

STORMWATER MANAGEMENT REPORT

FOR

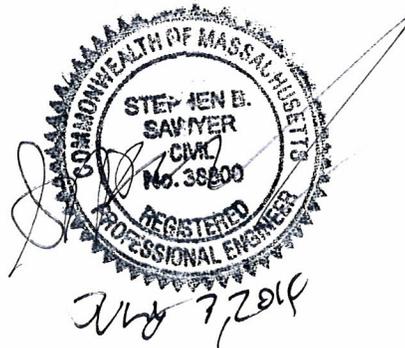
73 CONCORD AVENUE

**3 Residential Units
73 CONCORD AVENUE
Somerville, MA**

Prepared for:
Zeev Mehler
117 West 132nd St., Apt. 1
New York, NY 10027

Prepared by:
Design Consultants, Inc.
120 Middlesex Avenue, Suite 20
Somerville, Massachusetts 02145-1104

Project 2014-024
July 3, 2014



Design Consultants, Inc.

CIVIL ENGINEERS and LAND SURVEYORS

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- B. Soils Map – NRCS Web Soil Survey
- C. Figure 1 – Existing Catchment Areas
- D. Figure 2 – Proposed Catchment Areas
- E. Drainage Calculations
- F. Sanitary Sewer Calculations
- G. Domestic Water Demand Calculations and Pipe Sizing

INTRODUCTION

Zeev Mehler proposes the development of the property at 73 Concord Avenue in Somerville, MA. The site is zoned Residential B (RB). The existing parcel covers 4,695 square feet (0.108 acres). The parcel currently is the location of a 1-family residence and garage with gravel and grass areas. There is an existing curb cut on Concord Avenue that provides access to the property.

STORM WATER MANAGEMENT POLICY

The reference document used for developing the proposed stormwater management system for the project is the City of Somerville's Zoning Ordinance, Version June 25, 2009. Section 5.4.6.4 of the document describes the stormwater management standards that control quality, quantity, and groundwater recharge. The following report explains how the standards are met.

EXISTING CONDITION

The runoff from the lot is split into two drainage areas (subcatchments). (See Appendix C, Figure 1). The site is currently 34% impervious and mostly drains to the east. Runoff draining eventually makes its way into the drainage system in Concord Street.

According to FEMA Flood Insurance Rate Map Number 25017C0438E, with an effective date of June 4, 2010, the site is not located in a flood zone. (See Appendix A).

SOILS

The NRCS Web Soil Survey characterizes the soil at the site as entirely Merrimac-Urban Land complex and does not specify a Hydrologic Soil Group. (See Appendix B)

For calculation purposes, a Hydrologic Soils Group of C was used for all subsurface soils. Per the Massachusetts Stormwater Handbook, Table 2.3.3 1982 Rawls Rates, an infiltration rate of 0.27 in/hr has been used in the hydrologic model. Soil tests determined the groundwater elevation for the design. The proposed storage and infiltration fields, described below, have been designed for minimal cover. If necessary, shallower storage methods can be investigated to provide better separation to groundwater.

PROPOSED CONDITION

The proposed development includes the renovation of the existing structures and construction of a 2-unit townhouse building. Parking will be provided via the restored barn/garage for each unit. The site will be accessed by a new curb cut on the Marion Street side of the property, and the existing curb cut on Concord Avenue will be discontinued. Landscaping is proposed for the site (see Architectural plans for landscaping details and layout). A street tree will have to be removed to accommodate the new driveway opening. The proposed site is approximately 57% impervious.

The catchments in the proposed condition are similar to the catchments in the existing condition. Existing drainage patterns have been preserved. (See Appendix D, Figure 2)

Drainage:

Drainage calculations were conducted to evaluate peak discharges from the project site under the pre-development and post-development conditions (See Appendix E). As required under the City of Somerville's Stormwater Management Policy, peak discharges under post development conditions will not exceed the pre-development conditions.

The proposed stormwater management system includes roof drains and infiltration chambers for detention and groundwater recharge. A portion of the roof runoff is collected by gutters and downspouts that are connected to the infiltration chambers. Overflow will occur through the downspouts, at grade, into landscape areas. This runoff is then allowed to flow overland, eventually into Concord and Marion St. and to abutting properties.

4:1 Infiltration/Inflow Removal:

The 4:1 I-I requirement, for projects adding more than 2,000 gallons per day of sewage flow to the combined sewers, stipulates that for every increased gallon of sewage flow per day, four gallons of stormwater are stored and infiltrated onsite. The volume of stormwater represents the required amount to be stored/infiltrated per year. This project proposes to add only 440 gallons per day of sewage to the combined system. Therefore, the 4:1 I-I requirement should not apply to this project. However, since the project is providing a means for runoff infiltration on site, overall storm flows into the municipal system will still be reduced.

HYDROLOGIC MODEL

The hydrologic model used for this analysis is based upon the SCS Method. Both existing and proposed conditions are modeled for the 2-year, 10-year, 25-year, and 100-year storm events. The SCS Method allows for variable rainfall intensity throughout the storm duration, peaking near the middle of the Type III, 24-hour storm. The drainage area's time of concentration (t_c), is assumed to be six minutes for this site.

The designed on-site stormwater management system collects and infiltrates site runoff reducing off-site flows for all storm events.

Table 1**Total Offsite Runoff**

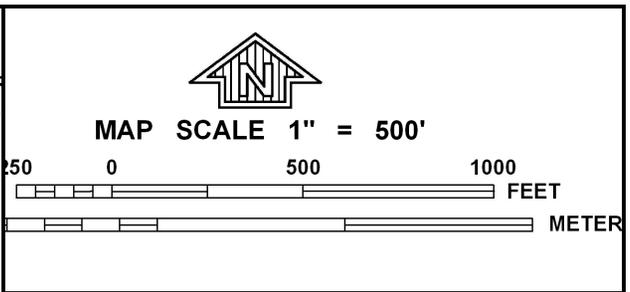
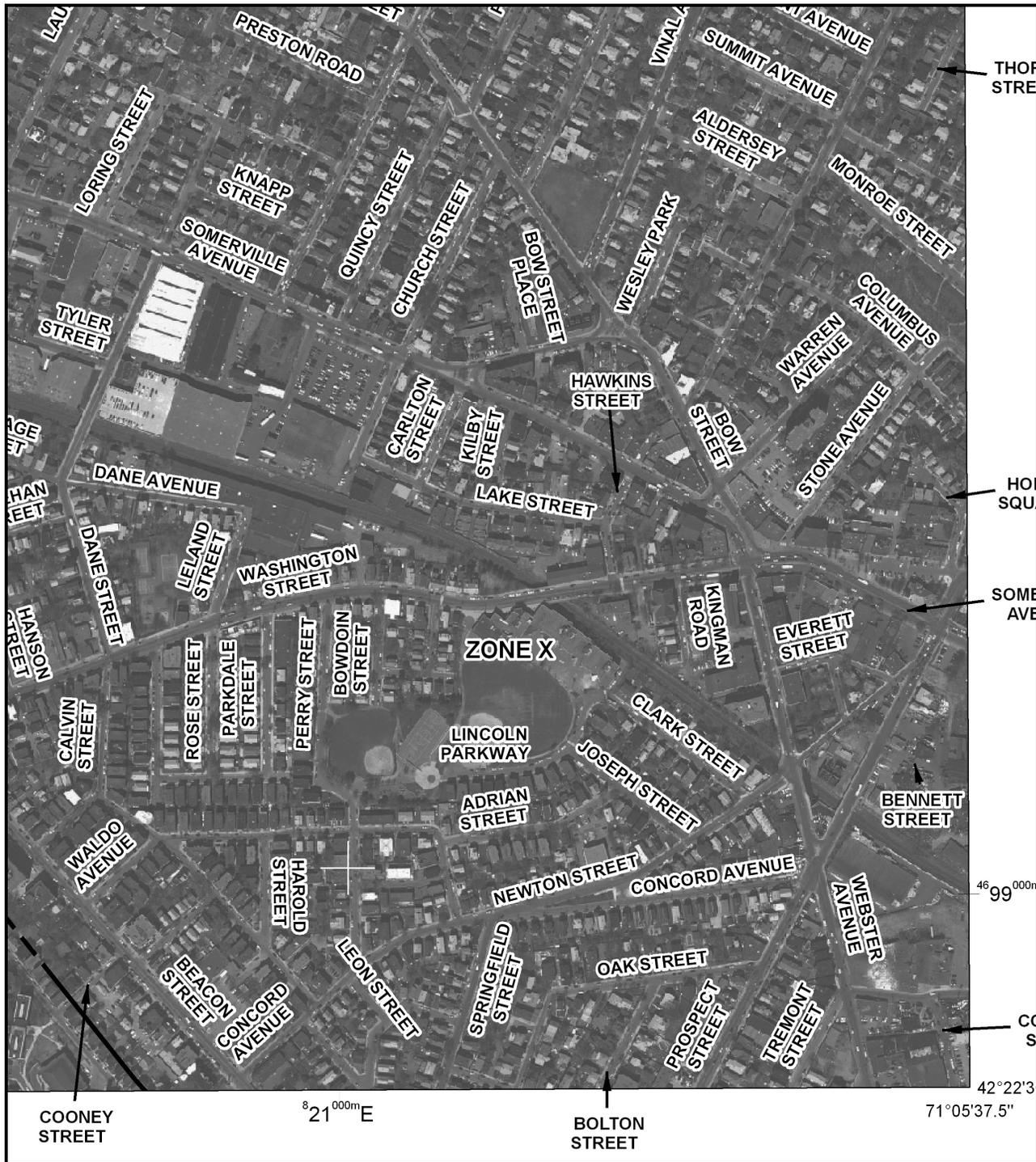
Peak Discharges (cubic feet per second, CFS) and Volumes cubic feet (CF)

Description	Existing Conditions		Proposed Conditions	
Drainage Area	0.108 Acres		0.108 Acres	
Storm Event (Years)	Offsite Peak Runoff (CFS)	Offsite Runoff Volume (AF)	Offsite Peak Runoff (CFS)	Offsite Runoff Volume (AF)
2	0.25	0.017	0.19	0.013
10	0.40	0.029	0.32	0.023
25	0.48	0.036	0.41	0.03
100	0.62	0.046	0.54	0.042

CONCLUSION

Based on DCI's analysis of the existing and proposed conditions, the proposed site condition meets the criteria set forth by the City of Somerville. Off-site runoff volume and peak flow rate for the 2, 10, 25 and 100-year storm events is decreased. If an illicit stormwater connection to the sanitary sewer is found, it will be eliminated and a new connection will be made to the appropriate storm sewer. The 4:1 I/I requirement does not apply to this project. DCI concludes that the proposed development at 73 Concord Avenue, Somerville, MA adheres to all applicable stormwater management policies.

