#1	101.00'	141 cf	**6.00'D x 5.00'H Vertical Cone/Cylinder** Inside #2
#2	100.00'	138 cf	**10.00'W x 10.00'L x 6.00'H Prismatoid**
			600 cf Overall - 141 cf Embedded = 459 cf x 30.0% Voids
		279 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.00'	**8.270 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 99.00'
#2	Primary	105.75'	**24.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads

Discarded OutFlow Max=0.13 cfs @ 12.20 hrs HW=105.78' (Free Discharge)
└─**1=Exfiltration** (Controls 0.13 cfs)

Primary OutFlow Max=0.08 cfs @ 12.20 hrs HW=105.77' (Free Discharge)
└─**2=Orifice/Grate** (Weir Controls 0.08 cfs @ 0.52 fps)

Summary for Pond 10P: LB-3

Inflow Area =		1,574 sf, 67.47% Impervious, Inflow Depth > 2.46" for 10-Year event
Inflow	=	0.10 cfs @ 12.09 hrs, Volume= 322 cf
Outflow	=	0.02 cfs @ 12.57 hrs, Volume= 322 cf, Atten= 83%, Lag= 29.1 min
Discarded	=	0.02 cfs @ 12.57 hrs, Volume= 322 cf
Primary	=	0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 104.08' @ 12.57 hrs Surf.Area= 64 sf Storage= 101 cf

Plug-Flow detention time= 45.0 min calculated for 322 cf (100% of inflow)
Center-of-Mass det. time= 44.3 min (871.8 - 827.5)

Volume	Invert	Avail.Storage	Storage Description
#1	103.50'	141 cf	**6.00'D x 5.00'H Vertical Cone/Cylinder** Inside #2
#2	102.50'	243 cf	**8.00'W x 8.00'L x 6.00'H Prismatoid**
			384 cf Overall - 141 cf Embedded = 243 cf
		384 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	102.50'	**8.270 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 99.00'
#2	Primary	105.75'	**24.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.57 hrs HW=104.08'   (Free Discharge)
└─**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=102.50'   (Free Discharge)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

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Summary for Subcatchment PW-1A: Proposed Watershed

Runoff = 0.38 cfs @ 12.09 hrs, Volume= 1,171 cf, Depth> 5.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.78"

Area (sf)	CN	Description
628	98	Roofs, HSG A
828	98	Paved parking, HSG A
1,098	39	>75% Grass cover, Good, HSG A
2,554	73	Weighted Average
1,098		42.99% Pervious Area
1,456		57.01% Impervious Area

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

Summary for Subcatchment PW-1B: Proposed Watershed

Runoff = 0.26 cfs @ 12.09 hrs, Volume= 817 cf, Depth> 6.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.78"

Area (sf)	CN	Description
466	98	Roofs, HSG A
596	98	Paved parking, HSG A
512	39	>75% Grass cover, Good, HSG A
1,574	79	Weighted Average
512		32.53% Pervious Area
1,062		67.47% Impervious Area

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

Summary for Subcatchment PW-2A: Proposed Watershed

Runoff = 0.01 cfs @ 12.11 hrs, Volume= 34 cf, Depth> 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.78"

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Area (sf)	CN	Description
276	39	>75% Grass cover, Good, HSG A
276		100.00% Pervious Area

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

Summary for Subcatchment PW-2B: Proposed Watershed

Runoff   =   0.70 cfs @ 12.10 hrs, Volume=   2,304 cf, Depth> 2.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.78"

Area (sf)	CN	Description
1,007	98	Roofs, HSG A
838	98	Paved parking, HSG A
8,261	39	>75% Grass cover, Good, HSG A
10,106	50	Weighted Average
8,261		81.74% Pervious Area
1,845		18.26% Impervious Area

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

Summary for Subcatchment PW-3A: Proposed house

Runoff   =   0.79 cfs @ 12.09 hrs, Volume=   2,464 cf, Depth> 5.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.78"

Area (sf)	CN	Description
3,201	98	Roofs, HSG A
1,839	39	>75% Grass cover, Good, HSG A
5,040	76	Weighted Average
1,839		36.49% Pervious Area
3,201		63.51% Impervious Area

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

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Summary for Subcatchment PW-3d: Proposed Watershed

Runoff   =   0.96 cfs @ 12.09 hrs, Volume=   3,050 cf, Depth> 6.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.78"

Area (sf)	CN	Description
4,016	98	Paved parking, HSG A
1,532	39	>75% Grass cover, Good, HSG A
5,548	82	Weighted Average
1,532		27.61% Pervious Area
4,016		72.39% Impervious Area

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

Summary for Reach 7R: Design Point

Inflow Area =   25,098 sf, 46.14% Impervious, Inflow Depth > 1.88"   for 100-Year event
Inflow   =   2.17 cfs @   12.15 hrs, Volume=   3,936 cf
Outflow   =   2.17 cfs @   12.15 hrs, Volume=   3,936 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond 3P: LB-2

Inflow Area =   2,554 sf, 57.01% Impervious, Inflow Depth > 5.50"   for 100-Year event
Inflow   =   0.38 cfs @   12.09 hrs, Volume=   1,171 cf
Outflow   =   0.32 cfs @   12.14 hrs, Volume=   1,171 cf, Atten= 15%, Lag= 3.3 min
Discarded =   0.04 cfs @   12.14 hrs, Volume=   967 cf
Primary   =   0.28 cfs @   12.14 hrs, Volume=   204 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 105.81' @ 12.14 hrs   Surf.Area= 64 sf   Storage= 292 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 69.1 min (883.0 - 813.9)

