



Main Office:
120 MIDDLESEX AVE. STE 20
SOMERVILLE, MA 02145
Tel: 617-776-3350

North Shore Office:
68 PLEASANT STREET
NEWBURYPORT, MA 01950
Tel: 978-358-7173

Drainage Report

For

181-197 Washington Street Somerville, MA

April 9, 2013



Prepared for:
Somerville Community Corp
DCI Project #2011-081

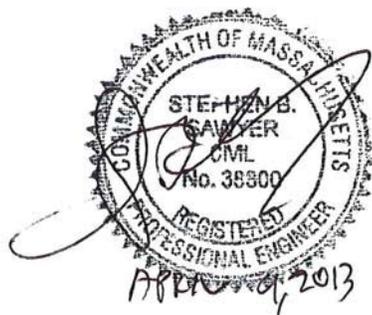


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ATTACHMENTS

- A. Existing Catchment Areas & Stormwater Calculations
- B. Proposed Catchment Areas & Stormwater Calculations
- C. 4:1 Inflow/Infiltration Calculations

INTRODUCTION

The Somerville Community Corp. proposes the development of the property at 181-197 Washington Street in Somerville, MA. The site is zoned Corridor Commercial District (CCD) and is located at the intersection of Washington Street and Boston Street. The existing parcel covers 49,876 square feet (1.145 acres). The developer is proposing the construction of two, five-story mixed-use buildings, with office and retail spaces on the ground floor and residential units above.

EXISTING CONDITION

The existing site is comprised of four lots, identified by the Somerville Assessors Department as Map 81; Block A, Lots 12, 13, 14 and 16. The lots are currently occupied by multiple buildings, including three attached brick buildings and a wood frame building used as a funeral home. There is a paved parking area associated with each building. The existing site is approximately 77% impervious.

The site is located on the south side of Prospect Hill. The previous development of the site included many retaining walls, both between the uphill abutting properties as well as between the lots themselves.

The easterly portion of the site is graded much flatter than the westerly portion. The easterly portion is nearly entirely impervious and has an existing drainage system, comprised of catch basins and roof drains, that minimizes surface runoff offsite. There are two existing connections that tie into a 12" combined sewer in Boston Street, one from a catch basin and one from a building. There are two additional connections from the easterly portion that tie into the 15" combined sewer in Washington Street, one from a catch basin and one from a building.

The westerly portion of the site more closely follows the natural slope of Prospect Hill and is approximately 60% impervious. The building sits at the high side of the site and the front yard slopes down to Washington Street at approximately 11% grade. There is a paved parking lot, accessed by Washington Street, with 18+/- spaces on the extreme westerly end of the site. There is no existing drainage system on the westerly portion of the site.

Existing subcatchment areas are defined in Figure 1, attached.

SOILS

The NRCS Web Soil Survey characterizes the soil at the site as predominantly Urban Land and does not specify a Hydrologic Soil Group. A Geotechnical Engineering Review has been provided by Geotechnical Partnership, Inc. and site soils are generally described as consisting of glacial till. More specifically, the soils are basal till, which contains a larger percentage of fines as compared with ablation till. Therefore, for calculation purposes, an infiltration rate of 0.27 in/hr has been used in the hydrologic model, per Massachusetts Stormwater Handbook, Table 2.3.3 1982 Rawls Rates.

There are two monitoring wells on the site. Proposed sub-surface storm water storage is located close to Well #2. As reported in the geotechnical report, the lowest observed depth to groundwater in Well #2 is -6.8ft (elevation 18.7'). This elevation was used for the design of the proposed storage system.

PROPOSED CONDITION

The proposed development includes the demolition of the existing buildings and the construction of two, five-story, mixed-use buildings, with office and retail spaces on the ground floor and residential units above. Parking will be provided at grade with access off of Washington Street. Additional parking will be provided on an upper level deck, with access off of Boston Street. The proposed condition will be approximately 82% impervious.

Drainage calculations were conducted to evaluate peak discharges from the project site under the pre-development and post-development conditions. As required under the City of Somerville's Stormwater Management Policy, peak discharges under post development condition will be less than the pre-development conditions. Also, the 4:1 Inflow/Infiltration requirement is far exceeded. Calculations are attached.