Appendix A



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0438E

FIRM
FLOOD INSURANCE RATE MAP
MIDDLESEX COUNTY,
MASSACHUSETTS
 (ALL JURISDICTIONS)

PANEL 438 OF 656
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CAMBRIDGE, CITY OF	250186	0438	E
MEDFORD, CITY OF	250205	0438	E
SOMERVILLE, CITY OF	250214	0438	E

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



MAP NUMBER
25017C0438E

EFFECTIVE DATE
JUNE 4, 2010

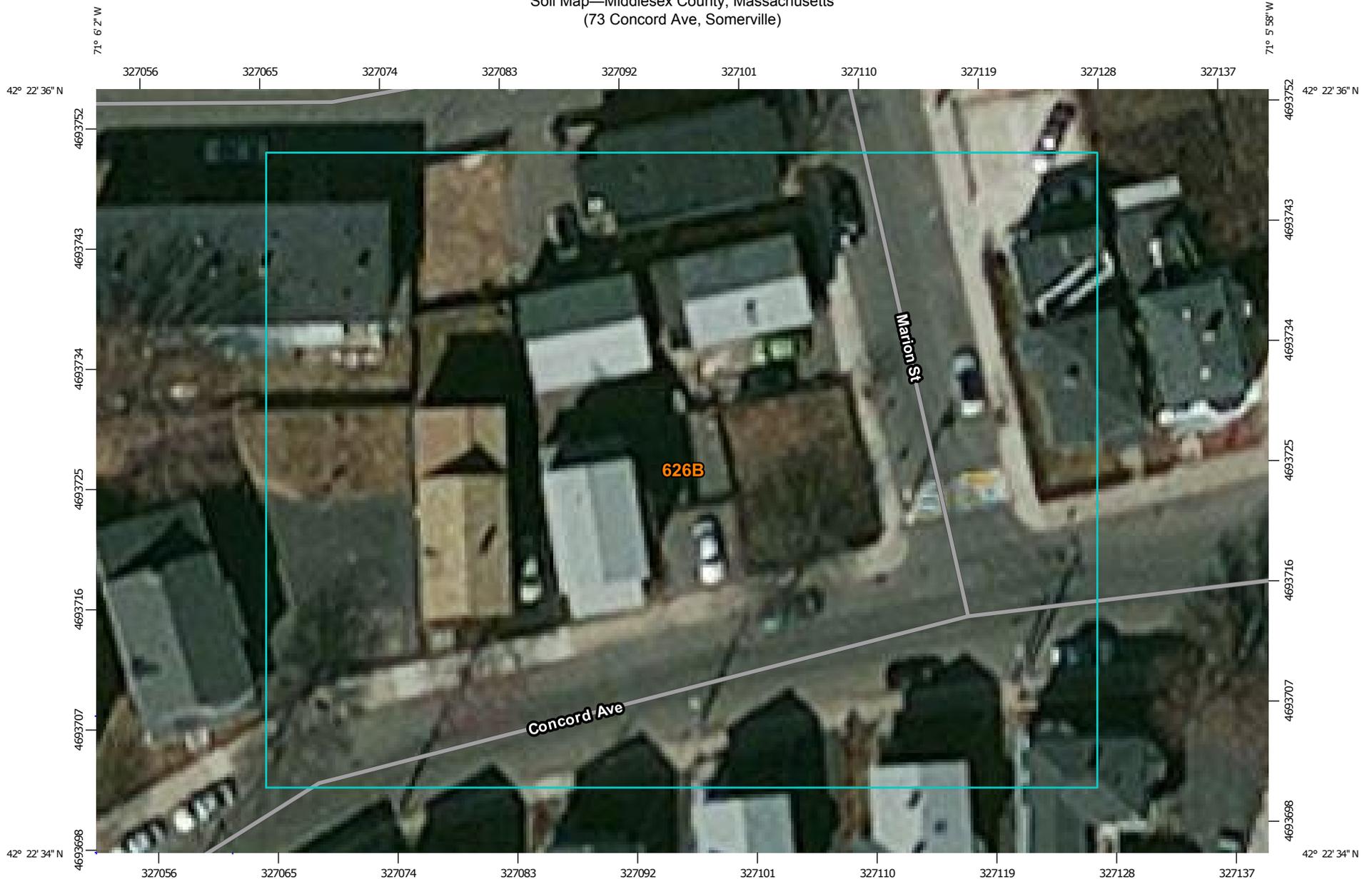
Federal Emergency Management Agency

COONEY STREET 8°21'00"E BOLTON STREET 71°05'37.5" 42°22'33"

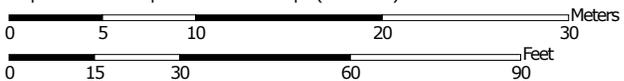
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Appendix B

Soil Map—Middlesex County, Massachusetts
(73 Concord Ave, Somerville)



Map Scale: 1:403 if printed on A landscape (11" x 8.5") sheet.



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 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: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 13, Dec 17, 2013

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

Date(s) aerial images were photographed: Mar 30, 2011—May 1, 2011

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.

Map Unit Legend

Middlesex County, Massachusetts (MA017)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	0.7	100.0%
Totals for Area of Interest		0.7	100.0%

Appendix C

TAUNTON STREET

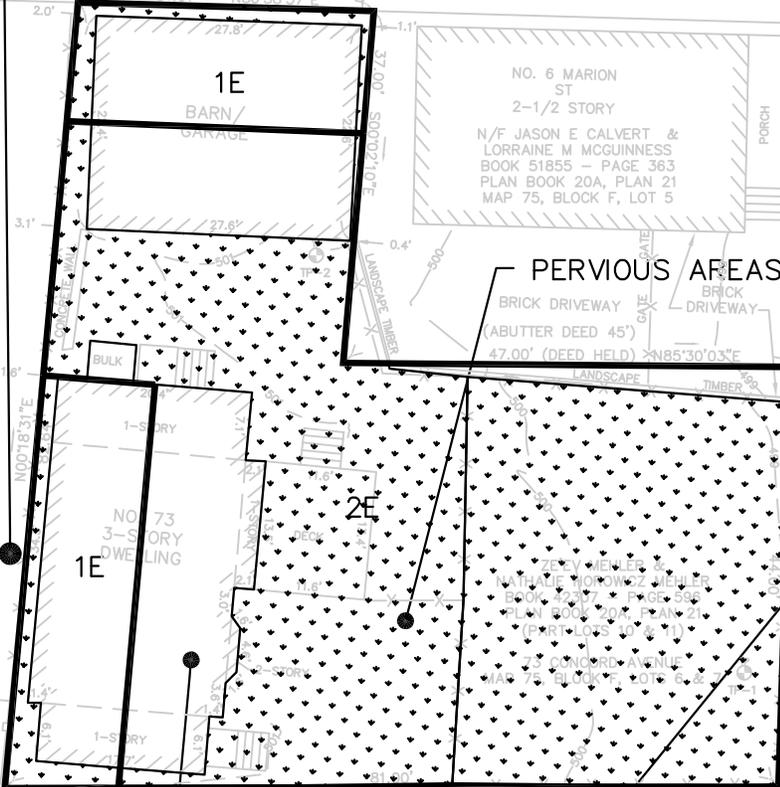
N/F
KERRYANNE HARDY
& PAUL FRENCH
BOOK 33178 - PAGE 556
PLAN BOOK 65, PLAN 35
8-10 MARION STREET
MAP 75, BLOCK F, LOT 4

DESIGN POINT #1

N/F
ADAM T & MOLLY F WYLIE
BOOK 56857 - PAGE 482
PLAN BOOK 20A, PLAN 21
75 CONCORD AVENUE
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NO. 6 MARION
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N/F JASON E CALVERT &
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BOOK 51855 - PAGE 363
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PERVIOUS AREAS



MARION STREET

IMPERVIOUS AREAS

CONCORD AVENUE

TBM NO. 2
SPIKE IN UP #13
ELEV=501.87

DESIGN POINT #2

TBM NO. 1
SPIKE IN UP
ELEV=500.32'

Design Consultants, Inc.
Consulting Engineers and Surveyors



120 MIDDLESEX AVENUE
SOMERVILLE, MA 02145
617-776-3350

73 CONCORD AVE
SOMERVILLE, MA

FIGURE 1
EXISTING
CATCHMENT
AREAS

SCALE: 1" = 20'