Volume	Invert	Avail.Storage	Storage Description
#1	102.25'	141 cf	**6.00'D x 5.00'H Vertical Cone/Cylinder** Inside #2
#2	101.25'	243 cf	**8.00'W x 8.00'L x 6.00'H Prismatoid**
			384 cf Overall - 141 cf Embedded = 243 cf
		384 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.25'	**8.270 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 99.00'
#2	Primary	105.75'	**24.0" Horiz. Orifice/Grate** C= 0.600

Limited to weir flow at low heads

Discarded OutFlow Max=0.04 cfs @ 12.14 hrs HW=105.81' (Free Discharge)
⤴**1=Exfiltration** (Controls 0.04 cfs)

Primary OutFlow Max=0.27 cfs @ 12.14 hrs HW=105.81' (Free Discharge)
⤴**2=Orifice/Grate** (Weir Controls 0.27 cfs @ 0.77 fps)

Summary for Pond 6P: roof Chambers

Inflow Area =   5,040 sf, 63.51% Impervious, Inflow Depth > 5.87"   for 100-Year event
Inflow   =   0.79 cfs @ 12.09 hrs, Volume=   2,464 cf
Outflow   =   0.59 cfs @ 12.16 hrs, Volume=   2,463 cf, Atten= 25%, Lag= 4.2 min
Discarded =   0.10 cfs @ 12.16 hrs, Volume=   2,000 cf
Primary   =   0.49 cfs @ 12.16 hrs, Volume=   464 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 106.94' @ 12.16 hrs Surf.Area= 290 sf Storage= 491 cf

Plug-Flow detention time= 30.9 min calculated for 2,462 cf (100% of inflow)
Center-of-Mass det. time= 30.8 min (838.4 - 807.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	103.50'	243 cf	**6.25'W x 46.34'L x 3.75'H Field A**
			1,086 cf Overall - 276 cf Embedded = 810 cf x 30.0% Voids
#2A	104.25'	276 cf	**ADS_StormTech SC-740 +Cap** x 6 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		519 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.50'	**8.270 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 98.75'
#2	Primary	106.25'	**6.0" Round Culvert**
			L= 35.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 106.25' / 104.00' S= 0.0643 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Primary	107.00'	**24.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads

Discarded OutFlow Max=0.10 cfs @ 12.16 hrs HW=106.93' (Free Discharge)
⤴**1=Exfiltration** (Controls 0.10 cfs)

Primary OutFlow Max=0.49 cfs @ 12.16 hrs HW=106.93' TW=106.00' (Fixed TW Elev= 106.00')
⤴**2=Culvert** (Inlet Controls 0.49 cfs @ 2.51 fps)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond 8P: LB-1

Inflow Area = 10,588 sf, 68.16% Impervious, Inflow Depth > 3.98" for 100-Year event
Inflow = 1.28 cfs @ 12.13 hrs, Volume= 3,514 cf
Outflow = 1.28 cfs @ 12.13 hrs, Volume= 3,512 cf, Atten= 0%, Lag= 0.1 min
Discarded = 0.13 cfs @ 12.13 hrs, Volume= 2,246 cf
Primary = 1.15 cfs @ 12.13 hrs, Volume= 1,266 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 105.90' @ 12.13 hrs Surf.Area= 100 sf Storage= 274 cf

Plug-Flow detention time= 13.5 min calculated for 3,512 cf (100% of inflow)
Center-of-Mass det. time= 13.1 min (799.8 - 786.7)

Volume	Invert	Avail.Storage	Storage Description
#1	101.00'	141 cf	**6.00'D x 5.00'H Vertical Cone/Cylinder** Inside #2
#2	100.00'	138 cf	**10.00'W x 10.00'L x 6.00'H Prismatoid**
			600 cf Overall - 141 cf Embedded = 459 cf x 30.0% Voids
		279 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	100.00'	**8.270 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 99.00'
#2	Primary	105.75'	**24.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads

Discarded OutFlow Max=0.13 cfs @ 12.13 hrs HW=105.90' (Free Discharge)
└─**1=Exfiltration** (Controls 0.13 cfs)

Primary OutFlow Max=1.14 cfs @ 12.13 hrs HW=105.90' (Free Discharge)
└─**2=Orifice/Grate** (Weir Controls 1.14 cfs @ 1.25 fps)

Summary for Pond 10P: LB-3

Inflow Area = 1,574 sf, 67.47% Impervious, Inflow Depth > 6.23" for 100-Year event
Inflow = 0.26 cfs @ 12.09 hrs, Volume= 817 cf
Outflow = 0.24 cfs @ 12.15 hrs, Volume= 817 cf, Atten= 7%, Lag= 4.0 min
Discarded = 0.02 cfs @ 12.15 hrs, Volume= 688 cf
Primary = 0.22 cfs @ 12.15 hrs, Volume= 128 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 105.80' @ 12.15 hrs Surf.Area= 64 sf Storage= 211 cf

Plug-Flow detention time= 70.3 min calculated for 817 cf (100% of inflow)
Center-of-Mass det. time= 69.7 min (870.7 - 801.1)

Williston Road, Newton

Proposed Conditions
Type III 24-hr 100-Year Rainfall=8.78"
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Volume	Invert	Avail.Storage	Storage Description
#1	103.50'	141 cf	**6.00'D x 5.00'H Vertical Cone/Cylinder** Inside #2
#2	102.50'	243 cf	**8.00'W x 8.00'L x 6.00'H Prismatoid**
			384 cf Overall - 141 cf Embedded = 243 cf
		384 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	102.50'	**8.270 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 99.00'
#2	Primary	105.75'	**24.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.15 hrs HW=105.79' (Free Discharge)
└─**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=0.18 cfs @ 12.15 hrs HW=105.79' (Free Discharge)
└─**2=Orifice/Grate** (Weir Controls 0.18 cfs @ 0.67 fps)