The proposed stormwater management system includes collection, detention, and infiltration of storm water to achieve reduction of offsite flows. Runoff from exterior paved areas will be collected and treated by HydroGuard water quality units prior to being routed to a detention system. A restricted outlet in the detention system will reduce peak discharge rates. Runoff volume reduction will also be provided by infiltration that occurs within the detention system prior to discharging through an existing 8-inch connection to the 15-inch combined sewer in Washington Street. A separate infiltration system is proposed for the driveway ramp used to access the parking deck. This driveway is proposed to be constructed of porous pavement over 18 inches of crushed stone. The crushed stone has been modeled in the calculations as having 33% void ratio and is capable of storing up to and including the 100 year rainfall depth. Rainfall on the roof will be collected with roof drains and plumbed internally.

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), assumed to be six minutes for this site.

The designed on-site stormwater management system collects, detains, and infiltrates site stormwater to reduce off-site flows for all storm events.

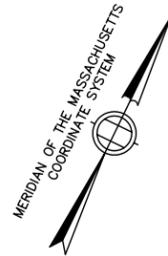
Table 1

| Description | Existing Conditions | | Proposed Conditions | |
|--------------------------------|---------------------------|----------------------------|---------------------------|----------------------------|
| Drainage Area | 1.145 Acres | | 1.145 Acres | |
| Weighted Runoff Coefficient, C | 93 | | 92 | |
| Time of Concentration | 6 minutes | | 6 minutes | |
| Storm Event (Years) | Offsite Peak Runoff (CFS) | Offsite Runoff Volume (CF) | Offsite Peak Runoff (CFS) | Offsite Runoff Volume (CF) |
| 2 | 3.14 | 10,442 | 2.60 | 9,773 |
| 10 | 4.63 | 15,692 | 3.77 | 15,187 |
| 25 | 5.54 | 18,955 | 4.44 | 18,321 |
| 100 | 6.89 | 23,875 | 5.49 | 23,048 |

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. No new storm drain connections to the combined sewer are proposed. The 4:1 I/I requirement will easily be met by significantly reducing peak stormwater runoff rates. DCI concludes that the proposed development at 181-197 Washington Street, Somerville, MA adheres to all applicable stormwater management policy.

APPENDIX A



EX 3

TOTAL AREA=7,004 S.F.
=IMPERVIOUS

DESIGN POINT 3

EX 1

TOTAL AREA=22,727 S.F.
IMPERVIOUS=13,806 S.F.
PERVIOUS= 8,921 S.F.

DESIGN POINT 1

EX 2

TOTAL AREA=20,145 S.F.
IMPERVIOUS=17,370 S.F.
PERVIOUS= 2,775 S.F.

DESIGN POINT 2

WASHINGTON STREET
(PUBLIC - VARIABLE WIDTH)

WASHINGTON TERRACE
(PRIVATE - VARIABLE WIDTH)

WASHINGTON TERRACE
(PRIVATE - VARIABLE WIDTH)

BOSTON STREET
(PUBLIC - 45' WIDE)

BENCHMARK: X-CUT ON HYDRANT
BOLT, ELEV. = 25.08 (DATUM: NAVD
1988)

