G - Stormwater Management Summary

Memorandum

To: Rachel Borgatti
Somerville Conservation Commission
Somerville City Hall
93 Highland Avenue
Somerville, MA 02143

Date: August 23, 2018

Project #: 14000.01

From: Peter Mara, P.E.

Re: XMBLY, Notice of Intent
Supplemental Stormwater Memo
5 Middlesex Avenue
Somerville, Massachusetts

This memorandum summarizes the stormwater management system for a portion of the proposed XMBLY as part of the master plan XMBLY Planned Unit Development (PUD) located at 5 Middlesex Avenue in the Assembly Square Mixed-Use District in Somerville, Massachusetts (the "Site"). This memorandum focuses on the portion of XMBLY is Alta XMBLY and the eastern half of Road L (the "Project"). Alta XMBLY was previously referred to as Block 23 in the XMBLY PUD. See Figure 1 for a Site Locus Plan. XMBLY is a mixed-use development that recently received Planned Unit Development – Preliminary Master Plan approval by the City of Somerville on June 7, 2018. Alta XMBLY was submitted to the City of Somerville for a Special Permit with Site Plan Approval on July 5, 2018, and is currently awaiting the City's decision.

The northeast corner of Alta XMBLY and adjacent eastern half of Road L are to redevelop a parcel of land, subject to an Order of Conditions (OOC) issued on May 8, 2009. This Order of Conditions was issued to the Assembly on Mystic Proposed 72-inch Storm Drain and Outfall Notice of Intent (NOI) dated November 21, 2008 submitted to the City of Somerville during the development of the neighboring Assembly Row development. Condition #62 of these 2009 OOC states that any future phase of the Assembly development utilizing the 72-inch outfall will require an amendment to the 2009 OOC before the development can occur. The Project's proposed stormwater management system design remains generally consistent with the stormwater management plan outlined in the previous site plan filings with the City of Somerville Planning Board and Conservation Commission.

The portion of Site that falls under the area that was part of the November 21, 2008 NOI labeled as Drainage Area designated "S2", as shown on Figure 2, which contributes to the 72-inch outfall at the Mystic River, downstream of the Amelia Earhart Dam. Drainage Area "S2" is the only portion of the Site that is under the subject of Condition #62 of the 2009 OOC. The memorandum focuses on the parts of the Site that contribute runoff to Drainage Area "S2", which includes the eastern half of Road L, sidewalk along Grand Union Boulevard and Road L, and part of the Alta XMBLY building footprint. The second existing drainage area, "S3", consists of the remainder of the proposed Alta XMBLY building, sidewalk, planters, and permeable pavers, and does not fall under the jurisdiction of the November 2008 NOI. Both Drainage Areas contribute stormwater runoff to the existing 72-inch outfall in the existing conditions and propose to improve stormwater quality by reducing impervious surface parking area.

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Hydrologic Analysis:

Existing Conditions

The Project is planned to be the first block developed at XMBLY. Under existing conditions, XMBLY has two drainage discharge points. The eastern half of the XMBLY development conveys the stormwater runoff to the existing stormwater infrastructure in Foley Street and Grand Union Boulevard, which flows East to the recently built 72-inch drainage outfall and ultimately discharging to the Mystic River downstream of the Amelia Earhart Dam. The western half of XMBLY conveys the stormwater runoff to the existing stormwater infrastructure near the intersection of Foley Street and Middlesex Avenue, which flows North to the existing 84-inch drainage outfall and ultimately discharging in the Mystic River downstream of the Amelia Earhart Dam. See Figure 3 for XMBLY's existing drainage boundaries.

Figure 5 shows the existing portions of Drainage Area "S2", for the development of Alta XMBLY and Road L, which consists mostly of a paved surface parking lot, a grass slope in poor condition, gravel surface, sidewalk, and a temporary construction trailer. Much of the runoff flows towards an area drain next to the temporary construction trailer that conveys the stormwater runoff into the closed pipe network in Grand Union Boulevard, ultimately reaching the 72-inch outfall. Currently the stormwater runoff generated in Drainage Area "S2" does not receive any water quality treatment prior to the 72-inch outfall.

Drainage Area "S3" consists primarily of paved surface parking lot with minimal landscape islands. The existing surface parking lot generates stormwater runoff that is collected by catch basins that convey the runoff to a closed pipe network that connects into the existing drainage infrastructure in Foley Street prior to discharging at the existing 72-inch outfall on the Mystic River. No water quality treatment is provided under existing conditions for the runoff collected in Drainage Area "S3" currently. Table 1 below provides a summary of the existing conditions hydrologic data.

Table 1
Existing Conditions Hydrologic Data

Description (Drainage Area #)	*Discharge Location*	*Design Point*	*Area (acres)*	*Curve Number*	*Time of Concentration (min)*
S2	*Area Subject to Condition #62*	*DP-1*	*0.2*	*91*	*5.0*
S3	*Area Not Subject to Condition #62*	*DP-1*	*1.6*	*97*	*5.0*
		Total:	1.8		

According to the National Resources Conservation Service (NRCS), surface soils in the Site include Urban Land with a Wet Substratum and Udorthents. Based on the soil type identified by the NRCS, included in Attachment 2, the Project

is not considered to be within an area of rapid infiltration (soils with a saturated hydraulic conductivity greater than 2.4 inches per hour).

Proposed Conditions

An overall goal of the XMBLY stormwater design is to provide a comprehensive stormwater management system designed to enhance the water resources both on the XMBLY Site and downstream of the master development. XMBLY will vastly improve the existing conditions on the Site and accomplish this goal by:

- Implementing an environmentally sensitive site design that creates additional open space areas and significantly reduces the amount of on-site paved surface parking areas thereby re-establishing components of a natural water cycle (evapotranspiration, groundwater recharge and runoff) on the Site.
- Improving the surface water and groundwater quality by implementing integrated stormwater controls throughout the Project area including the use of Low Impact Development (LID) techniques, where feasible, as well as traditional stormwater Best Management Practices (BMPs) combined with a thorough Operation and Maintenance Plan.
- The stormwater management system is designed to attenuate the peak rate and volume of runoff to meet existing conditions.

XMBLY, under proposed master plan conditions, maintains the existing hydrologic conditions and corresponding drainage boundaries (see Figure 4 for XMBLY's proposed drainage areas). The eastern half of XMBLY's Site will convey stormwater runoff to the 72-inch outfall and the western half will convey stormwater to the 84-inch outfall. Alta XMBLY at XMBLY proposes to maintain these master plan drainage patterns. The Project proposes to remove approximately 62,700 SF of impervious surface parking area. This removal of surface parking is an immediate improvement on the Site.

As shown in Figure 6, under proposed conditions, the Project is split into two drainage areas, "S2" and "S3". The Project proposes an eight-story mixed-use building with retail and townhomes on the first floor and residential units on the upper floors. The proposed Alta XMBLY is flat, with sidewalks, planters, permeable pavers, and tree pits surrounding the building. Road L is a two-way roadway, with 11-foot travel lanes and crowned 2% cross-slopes sloping down towards the six-inch vertical granite curb lines. Road L has a high point in the center of the road, aligned with the middle of the curb apron on the northern side of Alta XMBLY. The eastern half of the roadway grades to a series of catch basins and a water quality unit, providing water quality treatment and Total Suspended Solids (TSS) removal prior to conveying the stormwater runoff through a closed pipe network that connects into the existing 72-inch trunkline in Grand Union Boulevard. This runoff pattern is generally unchanged from the November 2008 NOI, thought he layout of the Assembly Row roadways has been revised slightly and the Partners Office project has been included instead of the IKEA project on Parcel 11A.

The two proposed drainage areas are the same under existing conditions. The stormwater runoff generated in Drainage Area "S2" falls under the jurisdiction of the November 2008 NOI and May 2009 Order of Conditions, thus

subject to following the ten Massachusetts Department of Environmental Protection (MassDEP) Stormwater Standards. The stormwater runoff generated by Drainage Area "S3" is not under the jurisdiction of an existing Order of Condition and does not fall within 100-feet of an environmentally sensitive area. The Project qualifies as a redevelopment; therefore, it must address the ten MassDEP Stormwater Standards to the maximum extent possible.

Table 2 below provides a summary of the proposed conditions hydrologic data for the Project.

Table 2
Proposed Conditions Hydrologic Data

Description (Drainage Area #)	*Discharge Location*	*Design Point*	*Area (acres)*	*Curve Number*	*Time of Concentration (min)*
S2	*Road L - Area Subject to Condition #62*	*DP-1*	*0.1*	*98*	*5.0*
S3	*XMBLY - Area Not Subject to Condition #62*	*DP-1*	*1.7*	*96*	*5.0*
		Total:	1.8		

A revised hydrologic analysis was conducted for the site based on the input parameters described above. As in the previous submission, the rainfall-runoff response of the Site under existing and proposed conditions was evaluated for storm events with recurrence intervals of 2, 10, 25, and 100-years. Rainfall volumes used for this analysis were based on the Natural Resources Conservation Service (NRCS) Type III, 24-hour storm event for Middlesex County. Runoff coefficients for the existing and proposed conditions were determined using NRCS Technical Release 55 (TR-55) methodology as provided in HydroCAD.

Drainage areas used in the analyses are represented above and are depicted on the attached Figures 5 and 6. Table 3 presents a summary of the existing and proposed conditions peak discharge rates.

Table 3
Peak Discharge Rates (cubic feet per second)

Design Point DP-1 72-inch Outfall	*2-year*	*10-year*	*25-year*	*100-year*
Existing	*5.32*	*8.22*	*10.47*	*15.04*
Proposed	*5.35*	*8.25*	*10.50*	*15.08*

As shown in Table 3, there is an insignificant increase in peak discharge rates from existing to proposed conditions. This slight increase in peak discharge rates is negligible and the runoff is discharged to tidal water. Although the Project increases the peak discharge rates, the overall XMBLY Site reduces impervious area from existing to proposed conditions, thus reducing runoff volume. The Project is the only portion of the overall XMBLY PUD that has an increase in impervious area, thus increasing runoff volume and peak rates.

Water Quality

The stormwater management system provides the required treatment for a 1-inch water quality volume. Only the roadway areas tributary to Drainage Area "S2" will be subject to water quality. The rest of the Site is considered clean sidewalks and rooftops, neither of which are accessible to vehicular traffic. The Project utilizes LID techniques, including green roofs and water quality units, to decrease impervious area and provide water quality, respectively.