2014-024

Appendix D

TAUNTON STREET

N/F
KERRYANNE HARDY
& PAUL FRENCH
BOOK 33178 - PAGE 556
PLAN BOOK 65, PLAN 35

8-10 MARION STREET
MAP 75, BLOCK F, LOT 4

ROOF AREA INTO
DRYWELL

DESIGN POINT#1

SCALED MERIDIAN OF
PL BK 20A, PL 20



EXISTING
BARN/GARAGE TO
REMAIN

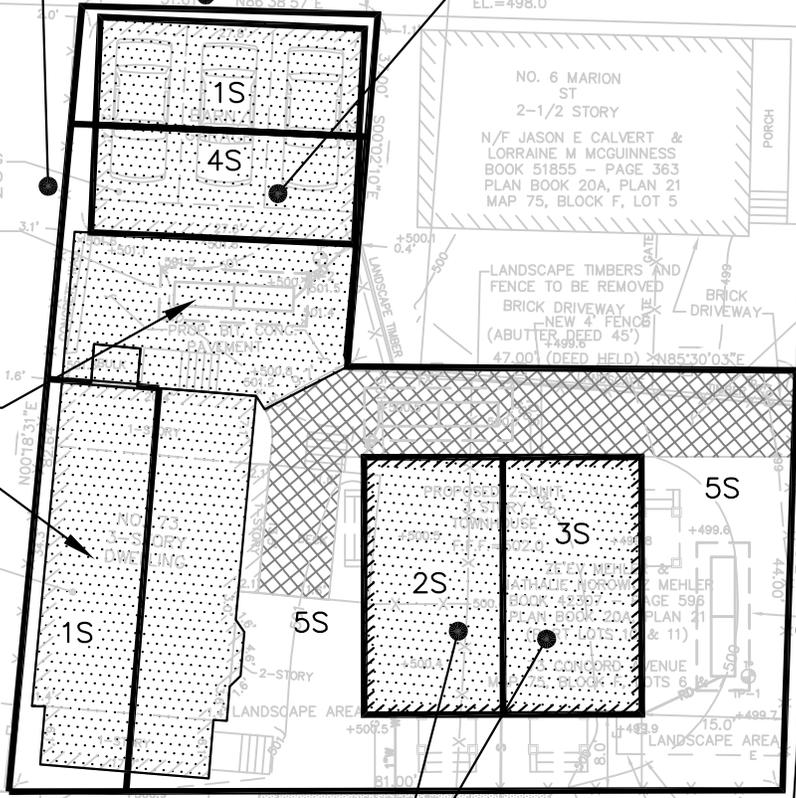
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120 MIDDLESEX AVENUE
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**73 CONCORD AVE
SOMERVILLE, MA**

**FIGURE 2
PROPOSED
CATCHMENT
AREAS**

SCALE: 1" = 20'

2014-024

Appendix E

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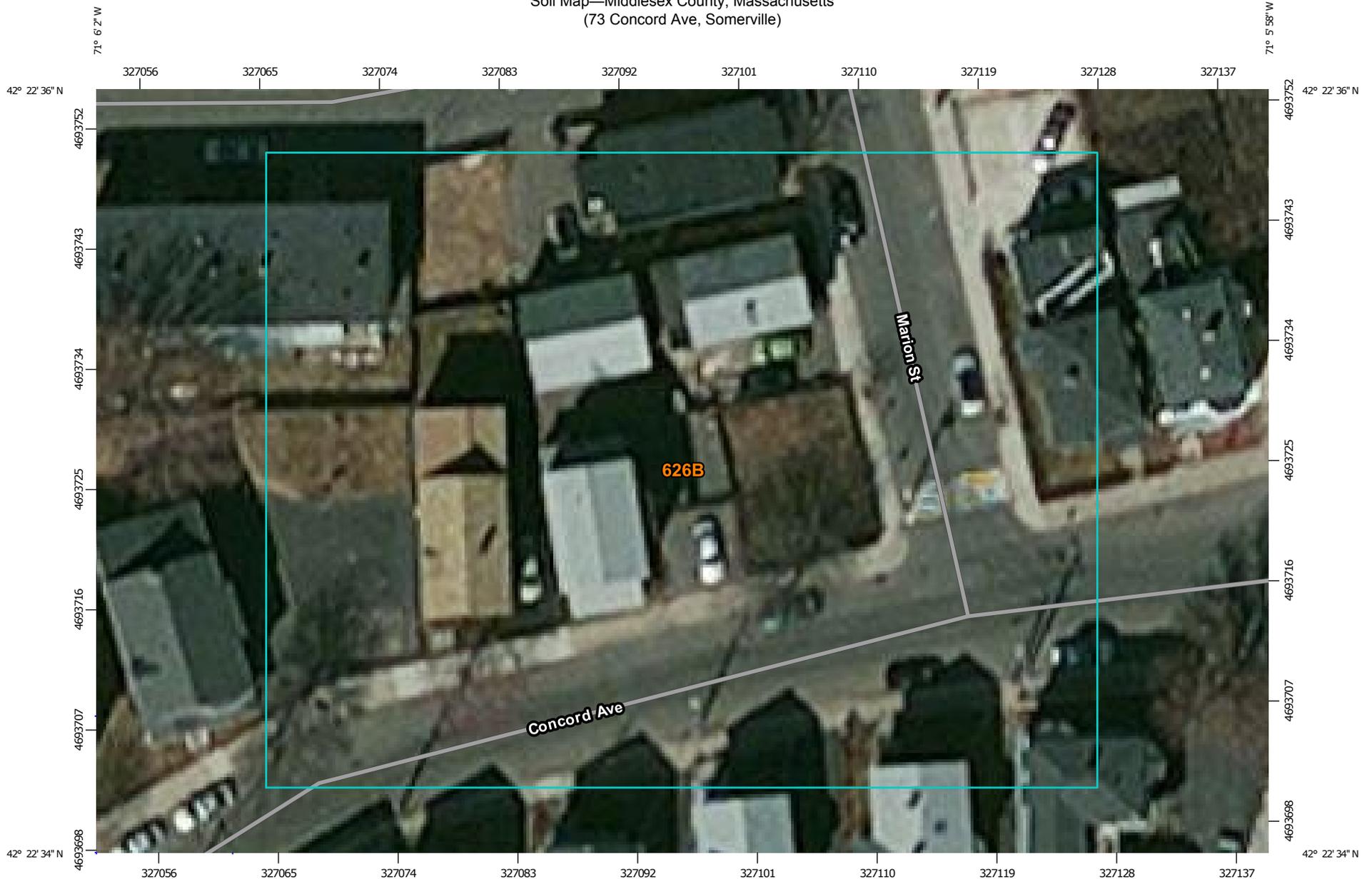
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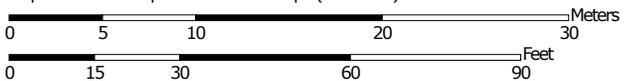
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Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



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Miscellaneous Water



Perennial Water



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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

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Aerial Photography

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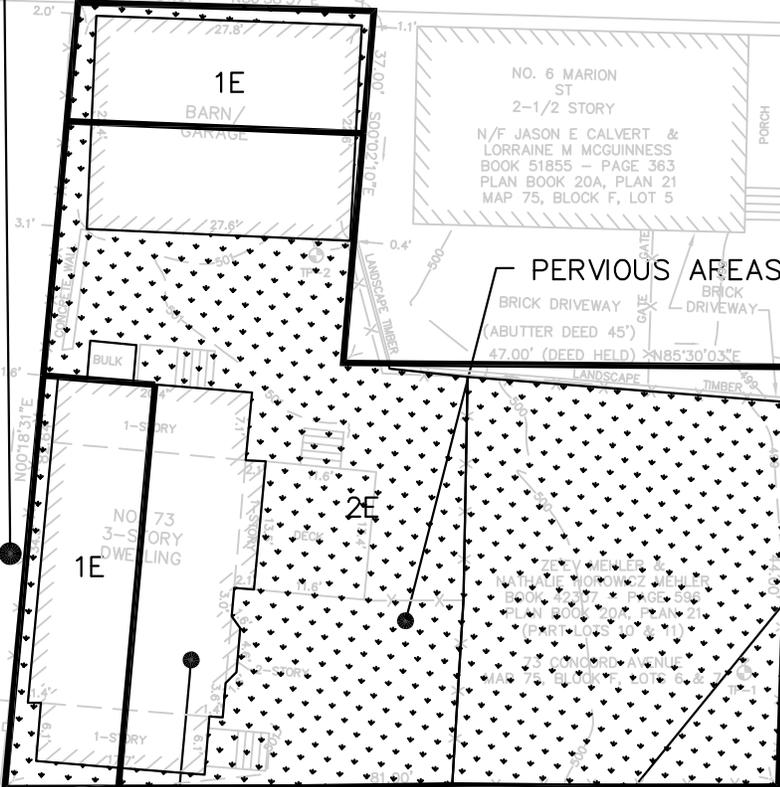
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8-10 MARION STREET
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DESIGN POINT #1

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MARION STREET

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ELEV=501.87

DESIGN POINT #2

TBM NO. 1
SPIKE IN UP
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FIGURE 1
EXISTING
CATCHMENT
AREAS

SCALE: 1" = 20'