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

88 PLEASANT STREET
NEWBURYPORT, MA 01950
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SCALE:
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| NO. | DATE | BY | REVISIONS |
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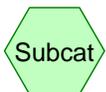
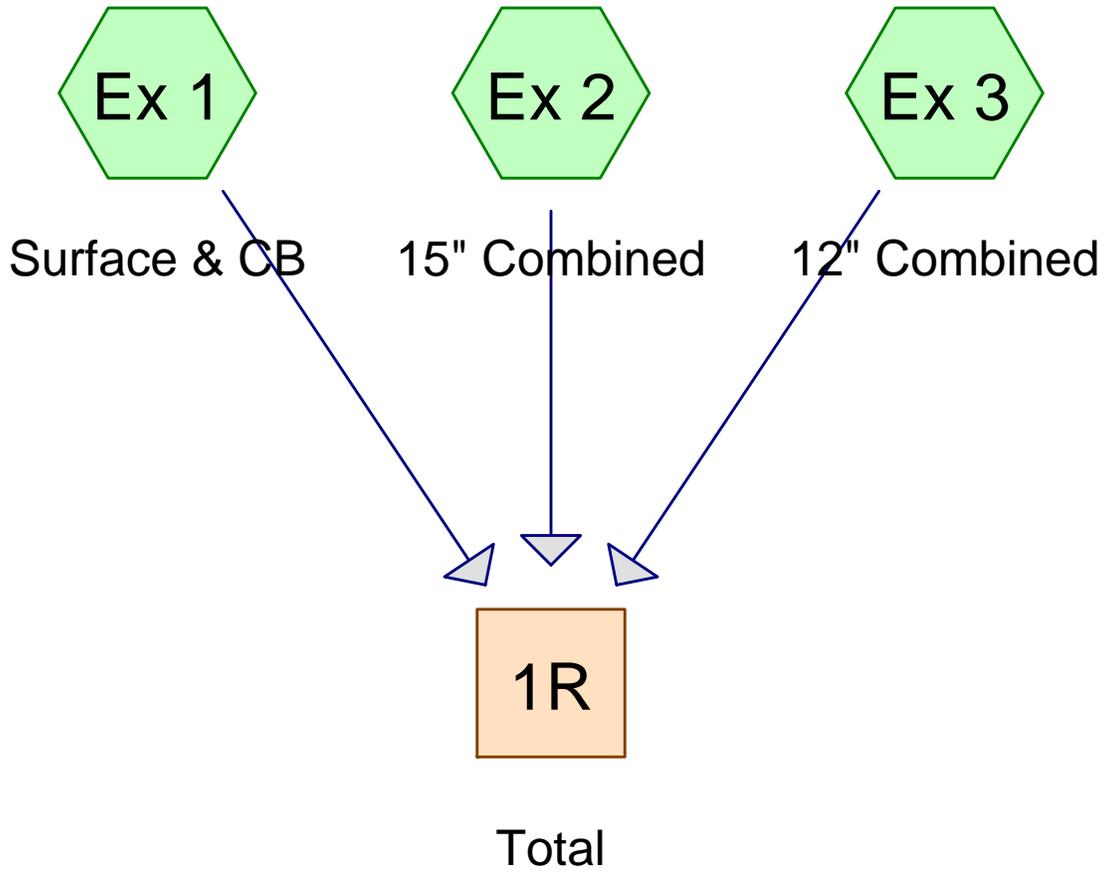
EXISTING DRAINAGE AREAS

UNION SQUARE HOUSING
WASHINGTON STREET

PLAN OF LAND IN
SOMERVILLE, MASSACHUSETTS
PREPARED FOR
SOMERVILLE CDC

PROJECT NO.
2011-081
DATE: APR. 8, 2013

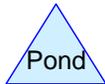
FIGURE 1



Subcat



Reach



Pond



Link

Drainage Diagram for 11-081 EX
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11-081 EX

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Page 1

Area Listing (all nodes)

| Area (sq-ft) | CN | Description (subcatchment-numbers) |
|-----------------|----|--|
| 11,696 | 79 | 50-75% Grass cover, Fair, HSG C (Ex 1, Ex 2) |
| 38,180 | 98 | Paved parking, HSG C (Ex 1, Ex 2, Ex 3) |

11-081 EX

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

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Page 2

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Ex 1: Surface & CB

Runoff Area=22,727 sf 60.75% Impervious Runoff Depth>2.16"
Tc=6.0 min CN=91 Runoff=1.28 cfs 4,096 cf

Subcatchment Ex 2: 15" Combined

Runoff Area=20,145 sf 86.22% Impervious Runoff Depth>2.55"
Tc=6.0 min CN=95 Runoff=1.28 cfs 4,273 cf

Subcatchment Ex 3: 12" Combined

Runoff Area=7,004 sf 100.00% Impervious Runoff Depth>2.87"
Tc=6.0 min CN=98 Runoff=0.47 cfs 1,673 cf

Reach 1R: Total

Inflow=3.03 cfs 10,042 cf
Outflow=3.03 cfs 10,042 cf

11-081 EX

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

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Ex 1: Surface & CB

Runoff Area=22,727 sf 60.75% Impervious Runoff Depth>3.50"
Tc=6.0 min CN=91 Runoff=2.02 cfs 6,620 cf

Subcatchment Ex 2: 15" Combined

Runoff Area=20,145 sf 86.22% Impervious Runoff Depth>3.92"
Tc=6.0 min CN=95 Runoff=1.92 cfs 6,584 cf