The eastern half of the roadway grades to a series of catch basins and a proprietary separator, providing water quality treatment and Total Suspended Solids (TSS) removal prior to conveying the stormwater runoff through a closed pipe network that connects into the existing 72-inch trunkline in Grand Union Boulevard. The pipe sizing and TSS removal calculations can be found in Attachment 3.

Water quality treatment for Alta XMBLY and Road L runoff consists of an operation and maintenance program for water quality measures and a construction phase spill prevention plan.

Operation and Maintenance (O&M) Program

A detailed Stormwater O&M program has been prepared for the Project. This plan includes detailed inspection criteria and identifies the responsible parties for implementing the program. In summary, The City of Somerville will be responsible for the maintenance and operation of the street drainage system, including street sweeping, catch basin and manhole cleaning, and maintenance of the street related structures. The Applicant will be responsible for the maintenance and operation of the XMBLY stormwater management systems including inspection, cleaning and maintenance of the drainage structure, and tree box filters on the site.

Spill Prevention

A spill prevention and control plan is an important Best Management Practice (BMP) to help minimize potential sources of pollution to ground and surface waters both during construction and as part of the long-term operation and maintenance measures of a development. Spill prevention is achieved with the proper storage and handling of hazardous materials. During construction, this is addressed in the Stormwater Pollution Prevention Plan (SWPPP) for Construction Activities to be prepared and implemented by the Site Contractor.

Water Quality Unit

The proposed Stormceptor 450i water quality units serve as treatment for runoff from the proposed Road L prior to discharge to the 72-inch outfall. The stormwater runoff from the paved surface of Road L that drain to the proposed proprietary separator receives TSS and oil removal through this proprietary separator. Water Quality Units are key features for TSS removal within dense ultra-urban brownfield redevelopment settings where space is a limiting factor for placement of alternative large-scale surface BMPs.

The water quality unit will be inspected four times per year and cleaned a minimum of once per year, or when the sediment depth reaches within 15% of the unit's storage capacity.

Compliance with Massachusetts Department of Environmental Protection (DEP) - Stormwater Management Standards

As demonstrated below, the proposed Project complies with the DEP Stormwater Management Standards to the maximum extent practicable.

Standard 1: No New Untreated Discharges or Erosion to Wetlands

The stormwater runoff generated within Drainage Area "S2" and tributary to the existing 72-inch outfall will receive water quality treatment in conformance with the Best Management Practices outlined in the Stormwater Management Performance Standards and Guidelines. The Alta XMBLY redevelopment and proposed Road L will result in improvements to the quality of stormwater discharged from the Project Site. These improvements will be achieved by reducing the overall amount of paved vehicular area; increasing the amount of pervious area; a combination of structural and non-structural BMPs implemented at the Project Site such as regular pavement sweeping and litter control program, installation of permeable pavers and a water quality unit. During the Assembly Row development, outfall erosion protection sizing computations were provided in the November 2008 NOI.

Standard 2: Peak Rate Attenuation

The Project has been designed to comply with Standard 2 to the maximum extent practicable.

The construction of Road L and Alta XMBLY will result in an increase of approximately 6,000 square feet of impervious area. The decrease in pervious area on site minimally increases peak rates. The increase in peak rates are negligible, as the Site's runoff discharges to tidal water. As presented in the approved XMBLY PUD-PMP submission, the overall master plan XMBLY project site decreases the total amount of impervious area. The only increase in impervious area within the limits of the XMBLY master plan development occurs within the project limits of Alta XMBLY.

The peak discharge rates for the 2, 10, 25, and 100-year storm events for Design Points 1 and 2 (DP-1 and DP-2) are included in Table 3 and the HydroCAD models can be found in Attachment 4.

Standard 3: Stormwater Recharge

The pre-development condition of the Project Site was almost completely impervious and little if any infiltration existed. Also, soil on the Project Site is contaminated, compacted fill material, or poor-quality material which makes it unsuitable for infiltration. Additionally, there are no drinking water supplies on or near the Project Site that require recharge. Finally, the Project is located at the terminus of the Mystic River and therefore any infiltration on the site is an insignificant portion of the flows that are supplying the river.

Standard 4: Water Quality

The Project Site is a dense ultra-urban redevelopment on a brownfield site. However, water quality treatment for runoff from the Project Site meets or exceeds the goal of 80% TSS Removal. TSS Removal worksheets are included in Attachment A of this memorandum. Figures 8 and 9 depict the areas on the Site that are tributary to the water quality unit. Due to the urban nature of the Project and the goal for maximizing dense development opportunities, water quality treatment techniques consistent with urban area constraints were selected.

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

The Project Site is a brownfield site which is a LUHPPL. Stormwater management BMP's have been selected and designed to comply with this standard. Under existing conditions infiltration is not currently significant at the Project Site and as described above infiltration is not recommended or proposed. Water quality units and extensive operations and maintenance requirements address the concerns for LUHPPLs. No surface parking is included on the Project Site with the vehicle parking located in covered garages, therefore reducing the effect of the LUHPPL's impervious area to a level of typical roadways.

Standard 6: Critical Areas

The existing MWRA 84-inch SMC and the proposed 72-inch outfall will discharge to a "Prohibited" shellfish growing area. Stormwater discharging to this area is treated for 1-inch of runoff and will utilize the applicable stormwater management BMPs approved for critical areas.

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the Maximum Extent Practicable

The Project, while a redevelopment project as defined by the regulations, complies with the Stormwater Standards to the maximum extent practicable. The proposed stormwater management system improves water quality and reduces runoff volume to the existing 72-inch outfall. Refer directly to each Standard for applicable computations and supporting information demonstrating compliance with each.

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

The Project will disturb greater than one acre of land and is therefore required to obtain coverage under the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) Construction General Permit. As required under this permit, a Stormwater Pollution Prevention Plan (SWPPP) will be developed and submitted before land disturbance begins. Recommended construction period pollution prevention and erosion and sedimentation controls to be finalized in the SWPPP are included in Attachment 4.

Standard 9: Operation and Maintenance Plan

In compliance with Standard 9, a Post Construction Stormwater Operation and Maintenance (O&M) Plan has been developed for the Project. The O&M Plan is included in Attachment 5 as part of the Long-Term Pollution Prevention Plan.

Standard 10: Prohibition of Illicit Discharges

Sanitary sewer and storm drainage structures remaining from previous development which are part of the redevelopment area will be removed or will be incorporated into updated sanitary sewer and separate stormwater sewer systems. The design plans submitted with this report have been designed so that the components included therein are in full compliance with current standards. No statement is made regarding the drainage and sanitary sewer systems in portions of the site not included in the redevelopment project area. The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges.

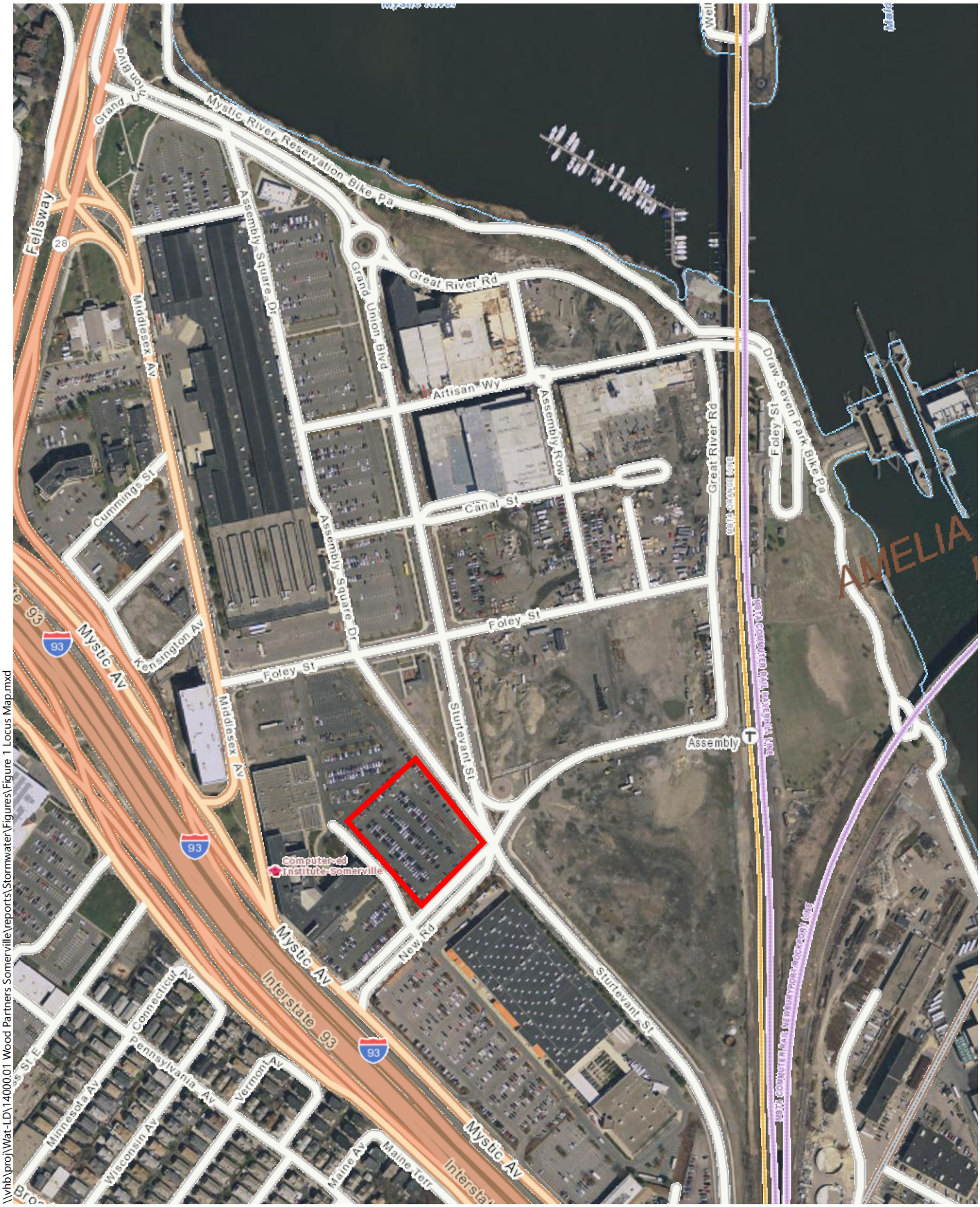
Figures

- Figure 1 – Site Location Map
- Figure 2 – Previously Proposed Full Build Project Drainage Areas
- Figure 3 –Existing Drainage Areas XMBLY
- Figure 4 – Proposed Drainage Areas XMBLY
- Figure 5 –Existing Drainage Areas Alta XMBLY and Road L
- Figure 6 –Proposed Drainage Areas Alta XMBLY and Road L
- Figure 7 – FEMA National Flood Hazard Layer FIRMette
- Figure 8 – TSS – Existing Tributary Areas
- Figure 9 – TSS – Proposed Tributary Areas