2014-024

Appendix D

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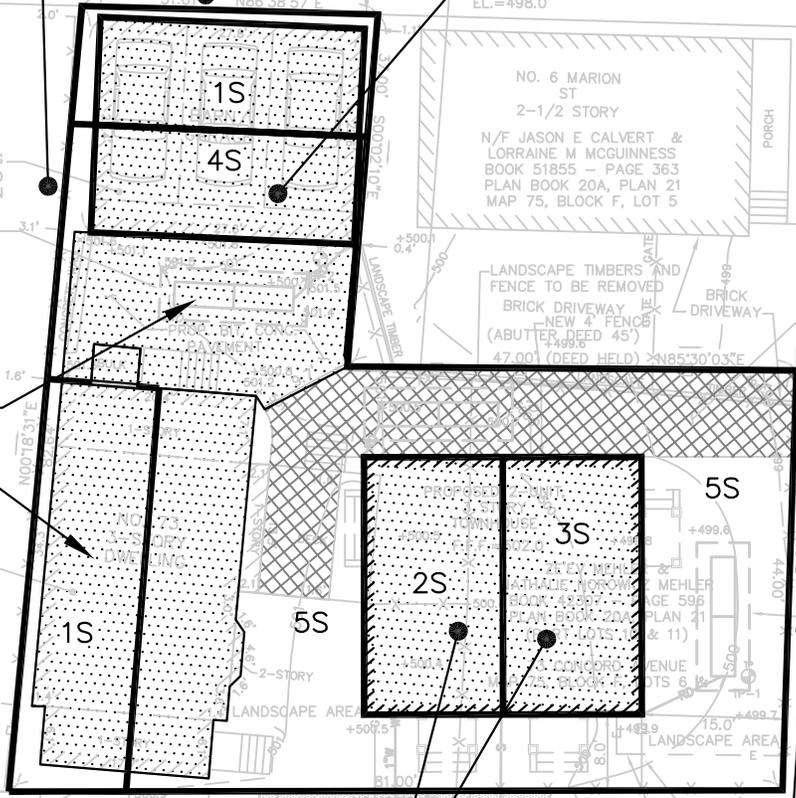
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INFILTRATION CHAMBERS

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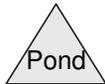
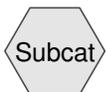
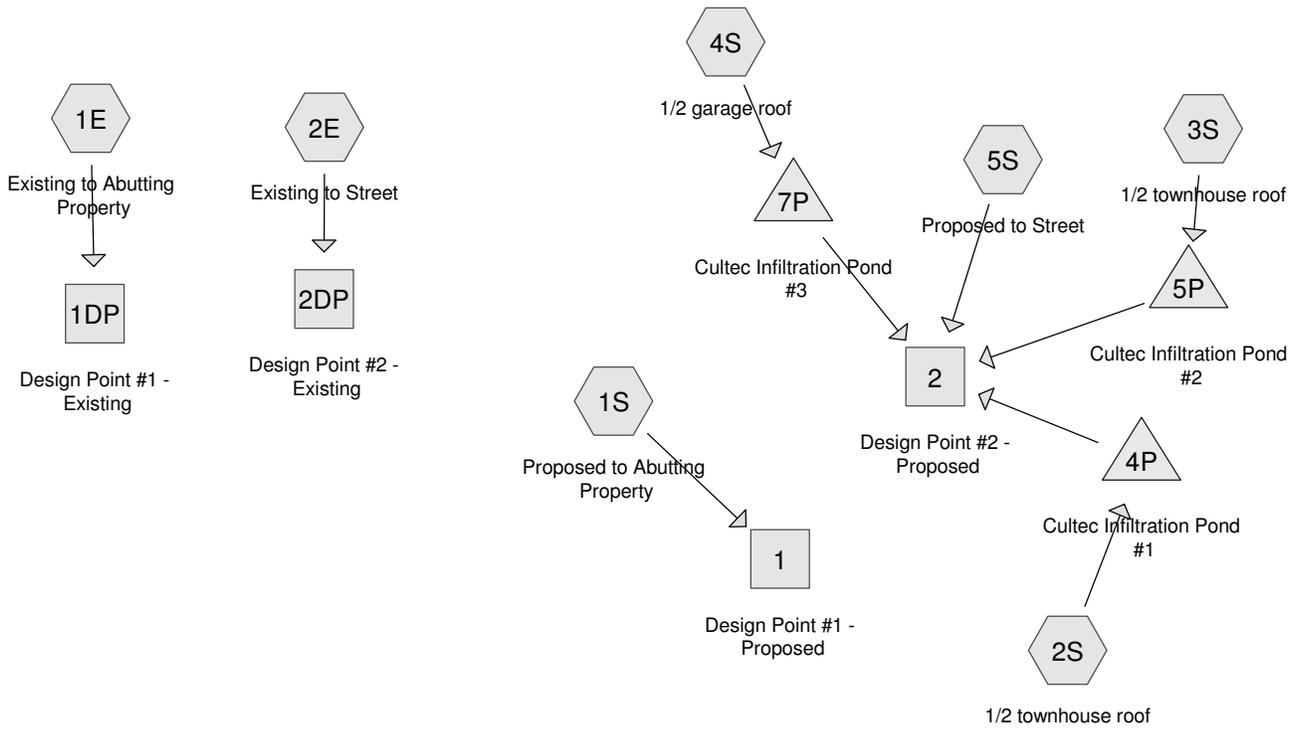
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**73 CONCORD AVE
SOMERVILLE, MA**

**FIGURE 2
PROPOSED
CATCHMENT
AREAS**

SCALE: 1" = 20' 2014-024

Appendix E



Summary for Subcatchment 1E: Existing to Abutting Property

Runoff = 0.06 cfs @ 12.08 hrs, Volume= 0.004 af, Depth> 2.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
* 716	98	Impervious areas
183	79	50-75% Grass cover, Fair, HSG C
899	94	Weighted Average
183		20.36% Pervious Area
716		79.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 min. minimum

Summary for Subcatchment 1S: Proposed to Abutting Property

Runoff = 0.06 cfs @ 12.09 hrs, Volume= 0.004 af, Depth> 2.35"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
* 716	98	Impervious areas
183	74	>75% Grass cover, Good, HSG C
899	93	Weighted Average
183		20.36% Pervious Area
716		79.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 min. minimum

Summary for Subcatchment 2E: Existing to Street

Runoff = 0.19 cfs @ 12.09 hrs, Volume= 0.013 af, Depth> 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
* 878	98	Impervious areas
* 1,520	89	Gravel, poor condition
1,398	79	50-75% Grass cover, Fair, HSG C
3,796	87	Weighted Average
2,918		76.87% Pervious Area
878		23.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 min. minimum

Summary for Subcatchment 2S: 1/2 townhouse roof

Runoff = 0.03 cfs @ 12.08 hrs, Volume= 0.002 af, Depth> 2.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
* 393	98	roof area
393		100.00% Impervious Area

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

Summary for Subcatchment 3S: 1/2 townhouse roof

Runoff = 0.03 cfs @ 12.08 hrs, Volume= 0.002 af, Depth> 2.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
* 393	98	roof area
393		100.00% Impervious Area

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

Summary for Subcatchment 4S: 1/2 garage roof

Runoff = 0.02 cfs @ 12.08 hrs, Volume= 0.002 af, Depth> 2.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
* 312	98	roof area
312		100.00% Impervious Area

2014-024 Pre and Post

Type III 24-hr 2-Year Rainfall=3.10"

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

Summary for Subcatchment 5S: Proposed to Street

Runoff = 0.13 cfs @ 12.09 hrs, Volume= 0.009 af, Depth> 1.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
* 873	98	Impervious areas
* 491	75	Pervious pavers
2,236	74	>75% Grass cover, Good, HSG C
3,600	80	Weighted Average
2,727		75.75% Pervious Area
873		24.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 min. minimum

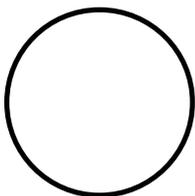
Summary for Reach 1: Design Point #1 - Proposed

Inflow Area = 0.021 ac, 79.64% Impervious, Inflow Depth > 2.35" for 2-Year event
 Inflow = 0.06 cfs @ 12.09 hrs, Volume= 0.004 af
 Outflow = 0.06 cfs @ 12.09 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
 Max. Velocity= 1.65 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 1.65 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 12.09 hrs
 Average Depth at Peak Storage= 0.03'
 Bank-Full Depth= 8.25', Capacity at Bank-Full= 990.08 cfs

99.0" Round Pipe
 n= 0.013 Corrugated PE, smooth interior
 Length= 1.0' Slope= 0.0100 '/'
 Inlet Invert= 0.00', Outlet Invert= -0.01'



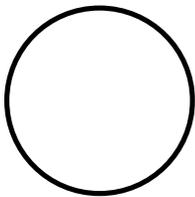
Summary for Reach 1DP: Design Point #1 - Existing

Inflow Area = 0.021 ac, 79.64% Impervious, Inflow Depth > 2.44" for 2-Year event
Inflow = 0.06 cfs @ 12.08 hrs, Volume= 0.004 af
Outflow = 0.06 cfs @ 12.09 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.65 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.65 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.03'
Bank-Full Depth= 8.25', Capacity at Bank-Full= 990.08 cfs

99.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 1.0' Slope= 0.0100 '/
Inlet Invert= 0.00', Outlet Invert= -0.01'



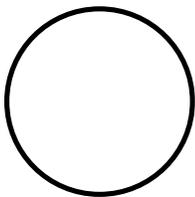
Summary for Reach 2: Design Point #2 - Proposed