Subcatchment Ex 3: 12" Combined

Runoff Area=7,004 sf 100.00% Impervious Runoff Depth>4.26"
Tc=6.0 min CN=98 Runoff=0.69 cfs 2,487 cf

Reach 1R: Total

Inflow=4.63 cfs 15,692 cf
Outflow=4.63 cfs 15,692 cf

11-081 EX

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

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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Ex 1: Surface & CB

Runoff Area=22,727 sf 60.75% Impervious Runoff Depth>4.27"
Tc=6.0 min CN=91 Runoff=2.44 cfs 8,088 cf

Subcatchment Ex 2: 15" Combined

Runoff Area=20,145 sf 86.22% Impervious Runoff Depth>4.71"
Tc=6.0 min CN=95 Runoff=2.29 cfs 7,913 cf

Subcatchment Ex 3: 12" Combined

Runoff Area=7,004 sf 100.00% Impervious Runoff Depth>5.06"
Tc=6.0 min CN=98 Runoff=0.81 cfs 2,953 cf

Reach 1R: Total

Inflow=5.54 cfs 18,955 cf
Outflow=5.54 cfs 18,955 cf

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

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Page 5

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Ex 1: Surface & CB

Runoff Area=22,727 sf 60.75% Impervious Runoff Depth>5.44"
Tc=6.0 min CN=91 Runoff=3.06 cfs 10,310 cf

Subcatchment Ex 2: 15" Combined

Runoff Area=20,145 sf 86.22% Impervious Runoff Depth>5.90"
Tc=6.0 min CN=95 Runoff=2.83 cfs 9,913 cf

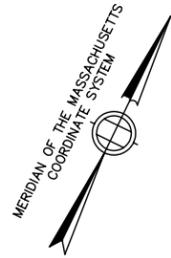
Subcatchment Ex 3: 12" Combined

Runoff Area=7,004 sf 100.00% Impervious Runoff Depth>6.26"
Tc=6.0 min CN=98 Runoff=1.00 cfs 3,652 cf

Reach 1R: Total

Inflow=6.89 cfs 23,875 cf
Outflow=6.89 cfs 23,875 cf

APPENDIX B



WASHINGTON TERRACE
(PRIVATE - VARIABLE WIDTH)

WASHINGTON TERRACE
(PRIVATE - VARIABLE WIDTH)

BOSTON STREET
(PUBLIC - 45' WIDE)

WASHINGTON STREET
(PUBLIC - VARIABLE WIDTH)

PR 1

TOTAL AREA=49,876 S.F.

BUILDING=23,504 S.F.

IMPERVIOUS=19,140 S.F.

PERVIOUS=7,232 S.F.

BENCHMARK: X-CUT ON HYDRANT
BOLT, ELEV. = 25.08 (DATUM: NAVD
1988)

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SOMERVILLE, MA 02145
617-776-3350