Attachments

- Attachment 1
    - DEP Checklist for Stormwater Report
- Attachment 2
    - NRCS Web Soil Survey

- Attachment 3
    - TSS Removal Calculations
    - Pipe Conduit Sizing Calculations
    - Stormceptor Sizing Report
    - Existing Conditions HydroCAD Model
    - Proposed Conditions HydroCAD Model
- Attachment 4
    - Long Term Stormwater Pollution Prevention Plan Operations and Maintenance (O&M)
    - O&M Checklist
    - Stormceptor Owner's Manual
- Attachment 5
    - List of Recommended Construction Period Erosion and Sediment Control BMPs
    - Construction Period Erosion and Sediment Control BMPs Checklist



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0 100 200 400 Feet

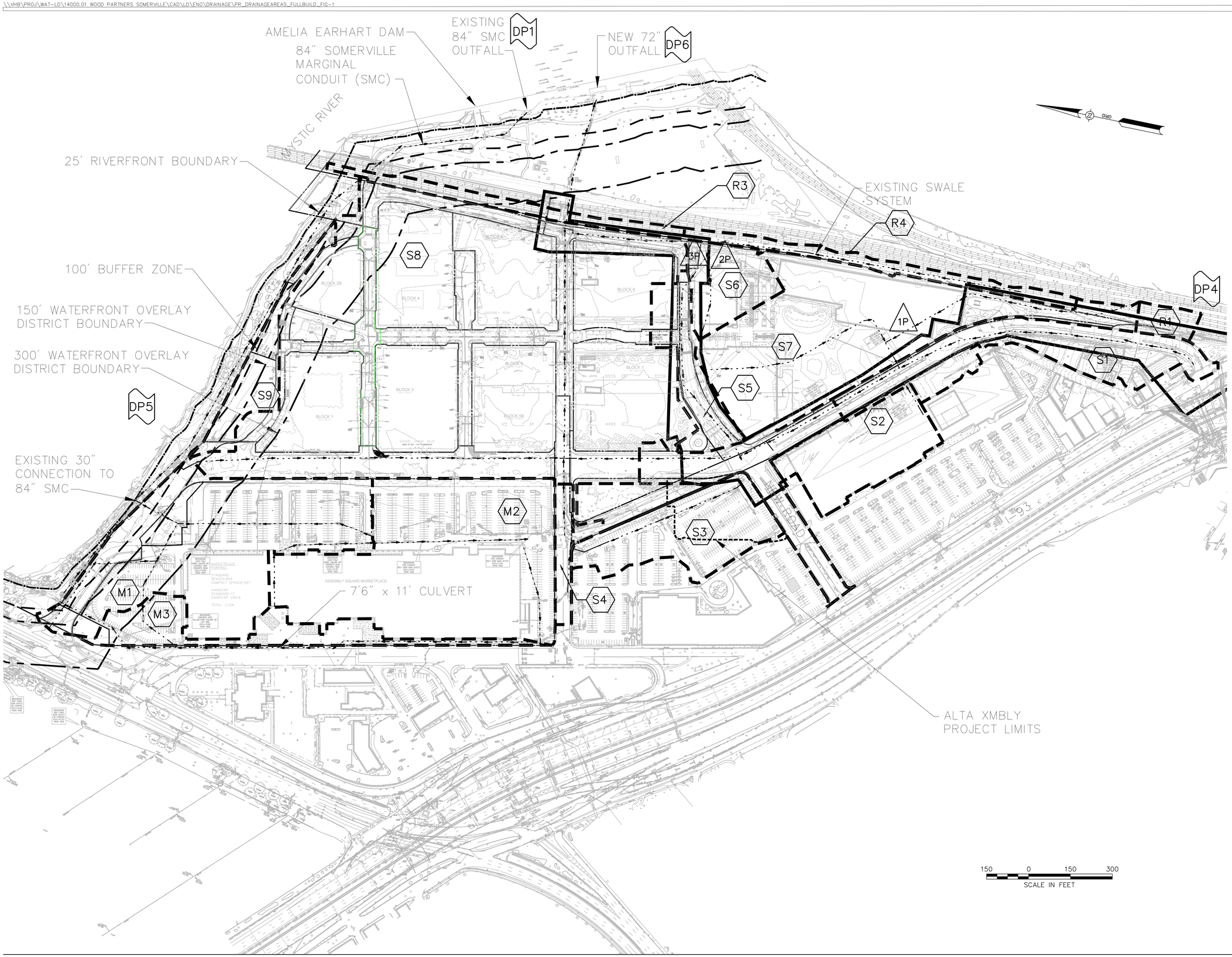
XMBLY - 5 MIddlesex Avenue | Somerville, MA

Legend

Project Site

Locus Map

Source Info: MassGIS



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LEGEND

- POND
- DESIGN POINT
- REACH
- DRAINAGE AREA DESIGNATION
- DRAINAGE AREA BOUNDARY
- TIME OF CONCENTRATION FLOW LINE
- 100' BUFFER ZONE
- WETLAND BOUNDARY
- 150' W.O.D. BOUNDARY
- 300' W.O.D. BOUNDARY
- 25' RIVERFRONT BOUNDARY

No.	Revision	Date	Appvd.

Designed by	Drawn by	Checked by	
CAD checked by		Approved by	
Scale 1"=150'		Date July 10, 2018	

Project Title
XMBLY

5 Middlesex Avenue
Somerville, Massachusetts

Issued for
Stormwater Management Report
As Part of November 2008 NOI

Not Approved for Construction

Drawing Title
Figure 2
Previously Proposed Full Build
Project Drainage Areas

Drawing Number
F-2

Sheet 1 of 1

Project Number
14000.01

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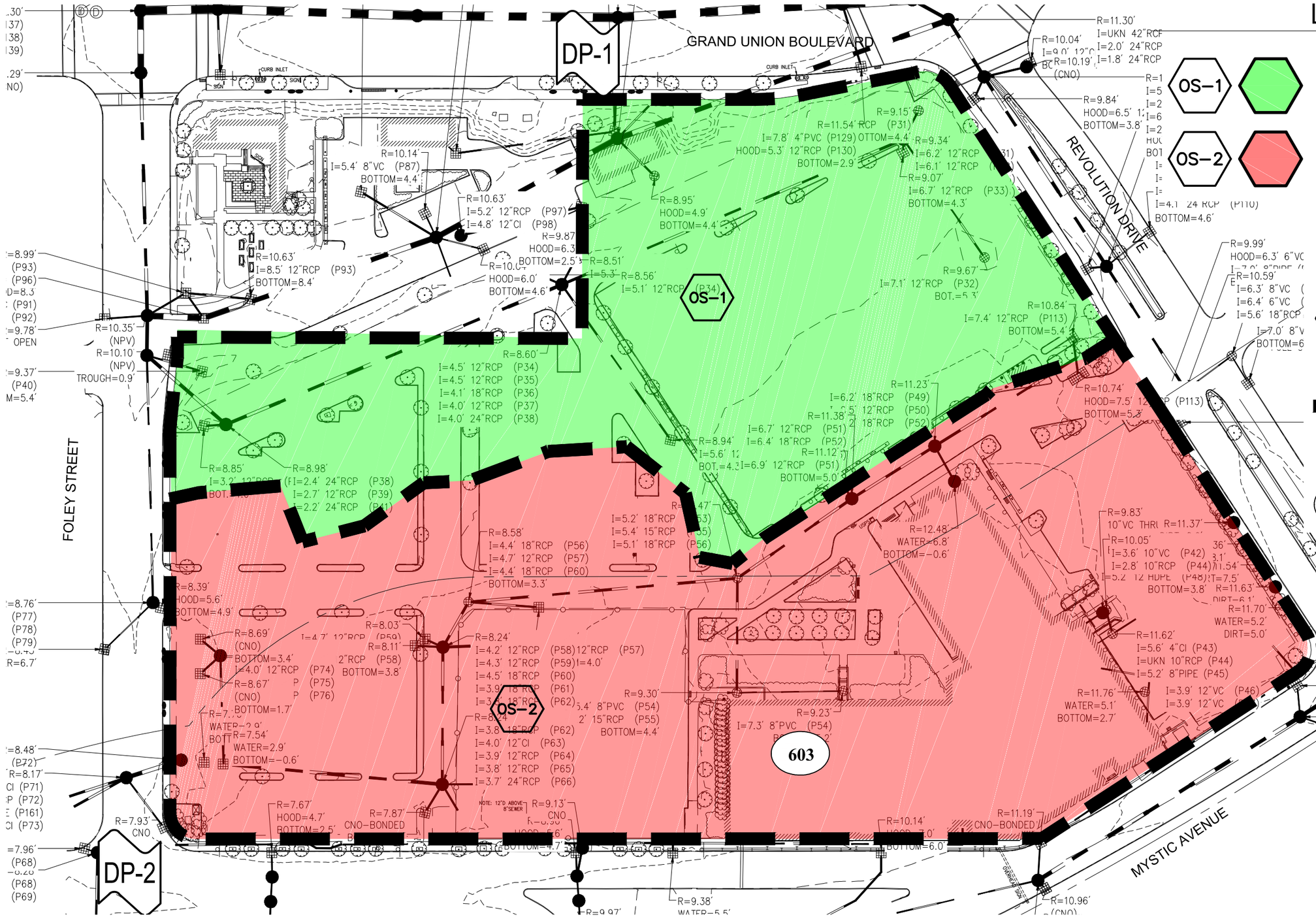