Inflow Area = 0.108 ac, 41.95% Impervious, Inflow Depth > 1.01" for 2-Year event
Inflow = 0.13 cfs @ 12.09 hrs, Volume= 0.009 af
Outflow = 0.13 cfs @ 12.09 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.65 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.65 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 8.25', Capacity at Bank-Full= 990.08 cfs

99.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 1.0' Slope= 0.0100 '/
Inlet Invert= 0.00', Outlet Invert= -0.01'



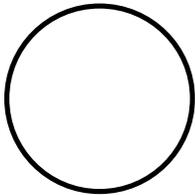
Summary for Reach 2DP: Design Point #2 - Existing

Inflow Area = 0.087 ac, 23.13% Impervious, Inflow Depth > 1.82" for 2-Year event
 Inflow = 0.19 cfs @ 12.09 hrs, Volume= 0.013 af
 Outflow = 0.19 cfs @ 12.09 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
 Max. Velocity= 1.82 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 1.65 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 12.09 hrs
 Average Depth at Peak Storage= 0.09'
 Bank-Full Depth= 8.25', Capacity at Bank-Full= 990.08 cfs

99.0" Round Pipe
 n= 0.013 Corrugated PE, smooth interior
 Length= 1.0' Slope= 0.0100 '/'
 Inlet Invert= 0.00', Outlet Invert= -0.01'



Summary for Pond 4P: Cultec Infiltration Pond #1

Inflow Area = 0.009 ac, 100.00% Impervious, Inflow Depth > 2.86" for 2-Year event
 Inflow = 0.03 cfs @ 12.08 hrs, Volume= 0.002 af
 Outflow = 0.00 cfs @ 15.34 hrs, Volume= 0.001 af, Atten= 96%, Lag= 195.4 min
 Discarded = 0.00 cfs @ 15.34 hrs, Volume= 0.001 af
 Primary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
 Peak Elev= 0.99' @ 15.34 hrs Surf.Area= 108 sf Storage= 53 cf

Plug-Flow detention time= 278.0 min calculated for 0.001 af (60% of inflow)
 Center-of-Mass det. time= 170.1 min (927.0 - 756.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	77 cf	6.00'W x 18.00'L x 2.04'H Field A 221 cf Overall - 28 cf Embedded = 193 cf x 40.0% Voids
#2A	0.50'	28 cf	Cultec C-100 x 2 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		105 cf	Total Available Storage

Storage Group A created with Chamber Wizard

2014-024 Pre and Post

Type III 24-hr 2-Year Rainfall=3.10"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	0.270 in/hr Exfiltration over Wetted area
#2	Primary	2.00'	3.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.00 cfs @ 15.34 hrs HW=0.99' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)**Primary OutFlow** Max=0.00 cfs @ 2.00 hrs HW=0.00' (Free Discharge)↑**2=Orifice/Grate** (Controls 0.00 cfs)**Summary for Pond 5P: Cultec Infiltration Pond #2**

Inflow Area =	0.009 ac, 100.00% Impervious, Inflow Depth > 2.86"	for 2-Year event
Inflow =	0.03 cfs @ 12.08 hrs, Volume=	0.002 af
Outflow =	0.00 cfs @ 15.66 hrs, Volume=	0.001 af, Atten= 97%, Lag= 214.5 min
Discarded =	0.00 cfs @ 15.66 hrs, Volume=	0.001 af
Primary =	0.00 cfs @ 2.00 hrs, Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs

Peak Elev= 1.23' @ 15.66 hrs Surf.Area= 85 sf Storage= 57 cf

Plug-Flow detention time= 286.5 min calculated for 0.001 af (53% of inflow)

Center-of-Mass det. time= 168.5 min (925.4 - 756.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	58 cf	5.00'W x 17.00'L x 2.04'H Field A 174 cf Overall - 28 cf Embedded = 146 cf x 40.0% Voids
#2A	0.50'	28 cf	Cultec C-100 x 2 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		86 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	0.270 in/hr Exfiltration over Wetted area
#2	Primary	2.00'	3.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.00 cfs @ 15.66 hrs HW=1.23' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)**Primary OutFlow** Max=0.00 cfs @ 2.00 hrs HW=0.00' (Free Discharge)↑**2=Orifice/Grate** (Controls 0.00 cfs)**Summary for Pond 7P: Cultec Infiltration Pond #3**

Inflow Area =	0.007 ac, 100.00% Impervious, Inflow Depth > 2.86"	for 2-Year event
Inflow =	0.02 cfs @ 12.08 hrs, Volume=	0.002 af
Outflow =	0.00 cfs @ 15.26 hrs, Volume=	0.001 af, Atten= 96%, Lag= 190.5 min
Discarded =	0.00 cfs @ 15.26 hrs, Volume=	0.001 af
Primary =	0.00 cfs @ 2.00 hrs, Volume=	0.000 af

2014-024 Pre and Post

Type III 24-hr 2-Year Rainfall=3.10"

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Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Peak Elev= 0.95' @ 15.26 hrs Surf.Area= 85 sf Storage= 42 cf

Plug-Flow detention time= 278.4 min calculated for 0.001 af (61% of inflow)
Center-of-Mass det. time= 172.5 min (929.4 - 756.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	58 cf	5.00'W x 17.00'L x 2.04'H Field A 174 cf Overall - 28 cf Embedded = 146 cf x 40.0% Voids
#2A	0.50'	28 cf	Cultec C-100 x 2 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		86 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	0.270 in/hr Exfiltration over Wetted area
#2	Primary	2.00'	3.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.00 cfs @ 15.26 hrs HW=0.95' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 2.00 hrs HW=0.00' (Free Discharge)
↑**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Subcatchment 1E: Existing to Abutting Property

Runoff = 0.09 cfs @ 12.08 hrs, Volume= 0.007 af, Depth> 3.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
* 716	98	Impervious areas
183	79	50-75% Grass cover, Fair, HSG C
899	94	Weighted Average
183		20.36% Pervious Area
716		79.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 min. minimum

Summary for Subcatchment 1S: Proposed to Abutting Property

Runoff = 0.08 cfs @ 12.08 hrs, Volume= 0.006 af, Depth> 3.70"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
* 716	98	Impervious areas
183	74	>75% Grass cover, Good, HSG C
899	93	Weighted Average
183		20.36% Pervious Area
716		79.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 min. minimum

Summary for Subcatchment 2E: Existing to Street

Runoff = 0.31 cfs @ 12.09 hrs, Volume= 0.022 af, Depth> 3.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
* 878	98	Impervious areas
* 1,520	89	Gravel, poor condition
1,398	79	50-75% Grass cover, Fair, HSG C
3,796	87	Weighted Average
2,918		76.87% Pervious Area
878		23.13% Impervious Area

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Type III 24-hr 10-Year Rainfall=4.50"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 min. minimum

Summary for Subcatchment 2S: 1/2 townhouse roof

Runoff = 0.04 cfs @ 12.08 hrs, Volume= 0.003 af, Depth> 4.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
* 393	98	roof area
393		100.00% Impervious Area

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

Summary for Subcatchment 3S: 1/2 townhouse roof

Runoff = 0.04 cfs @ 12.08 hrs, Volume= 0.003 af, Depth> 4.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
* 393	98	roof area
393		100.00% Impervious Area

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

Summary for Subcatchment 4S: 1/2 garage roof

Runoff = 0.03 cfs @ 12.08 hrs, Volume= 0.003 af, Depth> 4.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
* 312	98	roof area
312		100.00% Impervious Area

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Type III 24-hr 10-Year Rainfall=4.50"

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

Summary for Subcatchment 5S: Proposed to Street

Runoff = 0.24 cfs @ 12.09 hrs, Volume= 0.017 af, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
 Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
* 873	98	Impervious areas
* 491	75	Pervious pavers
2,236	74	>75% Grass cover, Good, HSG C
3,600	80	Weighted Average
2,727		75.75% Pervious Area
873		24.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 min. minimum

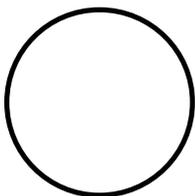
Summary for Reach 1: Design Point #1 - Proposed

Inflow Area = 0.021 ac, 79.64% Impervious, Inflow Depth > 3.70" for 10-Year event
 Inflow = 0.08 cfs @ 12.08 hrs, Volume= 0.006 af
 Outflow = 0.08 cfs @ 12.08 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
 Max. Velocity= 1.65 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 1.65 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 12.08 hrs
 Average Depth at Peak Storage= 0.05'
 Bank-Full Depth= 8.25', Capacity at Bank-Full= 990.08 cfs

99.0" Round Pipe
 n= 0.013 Corrugated PE, smooth interior
 Length= 1.0' Slope= 0.0100 '/'
 Inlet Invert= 0.00', Outlet Invert= -0.01'



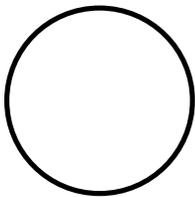
Summary for Reach 1DP: Design Point #1 - Existing

Inflow Area = 0.021 ac, 79.64% Impervious, Inflow Depth > 3.81" for 10-Year event
Inflow = 0.09 cfs @ 12.08 hrs, Volume= 0.007 af
Outflow = 0.09 cfs @ 12.08 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.65 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.65 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 8.25', Capacity at Bank-Full= 990.08 cfs

99.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 1.0' Slope= 0.0100 '/
Inlet Invert= 0.00', Outlet Invert= -0.01'