88 PLEASANT STREET
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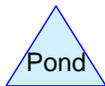
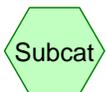
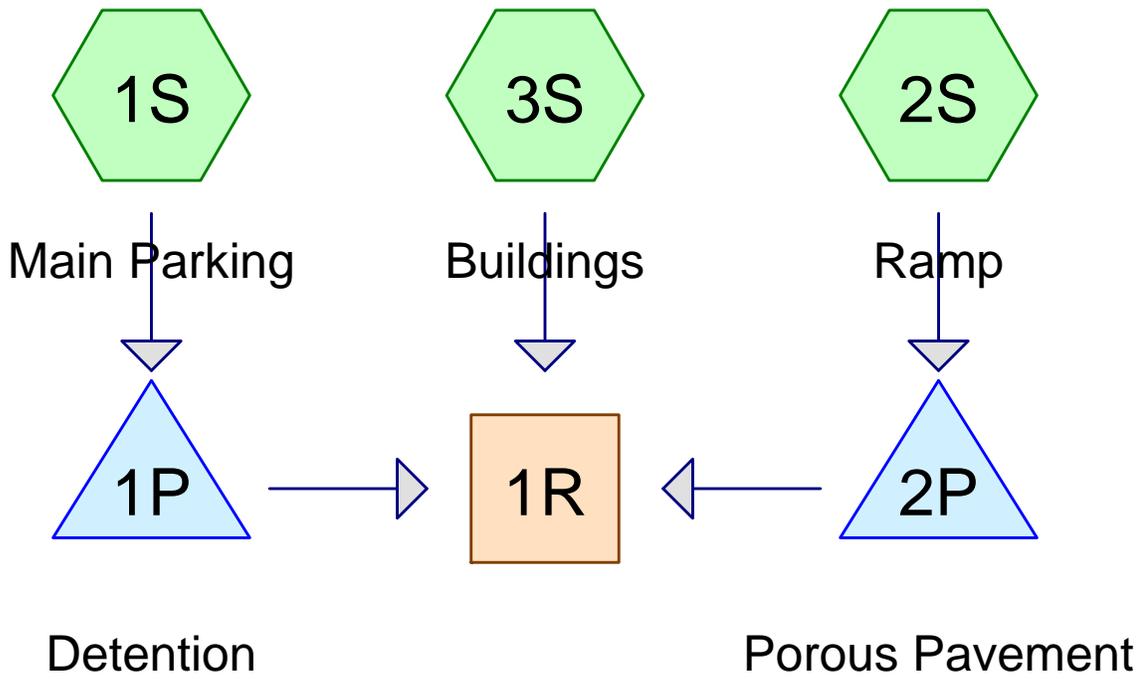
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| SCALE: | | | |
| HORIZ: | N.T.S. | | |
| VERT: | | | |
| NO. | DATE | BY | REVISIONS |

DESIGNED: RLB
DRAFTED: RLB/SSW
CHECKED: SBS
APPROVED: SBS

PROPOSED DRAINAGE AREAS
UNION SQUARE HOUSING
WASHINGTON STREET

PLAN OF LAND IN
SOMERVILLE, MASSACHUSETTS
PREPARED FOR
SOMERVILLE CDC

PROJECT NO.
2011-081
DATE: APR. 8, 2013
FIGURE 2



11-081 PR

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Page 2

Area Listing (all nodes)

| Area (sq-ft) | CN | Description (subcatchment-numbers) |
|-----------------|----|---------------------------------------|
| 1,848 | 30 | Porous Pavement (2S) |
| 7,232 | 74 | >75% Grass cover, Good, HSG C (1S) |
| 17,292 | 98 | Paved parking, HSG C (1S) |
| 23,504 | 98 | Unconnected roofs, HSG C (3S) |
| 49,876 | | TOTAL AREA |

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Main Parking

Runoff Area=24,524 sf 70.51% Impervious Runoff Depth>2.16"
Tc=6.0 min CN=91 Runoff=1.38 cfs 4,420 cf

Subcatchment 2S: Ramp

Runoff Area=1,848 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment 3S: Buildings

Runoff Area=23,504 sf 100.00% Impervious Runoff Depth>2.87"
Tc=6.0 min CN=98 Runoff=1.58 cfs 5,614 cf

Reach 1R:

Inflow=2.60 cfs 9,773 cf
Outflow=2.60 cfs 9,773 cf

Pond 1P: Detention

Peak Elev=0.76' Storage=301 cf Inflow=1.38 cfs 4,420 cf
Discarded=0.00 cfs 246 cf Primary=1.10 cfs 4,160 cf Outflow=1.11 cfs 4,406 cf

Pond 2P: Porous Pavement

Peak Elev=0.00' Storage=0 cf Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Total Runoff Area = 49,876 sf Runoff Volume = 10,034 cf Average Runoff Depth = 2.41"
18.21% Pervious = 9,080 sf 81.79% Impervious = 40,796 sf

Summary for Subcatchment 1S: Main Parking

Runoff = 1.38 cfs @ 12.09 hrs, Volume= 4,420 cf, Depth> 2.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.10"

| Area (sf) | CN | Description |
|-----------|----|-------------------------------|
| 17,292 | 98 | Paved parking, HSG C |
| 7,232 | 74 | >75% Grass cover, Good, HSG C |
| 24,524 | 91 | Weighted Average |
| 7,232 | | 29.49% Pervious Area |
| 17,292 | | 70.51% Impervious Area |

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

Summary for Subcatchment 2S: Ramp

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

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.10"

| Area (sf) | CN | Description |
|-----------|----|-----------------------|
| * 1,848 | 30 | Porous Pavement |
| 1,848 | | 100.00% Pervious Area |