LEGEND

OS–1 — DRAINAGE AREA CONTRIBUTING TO 72" OUTFALL AT MYSTIC RIVER

OS–2 — DRAINAGE AREA CONTRIBUTING TO EXISTING MIDDLESEX AVE DRAIN LINES AND 84" OUTFALL AT MYSTIC RIVER

X — DESIGN POINT

X — DRAINAGE AREA DESIGNATION

LINETYPES

DRAINAGE AREA BOUNDARY

SCS SOIL CLASSIFICATIONS

603 — URBAN LAND, WET SUBSTRATUM

0 40 80 160 Feet

Existing Drainage Areas
XMBLY
5 Middlesex Avenue
Somerville, Massachusetts

Figure 3

July 5, 2018

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LEGEND

OS–1 — DRAINAGE AREA CONTRIBUTING TO 72" OUTFALL AT MYSTIC RIVER

OS–2 — DRAINAGE AREA CONTRIBUTING TO EXISTING MIDDLESEX AVE DRAIN LINES AND 84" OUTFALL AT MYSTIC RIVER

X — DESIGN POINT

X — DRAINAGE AREA DESIGNATION

LINETYPES

DRAINAGE AREA BOUNDARY

SCS SOIL CLASSIFICATIONS

603 — URBAN LAND, WET SUBSTRATUM

DP-1

DP-2

GRAND UNION BOULEVARD

REVOLUTION DRIVE

FOLEY STREET

MYSTIC AVENUE

Alta XMBLY
TAT - 6/5/2018

FFE = 13.0

BLOCK 21

FFE = 13.0

BLOCK 25

FFE = 13.0
GARAGE
ELEV = -2.0

BLOCK 26

FFE = VARIES

BLOCK 24
EXIST OFFICE BLDG

FFE = 13.6

FFE = 9.0
GARAGE ELEV = -2.0

OS–1

OS–2

603

0 40 80 160 Feet

vhb

Proposed Drainage Areas
XMBLY
5 Middlesex Avenue
Somerville, Massachusetts

Figure 4

July 5, 2018
REV - August 23, 2018

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LEGEND

X — DESIGN POINT

X — DRAINAGE AREA DESIGNATION

LINETYPES

DRAINAGE AREA BOUNDARY

SCS SOIL CLASSIFICATIONS

603 — URBAN LAND, WET SUBSTRATUM

DP-1

GRAND UNION BOULEVARD

CURB INLET

SIGN

REVOLUTION DRIVE

S2

S3

603

R=10.63'
I=5.2' 12"RCP (P97)
I=4.8' 12"CI (P98)

R=10.04'
HOOD=6.0'
BOTTOM=4.6'

R=9.87'
HOOD=6.3'
BOTTOM=2.5'

R=8.95'
HOOD=4.9'
BOTTOM=4.4'

R=8.51'
I=5.3' 12"RCP (P35)

=8.56'
=5.1' 12"RCP (P34)

R=8.60'
I=4.5' 12"RCP (P34)
I=4.5' 12"RCP (P35)
I=4.1' 18"RCP (P36)
I=4.0' 12"RCP (P37)
I=4.0' 24"RCP (P38)

R=8.94'
I=5.6' 12"RCP (P37)
BOT.=4.3'

R=11.54'
I=7.8' 4"PVC (P129)
HOOD=5.3' 12"RCP (P130)
BOTTOM=2.9'

R=9.15'
I=6.2' 12"RCP (P31)
BOTTOM=4.4'

R=9.34'
I=6.2' 12"RCP (P31)
I=6.1' 12"RCP (P32)
I=6.0' 12"RCP (P33)
I=6.0' 18"RCP (P36)

R=9.07'
I=6.7' 12"RCP (P33)
BOTTOM=4.3'

R=9.67'
I=7.1' 12"RCP (P32)
BOT.=5.3'

R=10.19'
I=5.4' 8"VC (P105)
I=4.2' 18"RCP (P106)
I=5.4' 12"CI (P107)
I=4.1' 24"RCP (P110)

R=9.62'
WATER=6.2'
BOTTOM=4.6'

R=10.84'
I=7.4' 12"RCP (P113)
BOTTOM=5.4'

R=10.74'
HOOD=7.5' 12"RCP (P113)
BOTTOM=5.3'

R=11.23'
I=6.2' 18"RCP (P49)
I=6.5' 12"RCP (P50)
I=6.2' 18"RCP (P52)

R=11.38'
I=6.7' 12"RCP (P51)
I=6.4' 18"RCP (P52)
I=6.3' 18"RCP (P53)

R=11.12'

0 20 40 80 Feet

vhb

Existing Drainage Areas
Alta XMBLY and Road L
5 Middlesex Avenue
Somerville, Massachusetts

Figure 5

July 10, 2018
REV - August 23, 2018

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LEGEND

- DESIGN POINT
- DRAINAGE AREA DESIGNATION

LINETYPES

- DRAINAGE AREA BOUNDARY
- TIME OF CONCENTRATION FLOW LINE

SCS SOIL CLASSIFICATIONS

- 603 — URBAN LAND, WET SUBSTRATUM

DP-1

GRAND UNION BOULEVARD

REVOLUTION DRIVE

ROAD L

ROAD K

S2

S3

603

Alta XMBLY
TAT - 6/5/2018

FFE = 13.0

CURB INLET

SIGNI

R=10.63'
I=5.2' 12"RCP (P97)
I=4.8' 12"CI (P98)

R=8.95'
HOOD=4.9'
BOTTOM=4.4'

R=9.87'
HOOD=6.3'
BOTTOM=2.5'

R=10.04'
HOOD=6.0'
BOTTOM=4.6'

R=8.51'
I=5.3' 12"RCP (P34)

R=8.60'
I=4.5' 12"RCP (P34)
I=4.1' 18"RCP (P35)
I=4.0' 12"RCP (P37)
I=4.0' 24"RCP (P38)

R=11.54'
I=7.8' 4"PVC (P129)
HOOD=5.3' 12"RCP (P130)
BOTTOM=2.9'

R=9.15'
I=6.2' 12"RCP (P31)
BOTTOM=4.4'

R=9.34'
I=6.2' 12"RCP (P31)
I=6.1' 12"RCP (P32)
I=6.0' 12"RCP (P33)
I=6.0' 18"RCP (P36)

R=9.07'
I=6.7' 12"RCP (P33)
BOTTOM=4.3'

R=9.67'
I=7.1' 12"RCP (P32)
BOT.=5.3'

R=10.84'
I=7.4' 12"RCP (P113)
BOTTOM=5.4'

R=11.23'
I=6.2' 18"RCP (P49)
I=6.5' 12"RCP (P50)
I=6.2' 18"RCP (P52)

R=10.74'
HOOD=7.5' 12"RCP (P11
BOTTOM=5.3'

R=11.12'
I=6.9' 12"RCP (P51)

I=6.7' 12"RCP (P51)
I=6.4' 18"RCP (P52)

I=5.6' 12"RCP

0 40 80 160 Feet

Proposed Drainage Areas
Alta XMBLY and Road L
5 Middlesex Avenue
Somerville, Massachusetts

Figure 6

July 10, 2018
REV - August 23, 2018

National Flood Hazard Layer FIRMette - Figure 7

FEMA

Feet

0 250 500 1,000 1,500 2,000

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth
- Regulatory Floodway *Zone AE, AO, AH, VE, AR*

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

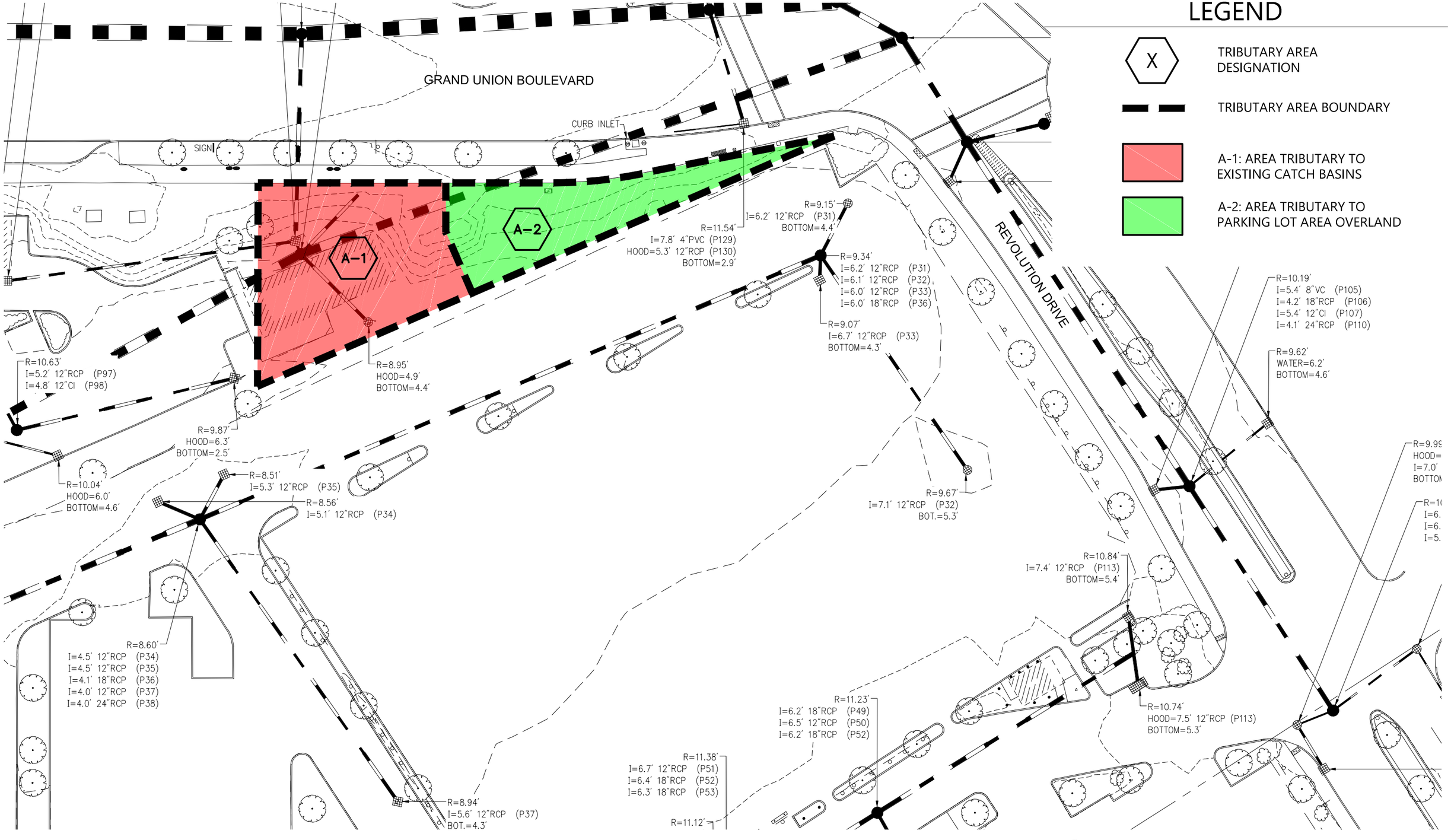
N

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The base map shown complies with FEMA's base map accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 2/6/2018 at 1:39:39 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: base map imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