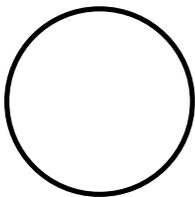
Summary for Reach 2: Design Point #2 - Proposed

Inflow Area = 0.108 ac, 41.95% Impervious, Inflow Depth > 1.90" for 10-Year event
Inflow = 0.24 cfs @ 12.09 hrs, Volume= 0.017 af
Outflow = 0.24 cfs @ 12.09 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Max. Velocity= 2.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.65 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 8.25', Capacity at Bank-Full= 990.08 cfs

99.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 1.0' Slope= 0.0100 '/
Inlet Invert= 0.00', Outlet Invert= -0.01'



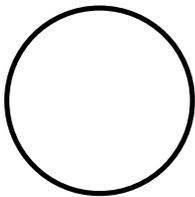
Summary for Reach 2DP: Design Point #2 - Existing

Inflow Area = 0.087 ac, 23.13% Impervious, Inflow Depth > 3.10" for 10-Year event
 Inflow = 0.31 cfs @ 12.09 hrs, Volume= 0.022 af
 Outflow = 0.31 cfs @ 12.09 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
 Max. Velocity= 2.19 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 1.65 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 12.09 hrs
 Average Depth at Peak Storage= 0.11'
 Bank-Full Depth= 8.25', Capacity at Bank-Full= 990.08 cfs

99.0" Round Pipe
 n= 0.013 Corrugated PE, smooth interior
 Length= 1.0' Slope= 0.0100 '/'
 Inlet Invert= 0.00', Outlet Invert= -0.01'



Summary for Pond 4P: Cultec Infiltration Pond #1

Inflow Area = 0.009 ac, 100.00% Impervious, Inflow Depth > 4.25" for 10-Year event
 Inflow = 0.04 cfs @ 12.08 hrs, Volume= 0.003 af
 Outflow = 0.00 cfs @ 15.88 hrs, Volume= 0.002 af, Atten= 97%, Lag= 227.8 min
 Discarded = 0.00 cfs @ 15.88 hrs, Volume= 0.002 af
 Primary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
 Peak Elev= 1.62' @ 15.88 hrs Surf.Area= 108 sf Storage= 87 cf

Plug-Flow detention time= 290.2 min calculated for 0.002 af (49% of inflow)
 Center-of-Mass det. time= 159.9 min (910.5 - 750.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	77 cf	6.00'W x 18.00'L x 2.04'H Field A 221 cf Overall - 28 cf Embedded = 193 cf x 40.0% Voids
#2A	0.50'	28 cf	Cultec C-100 x 2 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		105 cf	Total Available Storage

Storage Group A created with Chamber Wizard

2014-024 Pre and Post

Type III 24-hr 10-Year Rainfall=4.50"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	0.270 in/hr Exfiltration over Wetted area
#2	Primary	2.00'	3.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.00 cfs @ 15.88 hrs HW=1.62' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)**Primary OutFlow** Max=0.00 cfs @ 2.00 hrs HW=0.00' (Free Discharge)↑**2=Orifice/Grate** (Controls 0.00 cfs)**Summary for Pond 5P: Cultec Infiltration Pond #2**

Inflow Area =	0.009 ac, 100.00% Impervious, Inflow Depth > 4.25"	for 10-Year event
Inflow =	0.04 cfs @ 12.08 hrs, Volume=	0.003 af
Outflow =	0.00 cfs @ 13.95 hrs, Volume=	0.002 af, Atten= 95%, Lag= 111.7 min
Discarded =	0.00 cfs @ 13.95 hrs, Volume=	0.001 af
Primary =	0.00 cfs @ 13.95 hrs, Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs

Peak Elev= 2.02' @ 13.95 hrs Surf.Area= 85 sf Storage= 85 cf

Plug-Flow detention time= 291.2 min calculated for 0.002 af (48% of inflow)

Center-of-Mass det. time= 160.5 min (911.1 - 750.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	58 cf	5.00'W x 17.00'L x 2.04'H Field A 174 cf Overall - 28 cf Embedded = 146 cf x 40.0% Voids
#2A	0.50'	28 cf	Cultec C-100 x 2 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		86 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	0.270 in/hr Exfiltration over Wetted area
#2	Primary	2.00'	3.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.00 cfs @ 13.95 hrs HW=2.02' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)**Primary OutFlow** Max=0.00 cfs @ 13.95 hrs HW=2.02' (Free Discharge)↑**2=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.48 fps)**Summary for Pond 7P: Cultec Infiltration Pond #3**

Inflow Area =	0.007 ac, 100.00% Impervious, Inflow Depth > 4.25"	for 10-Year event
Inflow =	0.03 cfs @ 12.08 hrs, Volume=	0.003 af
Outflow =	0.00 cfs @ 15.81 hrs, Volume=	0.001 af, Atten= 97%, Lag= 223.3 min
Discarded =	0.00 cfs @ 15.81 hrs, Volume=	0.001 af
Primary =	0.00 cfs @ 2.00 hrs, Volume=	0.000 af

2014-024 Pre and Post

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Type III 24-hr 10-Year Rainfall=4.50"

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Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Peak Elev= 1.52' @ 15.81 hrs Surf.Area= 85 sf Storage= 69 cf

Plug-Flow detention time= 290.9 min calculated for 0.001 af (50% of inflow)
Center-of-Mass det. time= 162.7 min (913.3 - 750.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	58 cf	5.00'W x 17.00'L x 2.04'H Field A 174 cf Overall - 28 cf Embedded = 146 cf x 40.0% Voids
#2A	0.50'	28 cf	Cultec C-100 x 2 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		86 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	0.270 in/hr Exfiltration over Wetted area
#2	Primary	2.00'	3.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.00 cfs @ 15.81 hrs HW=1.52' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 2.00 hrs HW=0.00' (Free Discharge)
↑**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Subcatchment 1E: Existing to Abutting Property

Runoff = 0.10 cfs @ 12.08 hrs, Volume= 0.008 af, Depth> 4.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
* 716	98	Impervious areas
183	79	50-75% Grass cover, Fair, HSG C
899	94	Weighted Average
183		20.36% Pervious Area
716		79.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 min. minimum

Summary for Subcatchment 1S: Proposed to Abutting Property

Runoff = 0.10 cfs @ 12.08 hrs, Volume= 0.008 af, Depth> 4.49"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
* 716	98	Impervious areas
183	74	>75% Grass cover, Good, HSG C
899	93	Weighted Average
183		20.36% Pervious Area
716		79.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 min. minimum

Summary for Subcatchment 2E: Existing to Street

Runoff = 0.38 cfs @ 12.09 hrs, Volume= 0.028 af, Depth> 3.85"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
* 878	98	Impervious areas
* 1,520	89	Gravel, poor condition
1,398	79	50-75% Grass cover, Fair, HSG C
3,796	87	Weighted Average
2,918		76.87% Pervious Area
878		23.13% Impervious Area

2014-024 Pre and Post

Type III 24-hr 25-Year Rainfall=5.30"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 min. minimum

Summary for Subcatchment 2S: 1/2 townhouse roof

Runoff = 0.05 cfs @ 12.08 hrs, Volume= 0.004 af, Depth> 5.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
* 393	98	roof area
393		100.00% Impervious Area

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

Summary for Subcatchment 3S: 1/2 townhouse roof

Runoff = 0.05 cfs @ 12.08 hrs, Volume= 0.004 af, Depth> 5.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
* 393	98	roof area
393		100.00% Impervious Area

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

Summary for Subcatchment 4S: 1/2 garage roof

Runoff = 0.04 cfs @ 12.08 hrs, Volume= 0.003 af, Depth> 5.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
* 312	98	roof area
312		100.00% Impervious Area

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Type III 24-hr 25-Year Rainfall=5.30"

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

Summary for Subcatchment 5S: Proposed to Street

Runoff = 0.31 cfs @ 12.09 hrs, Volume= 0.022 af, Depth> 3.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
 Type III 24-hr 25-Year Rainfall=5.30"

Area (sf)	CN	Description
* 873	98	Impervious areas
* 491	75	Pervious pavers
2,236	74	>75% Grass cover, Good, HSG C
3,600	80	Weighted Average
2,727		75.75% Pervious Area
873		24.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 min. minimum

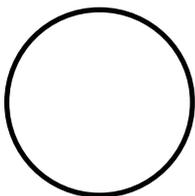
Summary for Reach 1: Design Point #1 - Proposed

Inflow Area = 0.021 ac, 79.64% Impervious, Inflow Depth > 4.49" for 25-Year event
 Inflow = 0.10 cfs @ 12.08 hrs, Volume= 0.008 af
 Outflow = 0.10 cfs @ 12.08 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
 Max. Velocity= 1.65 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 1.65 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 12.08 hrs
 Average Depth at Peak Storage= 0.06'
 Bank-Full Depth= 8.25', Capacity at Bank-Full= 990.08 cfs

99.0" Round Pipe
 n= 0.013 Corrugated PE, smooth interior
 Length= 1.0' Slope= 0.0100 '/'
 Inlet Invert= 0.00', Outlet Invert= -0.01'



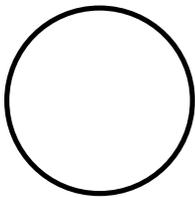
Summary for Reach 1DP: Design Point #1 - Existing

Inflow Area = 0.021 ac, 79.64% Impervious, Inflow Depth > 4.60" for 25-Year event
Inflow = 0.10 cfs @ 12.08 hrs, Volume= 0.008 af
Outflow = 0.10 cfs @ 12.08 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.65 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.65 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.06'
Bank-Full Depth= 8.25', Capacity at Bank-Full= 990.08 cfs