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

Summary for Subcatchment 3S: Buildings

Runoff = 1.58 cfs @ 12.09 hrs, Volume= 5,614 cf, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.10"

| Area (sf) | CN | Description |
|-----------|----|--------------------------|
| 23,504 | 98 | Unconnected roofs, HSG C |
| 23,504 | | 100.00% Impervious Area |
| 23,504 | | 100.00% Unconnected |

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

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Page 5

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

Summary for Reach 1R:

Inflow Area = 49,876 sf, 81.79% Impervious, Inflow Depth > 2.35" for 2-Year event
 Inflow = 2.60 cfs @ 12.10 hrs, Volume= 9,773 cf
 Outflow = 2.60 cfs @ 12.10 hrs, Volume= 9,773 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Pond 1P: Detention

Inflow Area = 24,524 sf, 70.51% Impervious, Inflow Depth > 2.16" for 2-Year event
 Inflow = 1.38 cfs @ 12.09 hrs, Volume= 4,420 cf
 Outflow = 1.11 cfs @ 12.15 hrs, Volume= 4,406 cf, Atten= 20%, Lag= 3.8 min
 Discarded = 0.00 cfs @ 9.25 hrs, Volume= 246 cf
 Primary = 1.10 cfs @ 12.15 hrs, Volume= 4,160 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 0.76' @ 12.15 hrs Surf.Area= 714 sf Storage= 301 cf

Plug-Flow detention time= 8.1 min calculated for 4,406 cf (100% of inflow)
 Center-of-Mass det. time= 6.0 min (809.2 - 803.2)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|--------|---------------|--|
| #1A | 0.00' | 525 cf | 8.17'W x 87.44'L x 2.33'H Field A 1,666 cf Overall - 354 cf Embedded = 1,312 cf x 40.0% Voids |
| #2A | 0.50' | 354 cf | StormTech SC-310 x 24 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap |
| #3 | 0.00' | 176 cf | 4.00'D x 7.00'H CB x 2 -Impervious |
| | | 1,055 cf | Total Available Storage |

Storage Group A created with Chamber Wizard

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|--------|--|
| #1 | Primary | 0.00' | 8.0" Round Culvert L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 0.00' / -1.00' S= 0.0200 ' / Cc= 0.900 n= 0.010 PVC, smooth interior |
| #2 | Discarded | 0.00' | 0.270 in/hr Exfiltration over Surface area |

Discarded OutFlow Max=0.00 cfs @ 9.25 hrs HW=0.07' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.10 cfs @ 12.15 hrs HW=0.76' (Free Discharge)
 ↳ **1=Culvert** (Inlet Controls 1.10 cfs @ 3.15 fps)

Summary for Pond 2P: Porous Pavement

Inflow Area = 1,848 sf, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
 Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 0.00' @ 0.00 hrs Surf.Area= 1,848 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|--------|---------------|---|
| #1 | 0.00' | 915 cf | 21.00'W x 88.00'L x 1.50'H Stone 2,772 cf Overall x 33.0% Voids |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|--------|---|
| #1 | Discarded | 0.00' | 0.270 in/hr Exfiltration over Surface area |

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↑**1=Exfiltration** (Passes 0.00 cfs of 0.01 cfs potential flow)

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Main Parking

Runoff Area=24,524 sf 70.51% Impervious Runoff Depth>3.50"
Tc=6.0 min CN=91 Runoff=2.18 cfs 7,144 cf

Subcatchment 2S: Ramp

Runoff Area=1,848 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment 3S: Buildings

Runoff Area=23,504 sf 100.00% Impervious Runoff Depth>4.26"
Tc=6.0 min CN=98 Runoff=2.32 cfs 8,347 cf

Reach 1R:

Inflow=3.77 cfs 15,187 cf
Outflow=3.77 cfs 15,187 cf

Pond 1P: Detention

Peak Elev=1.26' Storage=555 cf Inflow=2.18 cfs 7,144 cf
Discarded=0.00 cfs 282 cf Primary=1.62 cfs 6,840 cf Outflow=1.62 cfs 7,122 cf

Pond 2P: Porous Pavement

Peak Elev=0.00' Storage=0 cf Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Total Runoff Area = 49,876 sf Runoff Volume = 15,490 cf Average Runoff Depth = 3.73"
18.21% Pervious = 9,080 sf 81.79% Impervious = 40,796 sf