\\vhb\proj\Wat-LD\14000.01 Wood Partners Somerville\cad\ld\Eng\Drainage\1400000_Drain-Area-Figure-Block23_Road-L.dwg



LEGEND

X — TRIBUTARY AREA DESIGNATION

TRIBUTARY AREA BOUNDARY

A-1: AREA TRIBUTARY TO EXISTING CATCH BASINS

A-2: AREA TRIBUTARY TO PARKING LOT AREA OVERLAND

0 20 40 80 Feet

TSS - Existing Tributary Areas
Alta XMBLY and Road L
5 Middlesex Avenue
Somerville, Massachusetts

Figure 8

August 23, 2018

\\vhb\proj\Wat-LD\14000.01 Wood Partners Somerville\cad\ld\Eng\Drainage\1400000_Drain-Area-Figure-Block23_Road-L.dwg

LEGEND

X — TRIBUTARY AREA DESIGNATION

TRIBUTARY AREA BOUNDARY

A-1: ROAD L - AREA TRIBUTARY TO WQU

A-2: SIDEWALKS, LANDSCAPING, AND ROOF AREA

GRAND UNION BOULEVARD

REVOLUTION DRIVE

ROAD L

ROAD K

A–1

A–2

Alta XMBLY
TAT - 6/5/2018

FFE = 13.0

CURB INLET

SIGN

R=10.63'
I=5.2' 12"RCP (P97)
I=4.8' 12"CI (P98)

R=8.95'
HOOD=4.9'
BOTTOM=4.4'

R=9.87'
HOOD=6.3'
BOTTOM=2.5'

R=10.04'
HOOD=6.0'
BOTTOM=4.6'

R=8.51'
I=5.3' 12"RCP (P34)

R=8.60'
I=4.5' 12"RCP (P34)
I=4.5' 12"RCP (P35)
I=4.0' 12"RCP (P37)
I=4.0' 24"RCP (P38)

R=11.54'
I=7.8' 4"PVC (P129)
HOOD=5.3' 12"RCP (P130)
BOTTOM=2.9'

R=9.15'
I=6.2' 12"RCP (P31)
BOTTOM=4.4'

R=9.34'
I=6.2' 12"RCP (P31)
I=6.1' 12"RCP (P32)
I=6.0' 12"RCP (P33)
I=6.0' 18"RCP (P36)

R=9.07'
I=6.7' 12"RCP (P33)
BOTTOM=4.3'

R=9.67'
I=7.1' 12"RCP (P32)
BOT.=5.3'

R=10.19'
I=5.4' 8"VC (P105)
I=4.2' 18"RCP (P106)
I=5.4' 12"CI (P107)
I=4.1' 24"RCP (P110)

R=9.62'
WATER=6.2'
BOTTOM=4.6'

R=10.84'
I=7.4' 12"RCP (P113)
BOTTOM=5.4'

R=11.23'
I=6.2' 18"RCP (P49)
I=6.5' 12"RCP (P50)
I=6.2' 18"RCP (P52)

R=11.12'
I=6.9' 12"RCP (P51)

HYD

0 40 80 160 Feet

vhb

TSS - Proposed Tributary Areas
Alta XMBLY and Road L
5 Middlesex Avenue
Somerville, Massachusetts

Figure 9

August 23, 2018

Attachment 1

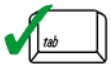
- DEP Checklist for Stormwater Report

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

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

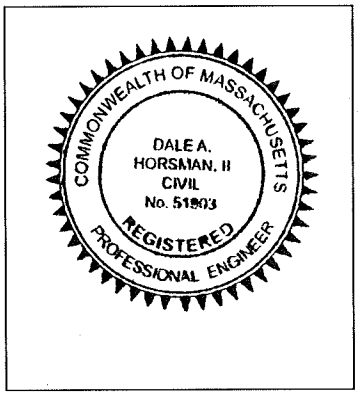
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



Dale A. H 07/09/18
Signature and Date

Checklist

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

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

☒ No disturbance to any Wetland Resource Areas

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

☐ Reduced Impervious Area (Redevelopment Only)

☒ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

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

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

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☒ Green Roof

☒ Other (describe): Water Quality Structures

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

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

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

Standard 3: Recharge

☒ Soil Analysis provided.

☐ Required Recharge Volume calculation provided.

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

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

☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

☐ Site is comprised solely of C and D soils and/or bedrock at the land surface

☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000

☐ Solid Waste Landfill pursuant to 310 CMR 19.000

☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

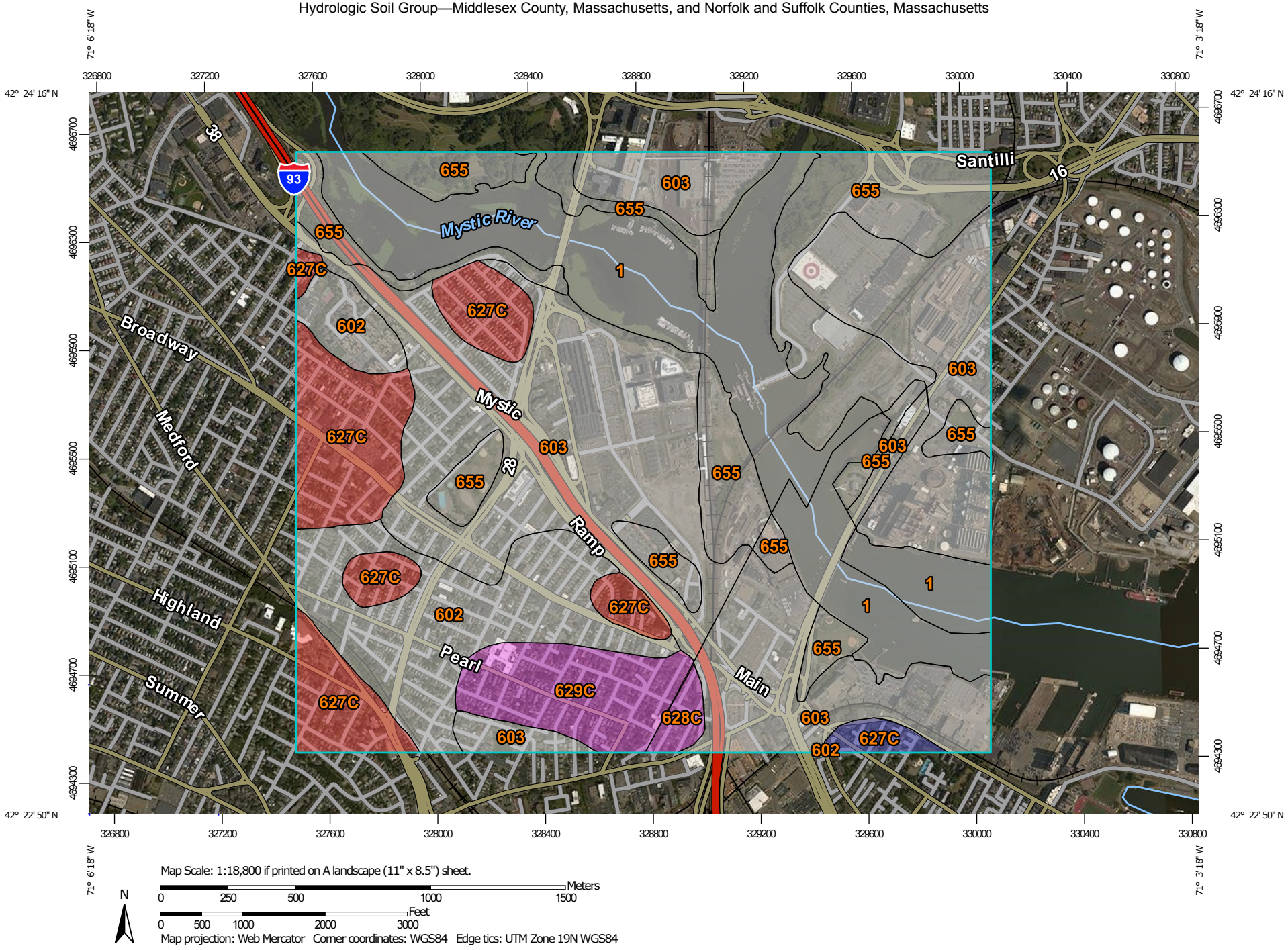
☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☐ An Illicit Discharge Compliance Statement is attached;

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

Attachment 2

- NRCS Web Soil Survey



Map Scale: 1:18,800 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 250 500 1000 1500

Feet: 0 500 1000 2000 3000

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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 17, Oct 6, 2017

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 13, Oct 6, 2017

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Aug 10, 2014—Aug 25, 2014

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		220.2	15.5%
602	Urban land		149.6	10.5%
603	Urban land, wet substratum		417.2	29.4%
627C	Newport-Urban land complex, 3 to 15 percent slopes	D	141.8	10.0%
629C	Canton-Charlton-Urban land complex, 3 to 15 percent slopes	A	63.2	4.5%
655	Udorthents, wet substratum		217.3	15.3%
Subtotals for Soil Survey Area			**1,209.5**	**85.1%**
Totals for Area of Interest			**1,420.8**	**100.0%**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		59.0	4.2%
602	Urban land, 0 to 15 percent slopes		0.1	0.0%
603	Urban land, wet substratum, 0 to 3 percent slopes		111.3	7.8%
627C	Newport-Urban land complex, 3 to 15 percent slopes	B	9.9	0.7%
628C	Canton-Urban land complex, 3 to 15 percent slopes	A	9.4	0.7%
655	Udorthents, wet substratum		21.4	1.5%
Subtotals for Soil Survey Area			**211.3**	**14.9%**
Totals for Area of Interest			**1,420.8**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Attachment 3