99.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 1.0' Slope= 0.0100 '/
Inlet Invert= 0.00', Outlet Invert= -0.01'



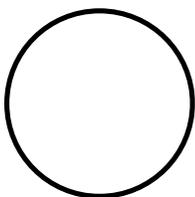
Summary for Reach 2: Design Point #2 - Proposed

Inflow Area = 0.108 ac, 41.95% Impervious, Inflow Depth > 2.49" for 25-Year event
Inflow = 0.31 cfs @ 12.09 hrs, Volume= 0.022 af
Outflow = 0.31 cfs @ 12.09 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Max. Velocity= 2.17 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.65 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 8.25', Capacity at Bank-Full= 990.08 cfs

99.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 1.0' Slope= 0.0100 '/
Inlet Invert= 0.00', Outlet Invert= -0.01'



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Type III 24-hr 25-Year Rainfall=5.30"

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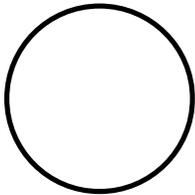
Summary for Reach 2DP: Design Point #2 - Existing

Inflow Area = 0.087 ac, 23.13% Impervious, Inflow Depth > 3.85" for 25-Year event
Inflow = 0.38 cfs @ 12.09 hrs, Volume= 0.028 af
Outflow = 0.38 cfs @ 12.09 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Max. Velocity= 2.32 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.66 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 8.25', Capacity at Bank-Full= 990.08 cfs

99.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 1.0' Slope= 0.0100 '/'
Inlet Invert= 0.00', Outlet Invert= -0.01'



Summary for Pond 4P: Cultec Infiltration Pond #1

Inflow Area = 0.009 ac, 100.00% Impervious, Inflow Depth > 5.05" for 25-Year event
Inflow = 0.05 cfs @ 12.08 hrs, Volume= 0.004 af
Outflow = 0.00 cfs @ 14.77 hrs, Volume= 0.002 af, Atten= 96%, Lag= 161.1 min
Discarded = 0.00 cfs @ 14.77 hrs, Volume= 0.002 af
Primary = 0.00 cfs @ 14.77 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Peak Elev= 2.01' @ 14.77 hrs Surf.Area= 108 sf Storage= 104 cf

Plug-Flow detention time= 294.6 min calculated for 0.002 af (47% of inflow)
Center-of-Mass det. time= 159.0 min (907.3 - 748.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	77 cf	6.00'W x 18.00'L x 2.04'H Field A 221 cf Overall - 28 cf Embedded = 193 cf x 40.0% Voids
#2A	0.50'	28 cf	Cultec C-100 x 2 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		105 cf	Total Available Storage

Storage Group A created with Chamber Wizard

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Type III 24-hr 25-Year Rainfall=5.30"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	0.270 in/hr Exfiltration over Wetted area
#2	Primary	2.00'	3.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.00 cfs @ 14.77 hrs HW=2.01' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)**Primary OutFlow** Max=0.00 cfs @ 14.77 hrs HW=2.01' (Free Discharge)↑**2=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.40 fps)**Summary for Pond 5P: Cultec Infiltration Pond #2**

Inflow Area =	0.009 ac, 100.00% Impervious, Inflow Depth > 5.05" for 25-Year event
Inflow =	0.05 cfs @ 12.08 hrs, Volume= 0.004 af
Outflow =	0.02 cfs @ 12.40 hrs, Volume= 0.002 af, Atten= 63%, Lag= 19.2 min
Discarded =	0.00 cfs @ 12.40 hrs, Volume= 0.001 af
Primary =	0.02 cfs @ 12.40 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs

Peak Elev= 2.09' @ 12.40 hrs Surf.Area= 85 sf Storage= 86 cf

Plug-Flow detention time= 243.2 min calculated for 0.002 af (55% of inflow)

Center-of-Mass det. time= 125.1 min (873.4 - 748.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	58 cf	5.00'W x 17.00'L x 2.04'H Field A 174 cf Overall - 28 cf Embedded = 146 cf x 40.0% Voids
#2A	0.50'	28 cf	Cultec C-100 x 2 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		86 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	0.270 in/hr Exfiltration over Wetted area
#2	Primary	2.00'	3.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.00 cfs @ 12.40 hrs HW=2.09' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)**Primary OutFlow** Max=0.01 cfs @ 12.40 hrs HW=2.09' (Free Discharge)↑**2=Orifice/Grate** (Orifice Controls 0.01 cfs @ 1.00 fps)**Summary for Pond 7P: Cultec Infiltration Pond #3**

Inflow Area =	0.007 ac, 100.00% Impervious, Inflow Depth > 5.05" for 25-Year event
Inflow =	0.04 cfs @ 12.08 hrs, Volume= 0.003 af
Outflow =	0.00 cfs @ 15.91 hrs, Volume= 0.001 af, Atten= 97%, Lag= 229.8 min
Discarded =	0.00 cfs @ 15.91 hrs, Volume= 0.001 af
Primary =	0.00 cfs @ 2.00 hrs, Volume= 0.000 af

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Type III 24-hr 25-Year Rainfall=5.30"

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Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
 Peak Elev= 1.97' @ 15.91 hrs Surf.Area= 85 sf Storage= 84 cf

Plug-Flow detention time= 300.2 min calculated for 0.001 af (47% of inflow)
 Center-of-Mass det. time= 164.5 min (912.8 - 748.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	58 cf	5.00'W x 17.00'L x 2.04'H Field A 174 cf Overall - 28 cf Embedded = 146 cf x 40.0% Voids
#2A	0.50'	28 cf	Cultec C-100 x 2 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		86 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	0.270 in/hr Exfiltration over Wetted area
#2	Primary	2.00'	3.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.00 cfs @ 15.91 hrs HW=1.97' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 2.00 hrs HW=0.00' (Free Discharge)
 ↑**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Subcatchment 1E: Existing to Abutting Property

Runoff = 0.13 cfs @ 12.08 hrs, Volume= 0.010 af, Depth> 5.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
* 716	98	Impervious areas
183	79	50-75% Grass cover, Fair, HSG C
899	94	Weighted Average
183		20.36% Pervious Area
716		79.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 min. minimum

Summary for Subcatchment 1S: Proposed to Abutting Property

Runoff = 0.13 cfs @ 12.08 hrs, Volume= 0.010 af, Depth> 5.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
* 716	98	Impervious areas
183	74	>75% Grass cover, Good, HSG C
899	93	Weighted Average
183		20.36% Pervious Area
716		79.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 min. minimum

Summary for Subcatchment 2E: Existing to Street

Runoff = 0.49 cfs @ 12.09 hrs, Volume= 0.036 af, Depth> 4.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
* 878	98	Impervious areas
* 1,520	89	Gravel, poor condition
1,398	79	50-75% Grass cover, Fair, HSG C
3,796	87	Weighted Average
2,918		76.87% Pervious Area
878		23.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 min. minimum

Summary for Subcatchment 2S: 1/2 townhouse roof

Runoff = 0.06 cfs @ 12.08 hrs, Volume= 0.005 af, Depth> 6.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
* 393	98	roof area
393		100.00% Impervious Area

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

Summary for Subcatchment 3S: 1/2 townhouse roof

Runoff = 0.06 cfs @ 12.08 hrs, Volume= 0.005 af, Depth> 6.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
* 393	98	roof area
393		100.00% Impervious Area

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

Summary for Subcatchment 4S: 1/2 garage roof

Runoff = 0.05 cfs @ 12.08 hrs, Volume= 0.004 af, Depth> 6.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
* 312	98	roof area
312		100.00% Impervious Area

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Type III 24-hr 100-Year Rainfall=6.50"

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

Summary for Subcatchment 5S: Proposed to Street

Runoff = 0.41 cfs @ 12.09 hrs, Volume= 0.029 af, Depth> 4.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
* 873	98	Impervious areas
* 491	75	Pervious pavers
2,236	74	>75% Grass cover, Good, HSG C
3,600	80	Weighted Average
2,727		75.75% Pervious Area
873		24.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, 6 min. minimum

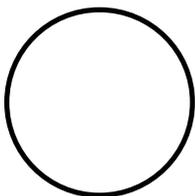
Summary for Reach 1: Design Point #1 - Proposed

Inflow Area = 0.021 ac, 79.64% Impervious, Inflow Depth > 5.67" for 100-Year event
 Inflow = 0.13 cfs @ 12.08 hrs, Volume= 0.010 af
 Outflow = 0.13 cfs @ 12.08 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
 Max. Velocity= 1.65 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 1.65 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 12.08 hrs
 Average Depth at Peak Storage= 0.07'
 Bank-Full Depth= 8.25', Capacity at Bank-Full= 990.08 cfs

99.0" Round Pipe
 n= 0.013 Corrugated PE, smooth interior
 Length= 1.0' Slope= 0.0100 '/'
 Inlet Invert= 0.00', Outlet Invert= -0.01'



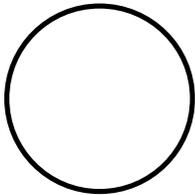
Summary for Reach 1DP: Design Point #1 - Existing

Inflow Area = 0.021 ac, 79.64% Impervious, Inflow Depth > 5.79" for 100-Year event
Inflow = 0.13 cfs @ 12.08 hrs, Volume= 0.010 af
Outflow = 0.13 cfs @ 12.08 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Max. Velocity= 1.65 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.65 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 8.25', Capacity at Bank-Full= 990.08 cfs