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Main Parking

Runoff Area=24,524 sf 70.51% Impervious Runoff Depth>4.27"
Tc=6.0 min CN=91 Runoff=2.63 cfs 8,728 cf

Subcatchment 2S: Ramp

Runoff Area=1,848 sf 0.00% Impervious Runoff Depth>0.02"
Tc=6.0 min CN=30 Runoff=0.00 cfs 3 cf

Subcatchment 3S: Buildings

Runoff Area=23,504 sf 100.00% Impervious Runoff Depth>5.06"
Tc=6.0 min CN=98 Runoff=2.73 cfs 9,910 cf

Reach 1R:

Inflow=4.44 cfs 18,321 cf
Outflow=4.44 cfs 18,321 cf

Pond 1P: Detention

Peak Elev=1.64' Storage=716 cf Inflow=2.63 cfs 8,728 cf
Discarded=0.00 cfs 294 cf Primary=1.92 cfs 8,411 cf Outflow=1.92 cfs 8,705 cf

Pond 2P: Porous Pavement

Peak Elev=0.00' Storage=0 cf Inflow=0.00 cfs 3 cf
Outflow=0.00 cfs 2 cf

Total Runoff Area = 49,876 sf Runoff Volume = 18,641 cf Average Runoff Depth = 4.48"
18.21% Pervious = 9,080 sf 81.79% Impervious = 40,796 sf

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Main Parking

Runoff Area=24,524 sf 70.51% Impervious Runoff Depth>5.44"
Tc=6.0 min CN=91 Runoff=3.30 cfs 11,125 cf

Subcatchment 2S: Ramp

Runoff Area=1,848 sf 0.00% Impervious Runoff Depth>0.13"
Tc=6.0 min CN=30 Runoff=0.00 cfs 20 cf

Subcatchment 3S: Buildings

Runoff Area=23,504 sf 100.00% Impervious Runoff Depth>6.26"
Tc=6.0 min CN=98 Runoff=3.36 cfs 12,257 cf

Reach 1R:

Inflow=5.49 cfs 23,048 cf
Outflow=5.49 cfs 23,048 cf

Pond 1P: Detention

Peak Elev=2.50' Storage=941 cf Inflow=3.30 cfs 11,125 cf
Discarded=0.00 cfs 308 cf Primary=2.47 cfs 10,791 cf Outflow=2.48 cfs 11,099 cf

Pond 2P: Porous Pavement

Peak Elev=0.00' Storage=1 cf Inflow=0.00 cfs 20 cf
Outflow=0.00 cfs 20 cf

Total Runoff Area = 49,876 sf Runoff Volume = 23,402 cf Average Runoff Depth = 5.63"
18.21% Pervious = 9,080 sf 81.79% Impervious = 40,796 sf

APPENDIX C

INFILTRATION/INFLOW REMOVAL CALCULATIONS

I. INTRODUCTION

The following infiltration/inflow removal calculations are based upon 310 CMR 15.203, the sewer calculations presented above, and the storm drainage calculations summarized in Table I. The City of Somerville requires that infiltration/inflow removal of four times the proposed additional average daily sewer flow must be provided by the project.

II. CALCULATIONS

| | |
|---|-------------------------------|
| Existing Average Daily Sewer Flow | 5,540 gal/day |
| Proposed Average Daily Sewer Flow | 23,605 gal/day |
| Additional Average Daily Flow | 18,065 gal/day |
| Four Times Additional Average Daily Flow | 72,260 gal/ day = 0.11 cfs |

III. REMOVAL

The required 0.11 cfs of infiltration/ inflow will be removed from the combined sewer system by peak flow reduction in the storm drainage from the site. Subtraction of the proposed flow rates from the existing flow rates given in Table 1 gives flow reductions of 0.54 cfs, 0.86 cfs, 1.10 cfs, and 1.40 cfs for the 2 yr., 10yr., 25 yr., and 100 yr. Storms respectively. All of these flow reductions exceed the required removal of 0.11 cfs.

IV. CONCLUSION

Because the storm drainage flow reductions provided by the project exceed the required infiltration/inflow removal rate we conclude that the proposed design meets and exceeds the requirement for infiltration/inflow removal.