- TSS Removal Calculations
- Pipe Conduit Sizing Calculations
- Stormceptor Sizing Report
- Existing Conditions HydroCAD Model
- Proposed Conditions HydroCAD Model

VHB, Inc.
101 Walnut Street
Watertown, MA 02471
(617) 924-1770

TSS Removal Calculation Worksheet

Project Name:	Alta XMBLY	Sheet:	1 OF 2
Project Number:	14000.01	Date:	August 2018
Location:	Somerville, MA	Computed by:	PTM
Discharge Point:	DP-1	Checked by:	DAH
Drainage Area(s):	Alta XMBLY and Road L		

Existing Conditions

A	B	C	D	E	F	G	H	I
Area	Description	Tributary Area (S.F.)*	BMP	TSS Removal Rate**	Starting TSS Load	Area Weighted Starting TSS Load***	Area Weighted Amount Removed (E*G)	Remaining Load (G-H)
A-1	**Tributary to Existing CBs**	**6,236**	**N/A**	**0%**	**100%**	**62%**	**0%**	**62%**
A-2	**Tributary to Parking Lot Area Overland**	**3,813**	**N/A**	**0%**	**100%**	**38%**	**0%**	**38%**
Total Block	**Total Block**	**10,049**	**n/a**	**n/a**	**100%**	**100%**	**0%**	**100%**

Overall Block TSS Removal=	**0%**

*Tributary area includes pervious and impervious area.
** BMP and TSS Removal Rate Values from the MassDEP Stormwater Handbook Vol. removal rate has been updated to current standards. Rain Graden removal rate does not include the pretreatment provided by sediment forebay.

*** Area weighted starting TSS load is calculated by [E*B/(Total Block Area)]

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TSS Removal Calculation Worksheet

Project Name:	Alta XMBLY	Sheet:	2 OF 2
Project Number:	14000.01	Date:	August 2018
Location:	Somerville, MA	Computed by:	PTM
Discharge Point:	DP-1	Checked by:	DAH
Drainage Area(s):	Alta XMBLY and Road L		

Proposed Conditions

A	B	C	D	E	F	G	H	I
Area	Description	Tributary Area (S.F.)*	BMP	TSS Removal Rate**	Starting TSS Load	Area Weighted Starting TSS Load***	Area Weighted Amount Removed (F*G)	Remaining Load (G-H)
A-1	**Road L - Tributary to WQU**	**3,111**	**Stormceptor 450i**	**50%**	**100%**	**31%**	**15.5%**	**15.5%**
A-2	**Sidewalk, Lanscape, and Roofed Area**	**6,938**	**Roof Drains**	**n/a**	**0%**	**0%**	**0.0%**	**0.0%**
Total Block	**Total Block**	**10,049**	**n/a**	**n/a**	**100%**	**31%**	**15.5%**	**15.5%**

Overall Block TSS Removal=	**84.5%**

*Tributary area includes pervious and impervious area.

** BMP and TSS Removal Rate Values from the MassDEP Stormwater Handbook Vol. removal rate has been updated to current standards. Rain Graden removal rate does not include the pretreatment provided by sediment forebay.

*** Area weighted starting TSS load is calculated by [E*B/(Total Block Area)]

101 Walnut Street
Post Office Box 9151
Watertown, MA 02471
P 617.924.1770

Storm Drainage Computations

Name: Alta XMBLY and Road L
Somerville, MA
Client: Wood Partners

Proj. No.: **14000.01**
Date: **8/23/2018**
Computed by: **PTM**
Checked by: **DAH**

Design Parameters:
25 **Year Storm** Boston, MA
k_e= **0.5**

DESCRIPTION	LOCATION		AREA	C	C x A	SUM	FLOW TIME (MIN)		i*	DESIGN					CAPACITY		PROFILE						
	FROM	TO	(AC.)			C x A	PIPE	CONC TIME		Q cfs	V fps	n	PIPE SIZE	SLOPE	Q full ft^3/s	V full ft/s	LENGTH ft	FALL ft	RIM	INV UPPER	INV LOWER	W.S.E. ft	Freeboard ft
	CB-12	WQU-4	0.06	0.90	0.06	0.06	0.09	5.0	6.0	0.4	2.9	0.012	12	0.0185	5.2	6.7	16	0.30	12.3	8.3	8.0	8.2	4.1
	CB-13	WQU-4	0.03	0.90	0.02	0.02	0.18	5.0	6.0	0.1	1.9	0.012	12	0.0187	5.3	6.7	21	0.39	12.2	8.2	7.8	8.2	4.0
	WQU-4	EX-DMH	---	---	---	0.08	0.64	5.0	6.0	0.5	2.4	0.012	18	0.0108	11.8	6.7	92	1.00	12.5	4.9	3.9	4.8	7.7

Brief Stormceptor Sizing Report - Alta XMBLY and Road L

Project Information & Location			
Project Name	Alta XMBLY and Road L	**Project Number**	14000.01
City	Somerville	**State/ Province**	Massachusetts
Country	United States of America	**Date**	8/23/2018
Designer Information		**EOR Information (optional)**	
Name	Peter Mara	**Name**	
Company	VHB	**Company**	
Phone #	617-924-1770	**Phone #**	
Email	pmara@vhb.com	**Email**	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	Alta XMBLY and Road L
Target TSS Removal (%)	50
TSS Removal (%) Provided	94
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	94
STC 900	97
STC 1200	97
STC 1800	97
STC 2400	98
STC 3600	98
STC 4800	99
STC 6000	99
STC 7200	99
STC 11000	99
STC 13000	99
STC 16000	100
StormceptorMAX	Custom

Sizing Details

Drainage Area	
Total Area (acres)	0.09
Imperviousness %	100.0

Rainfall	
Station Name	BOSTON WSFO AP
State/Province	Massachusetts
Station ID #	0770
Years of Records	58
Latitude	42°21'38"N
Longitude	71°0'38"W

Water Quality Objective	
TSS Removal (%)	50.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

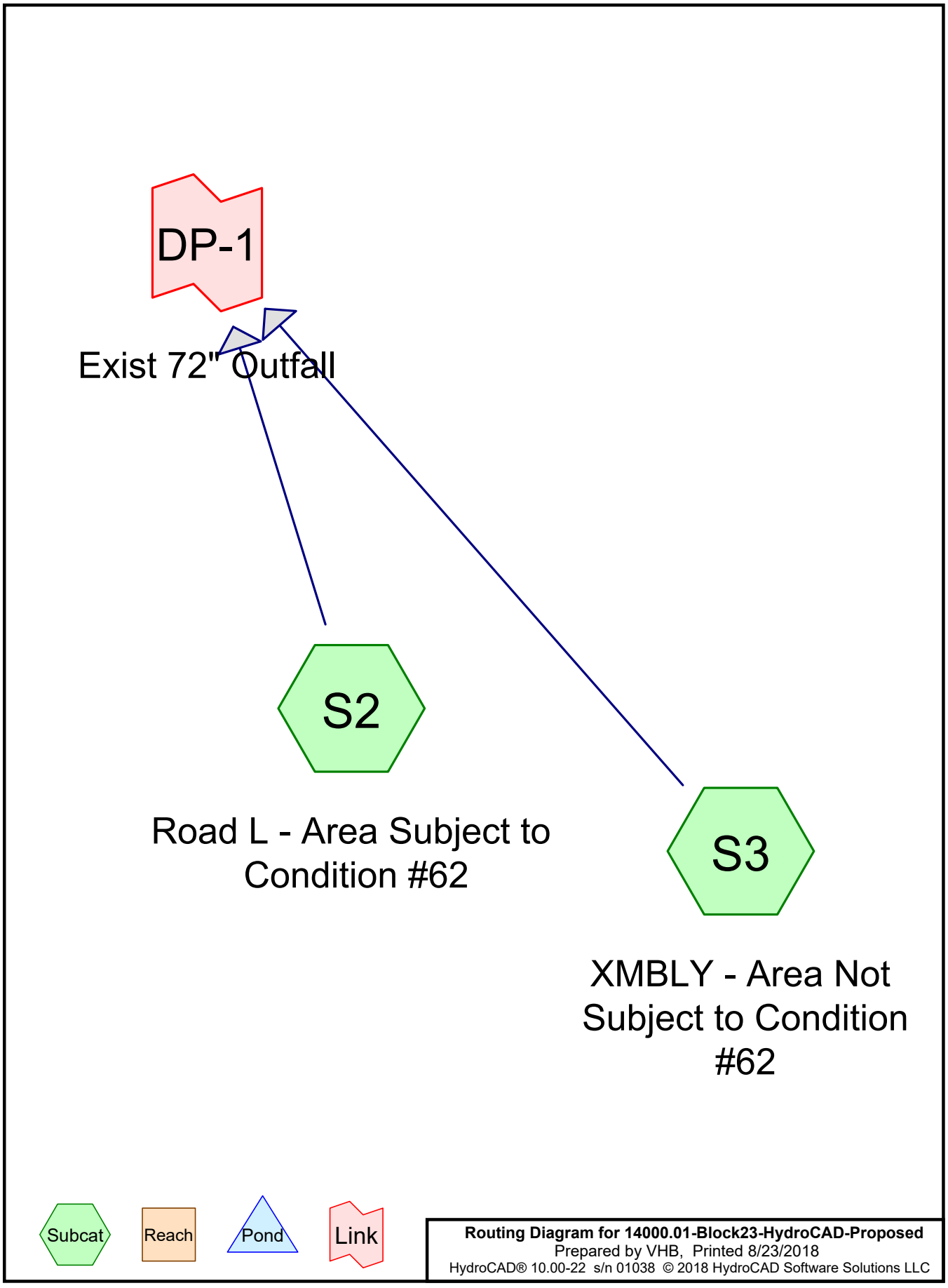
Particle Size Distribution (PSD)
The selected PSD defines TSS removal