99.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 1.0' Slope= 0.0100 '/
Inlet Invert= 0.00', Outlet Invert= -0.01'



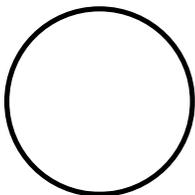
Summary for Reach 2: Design Point #2 - Proposed

Inflow Area = 0.108 ac, 41.95% Impervious, Inflow Depth > 3.55" for 100-Year event
Inflow = 0.41 cfs @ 12.09 hrs, Volume= 0.032 af
Outflow = 0.41 cfs @ 12.09 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Max. Velocity= 2.35 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.66 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 8.25', Capacity at Bank-Full= 990.08 cfs

99.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 1.0' Slope= 0.0100 '/
Inlet Invert= 0.00', Outlet Invert= -0.01'



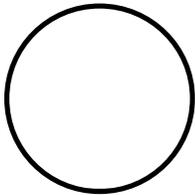
Summary for Reach 2DP: Design Point #2 - Existing

Inflow Area = 0.087 ac, 23.13% Impervious, Inflow Depth > 4.99" for 100-Year event
 Inflow = 0.49 cfs @ 12.09 hrs, Volume= 0.036 af
 Outflow = 0.49 cfs @ 12.09 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
 Max. Velocity= 2.46 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 1.66 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 12.09 hrs
 Average Depth at Peak Storage= 0.14'
 Bank-Full Depth= 8.25', Capacity at Bank-Full= 990.08 cfs

99.0" Round Pipe
 n= 0.013 Corrugated PE, smooth interior
 Length= 1.0' Slope= 0.0100 '/'
 Inlet Invert= 0.00', Outlet Invert= -0.01'



Summary for Pond 4P: Cultec Infiltration Pond #1

Inflow Area = 0.009 ac, 100.00% Impervious, Inflow Depth > 6.23" for 100-Year event
 Inflow = 0.06 cfs @ 12.08 hrs, Volume= 0.005 af
 Outflow = 0.03 cfs @ 12.38 hrs, Volume= 0.003 af, Atten= 54%, Lag= 17.9 min
 Discarded = 0.00 cfs @ 12.38 hrs, Volume= 0.002 af
 Primary = 0.03 cfs @ 12.38 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
 Peak Elev= 2.11' @ 12.38 hrs Surf.Area= 108 sf Storage= 105 cf

Plug-Flow detention time= 237.7 min calculated for 0.003 af (55% of inflow)
 Center-of-Mass det. time= 118.9 min (864.9 - 745.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	77 cf	6.00'W x 18.00'L x 2.04'H Field A 221 cf Overall - 28 cf Embedded = 193 cf x 40.0% Voids
#2A	0.50'	28 cf	Cultec C-100 x 2 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		105 cf	Total Available Storage

Storage Group A created with Chamber Wizard

2014-024 Pre and Post

Type III 24-hr 100-Year Rainfall=6.50"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	0.270 in/hr Exfiltration over Wetted area
#2	Primary	2.00'	3.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.00 cfs @ 12.38 hrs HW=2.11' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)**Primary OutFlow** Max=0.02 cfs @ 12.38 hrs HW=2.11' (Free Discharge)↑**2=Orifice/Grate** (Orifice Controls 0.02 cfs @ 1.13 fps)**Summary for Pond 5P: Cultec Infiltration Pond #2**

Inflow Area = 0.009 ac, 100.00% Impervious, Inflow Depth > 6.23" for 100-Year event
 Inflow = 0.06 cfs @ 12.08 hrs, Volume= 0.005 af
 Outflow = 0.07 cfs @ 12.16 hrs, Volume= 0.003 af, Atten= 0%, Lag= 4.5 min
 Discarded = 0.00 cfs @ 12.14 hrs, Volume= 0.002 af
 Primary = 0.07 cfs @ 12.16 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs

Peak Elev= 2.21' @ 12.16 hrs Surf.Area= 85 sf Storage= 86 cf

Plug-Flow detention time= 200.6 min calculated for 0.003 af (62% of inflow)

Center-of-Mass det. time= 93.3 min (839.3 - 745.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	58 cf	5.00'W x 17.00'L x 2.04'H Field A 174 cf Overall - 28 cf Embedded = 146 cf x 40.0% Voids
#2A	0.50'	28 cf	Cultec C-100 x 2 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		86 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	0.270 in/hr Exfiltration over Wetted area
#2	Primary	2.00'	3.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.00 cfs @ 12.14 hrs HW=2.09' (Free Discharge)↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)**Primary OutFlow** Max=0.07 cfs @ 12.16 hrs HW=2.20' (Free Discharge)↑**2=Orifice/Grate** (Orifice Controls 0.07 cfs @ 1.53 fps)**Summary for Pond 7P: Cultec Infiltration Pond #3**

Inflow Area = 0.007 ac, 100.00% Impervious, Inflow Depth > 6.23" for 100-Year event
 Inflow = 0.05 cfs @ 12.08 hrs, Volume= 0.004 af
 Outflow = 0.01 cfs @ 12.46 hrs, Volume= 0.002 af, Atten= 72%, Lag= 22.4 min
 Discarded = 0.00 cfs @ 12.44 hrs, Volume= 0.001 af
 Primary = 0.01 cfs @ 12.46 hrs, Volume= 0.001 af

2014-024 Pre and Post

Type III 24-hr 100-Year Rainfall=6.50"

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Routing by Stor-Ind method, Time Span= 2.00-24.00 hrs, dt= 0.02 hrs
Peak Elev= 2.07' @ 12.46 hrs Surf.Area= 85 sf Storage= 86 cf

Plug-Flow detention time= 249.2 min calculated for 0.002 af (54% of inflow)
Center-of-Mass det. time= 128.4 min (874.3 - 745.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	58 cf	5.00'W x 17.00'L x 2.04'H Field A 174 cf Overall - 28 cf Embedded = 146 cf x 40.0% Voids
#2A	0.50'	28 cf	Cultec C-100 x 2 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		86 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	0.270 in/hr Exfiltration over Wetted area
#2	Primary	2.00'	3.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.00 cfs @ 12.44 hrs HW=2.07' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.01 cfs @ 12.46 hrs HW=2.07' (Free Discharge)
↑**2=Orifice/Grate** (Orifice Controls 0.01 cfs @ 0.92 fps)

Appendix F

I. INTRODUCTION

The following sewerage calculations are based upon 310 CMR 15.203, 314 CMR 7.15 and architectural floor plans provided by KDI.

II. CALCULATIONS

Number of Bedrooms	4
Average Daily Flow (110 gal/day/bedroom)	440 gpd
Peaking Factor	5.5
Total Peak Flow	1.68 gal/min
Slope	0.020
Pipe Size	6"

III. DESIGN

PVC pipe (Manning's roughness coefficient = 0.011) at the calculated slope and diameter is adequate for flows of 420 gal/min and less. The proposed design falls within acceptable limits.

IV. CONCLUSION

Six-inch (6") PVC, SDR 35, ASTM D3034 is proposed for the sewer line.

Appendix G

DOMESTIC WATER DEMAND CALCULATIONS AND PIPE SIZING

LOCATION: 73 Concord Ave	[REDACTED]	Design Consultants, Inc.
DESCRIPTION OF FACILITY:	2-unit Townhouse	Calc by: CR
Architectural Reference Plans:	KDI	Date: 3-July

UNITS	DESCRIPTION	DCI Job#:	2014-024	FACTOR	HOT	COLD
4	BATHTUBS (W/WO SHOWERHEAD)			2	8	8
0	DRINKING FOUNTAIN			1	N/A	0
2	DISHWASHER (DOMESTIC)			2	4	4
2	KITCHEN SINKS (RESIDENTIAL)			2	4	4
0	KITCHEN SINKS (COMMERCIAL)			6	0	0
4	LAVATORIES			1	4	4
2	WASHING MACHINE/LAUNDRY TRAY			2	0	4
0	URINALS (FLUSH VALVE TYPE)			6	N/A	0
4	WATER CLOSETS (TANK TYPE)			1	N/A	4
0	WATER CLOSETS (FLUSH VALVE TYPE)			12	N/A	0
0	HOSE FAUCET/SILL COCK/HOSE BIBBS			2	N/A	0
0	OTHER			0	0	0

adding HOT & COLD values yields... FIXTURE UNITS: 48 = 20 + 28

SELECT PROPER DEMAND FACTOR FROM TBL 2 (SEE BELOW) 0.50

MULTIPLY TOTAL x DEMAND FACTOR (FROM TABLE 2) 48 x 0.5 = 24

A CAPACITY VALUE OF 24 WOULD REQUIRE A WATER SERVICE SIZE OF 1"

<u>TABLE 2</u>	
<u>OCCUPANCY USE</u>	<u>DEMAND FACTOR</u>
RES. 1 OR 2 FAMILY	0.50

<u>TABLE 3</u>	
<u>SERVICE PIPE SIZE</u>	<u>CAPACITY VALUE</u>
3/4 "	NOT RECOMMENDED

	MULTI-RESIDENTIAL	0.35		1 "	9.1 TO	16.5
	HOTEL	0.70		1 1/2 "	16.6 TO	55.0
BUS. GENERAL		0.25		2 "	55.1 TO	107.5
	RESTAURANT/CAFÉ	0.70		4 "	107.5 TO	700

Note: Calculations based upon Mass. Plumbing Codes (248 CMR 10.14)

Note: Calculations are preliminary, to be confirmed by Registered MEP Engineer.