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Notes

- Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
- For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
http://www.imbriumsystems.com/technical-specifications



Routing Diagram for 14000.01-Block23-HydroCAD-Proposed
Prepared by VHB, Printed 8/23/2018

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.180	80	>75% Grass cover, Good, HSG D (S2, S3)
0.033	80	Permeable Pavers, HSG D (S3)
0.012	80	Synthetic Turf (S3)
1.610	98	Unconnected pavement, HSG D (S2, S3)
1.836	**96**	**TOTAL AREA**

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

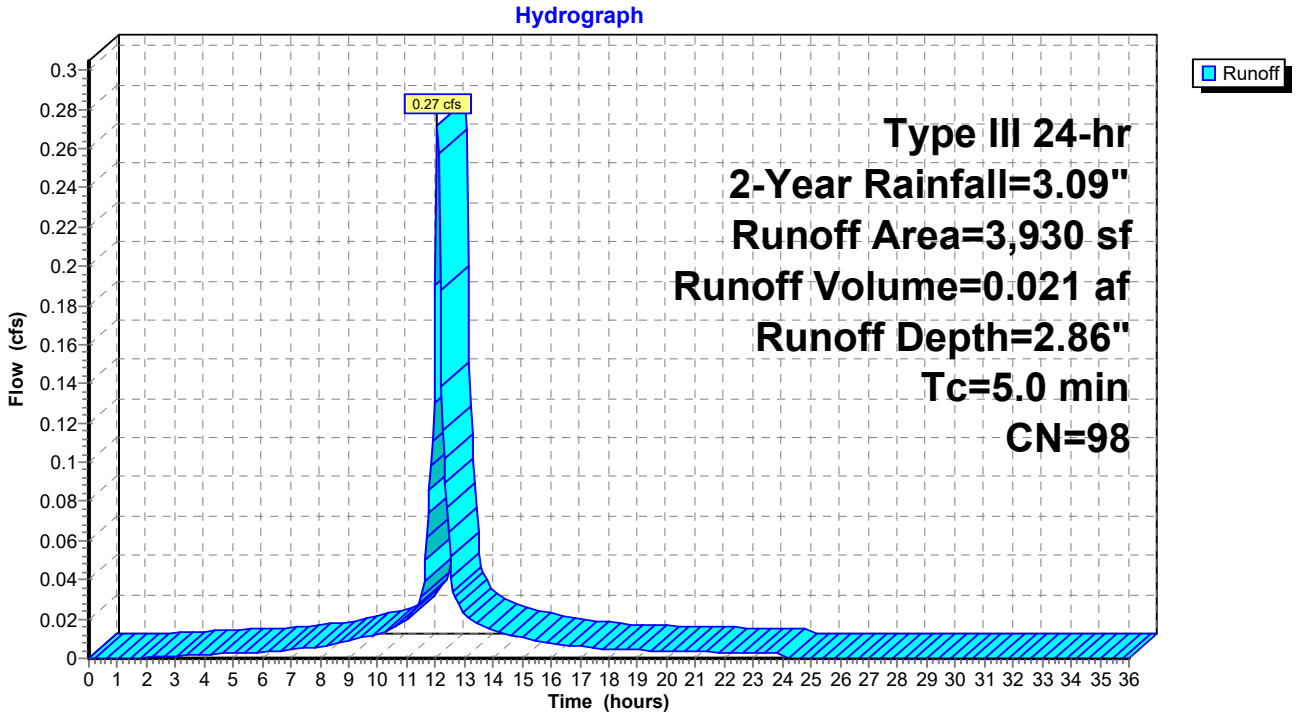
SubcatchmentS2: Road L - Area Subject to Runoff Area=3,930 sf 98.63% Impervious Runoff Depth=2.86"
Tc=5.0 min CN=98 Runoff=0.27 cfs 0.021 af

SubcatchmentS3: XMBLY - Area Not Runoff Area=76,042 sf 87.15% Impervious Runoff Depth=2.64"
Tc=5.0 min CN=96 Runoff=5.07 cfs 0.384 af

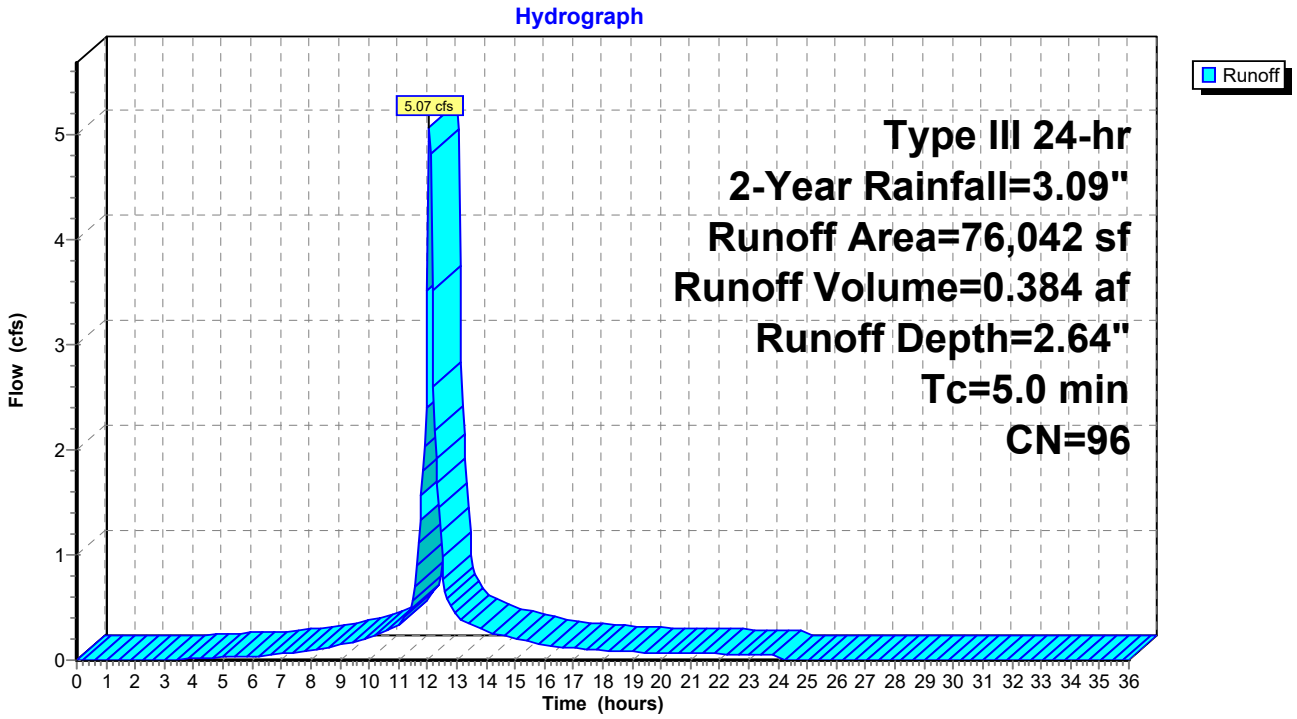
Link DP-1: Exist 72" Outfall Inflow=5.35 cfs 0.406 af
Primary=5.35 cfs 0.406 af

Total Runoff Area = 1.836 ac Runoff Volume = 0.406 af Average Runoff Depth = 2.65"
12.28% Pervious = 0.226 ac 87.72% Impervious = 1.610 ac

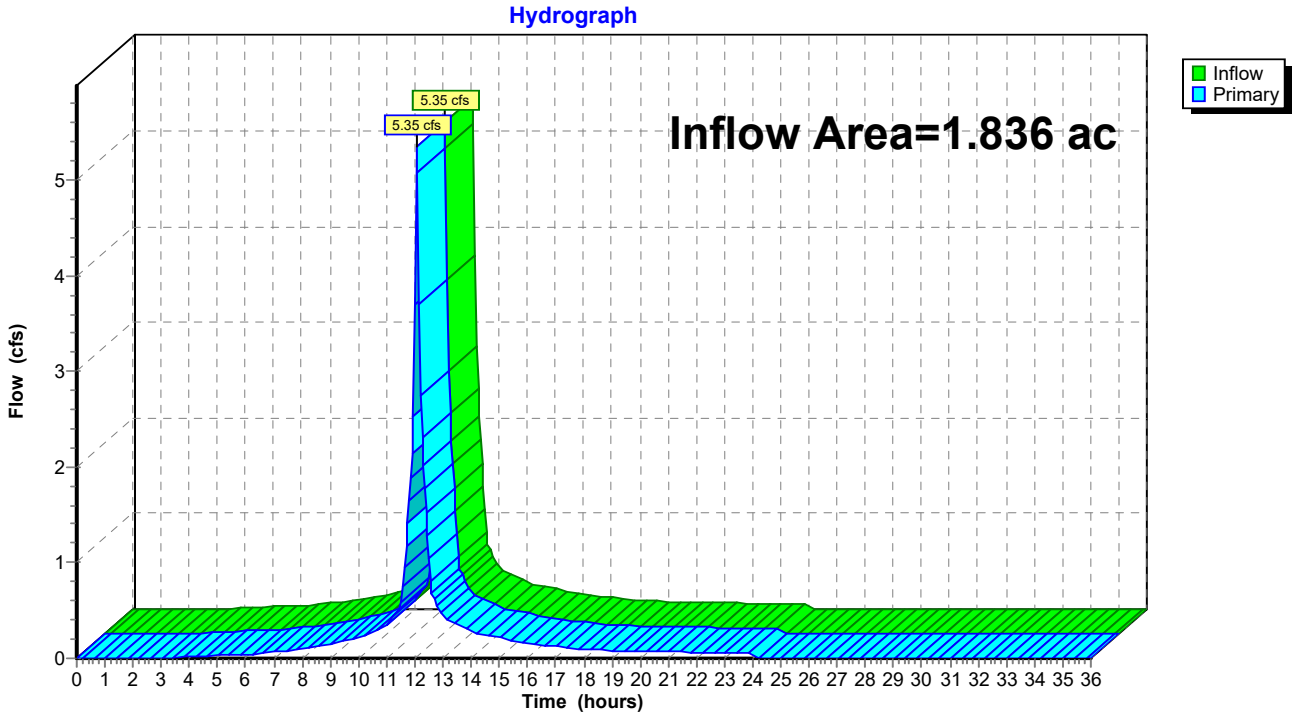
Subcatchment S2: Road L - Area Subject to Condition #62



Subcatchment S3: XMBLY - Area Not Subject to Condition #62



Link DP-1: Exist 72" Outfall



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

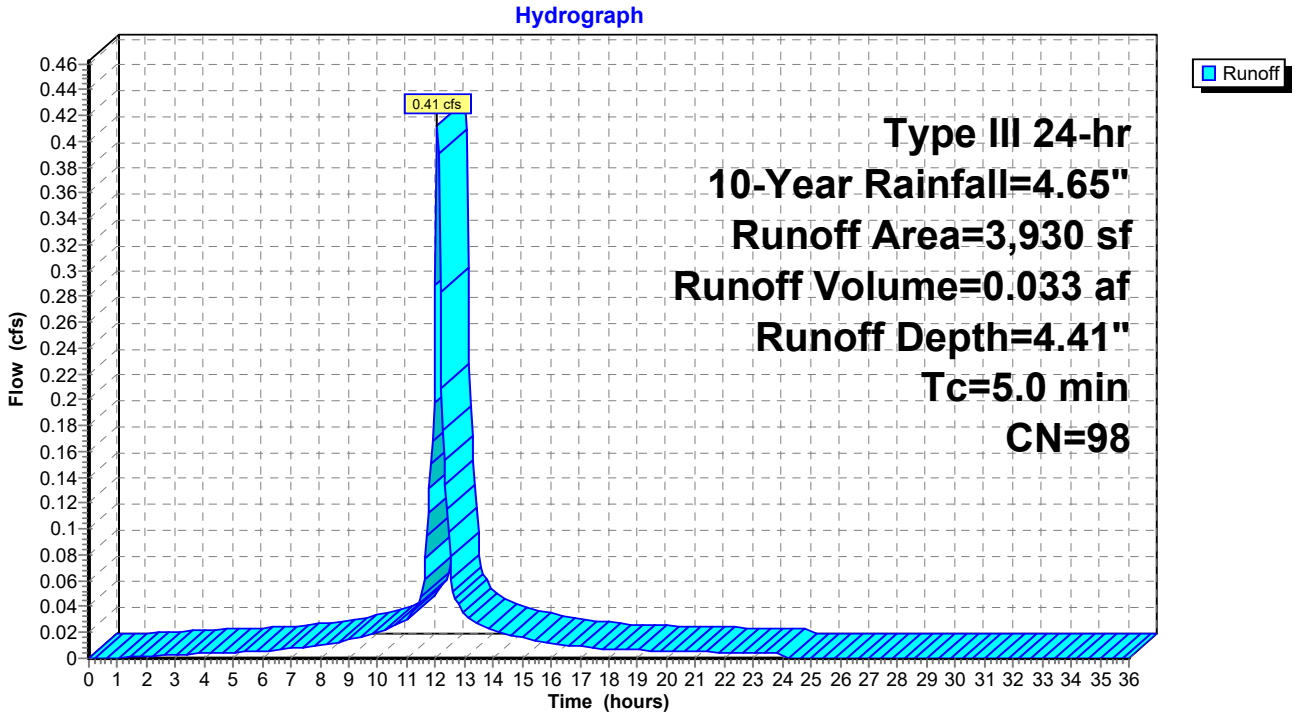
SubcatchmentS2: Road L - Area Subject to Runoff Area=3,930 sf 98.63% Impervious Runoff Depth=4.41"
Tc=5.0 min CN=98 Runoff=0.41 cfs 0.033 af

SubcatchmentS3: XMBLY - Area Not Runoff Area=76,042 sf 87.15% Impervious Runoff Depth=4.18"
Tc=5.0 min CN=96 Runoff=7.84 cfs 0.609 af

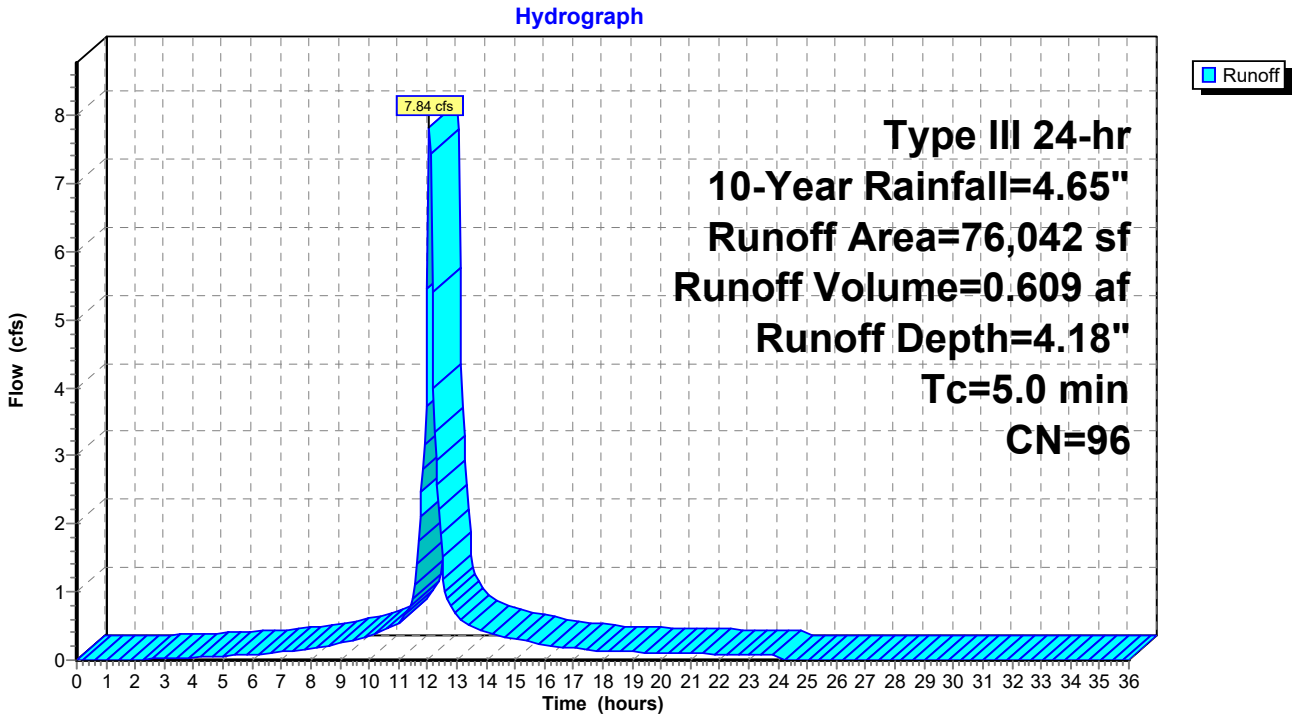
Link DP-1: Exist 72" Outfall Inflow=8.25 cfs 0.642 af
Primary=8.25 cfs 0.642 af

Total Runoff Area = 1.836 ac Runoff Volume = 0.642 af Average Runoff Depth = 4.20"
12.28% Pervious = 0.226 ac 87.72% Impervious = 1.610 ac

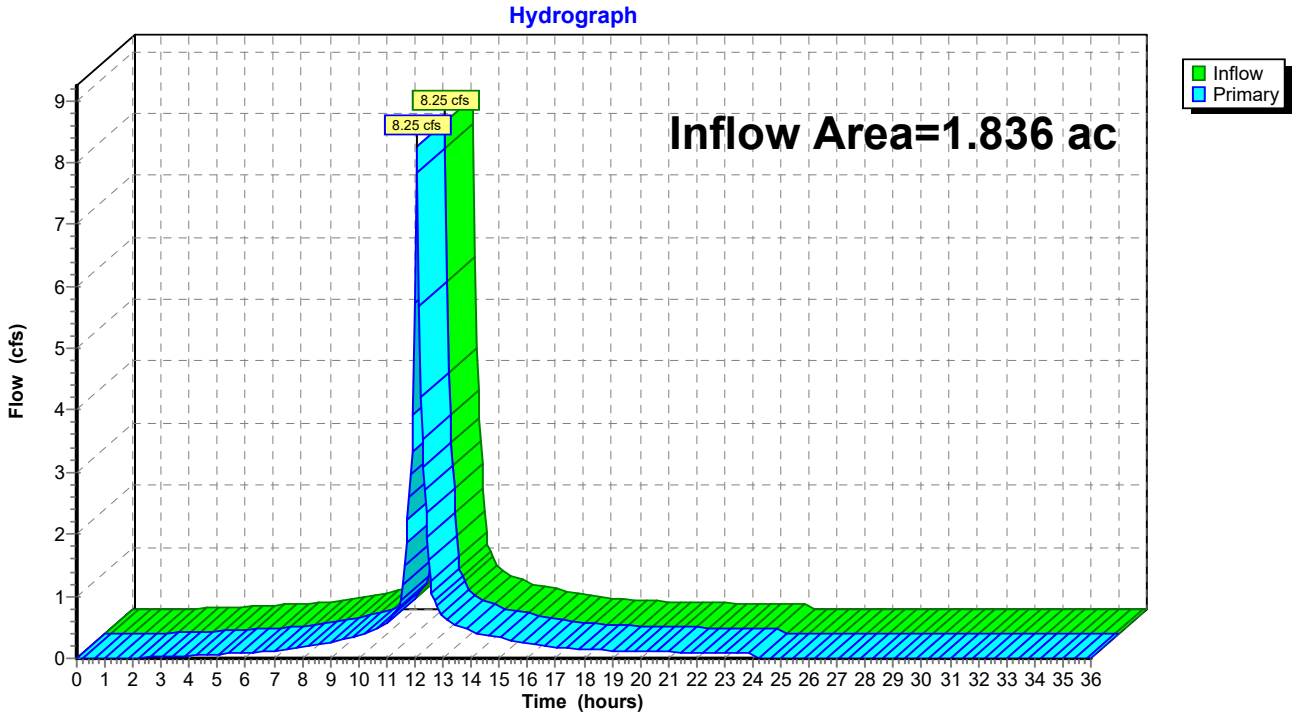
Subcatchment S2: Road L - Area Subject to Condition #62



Subcatchment S3: XMBLY - Area Not Subject to Condition #62



Link DP-1: Exist 72" Outfall



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

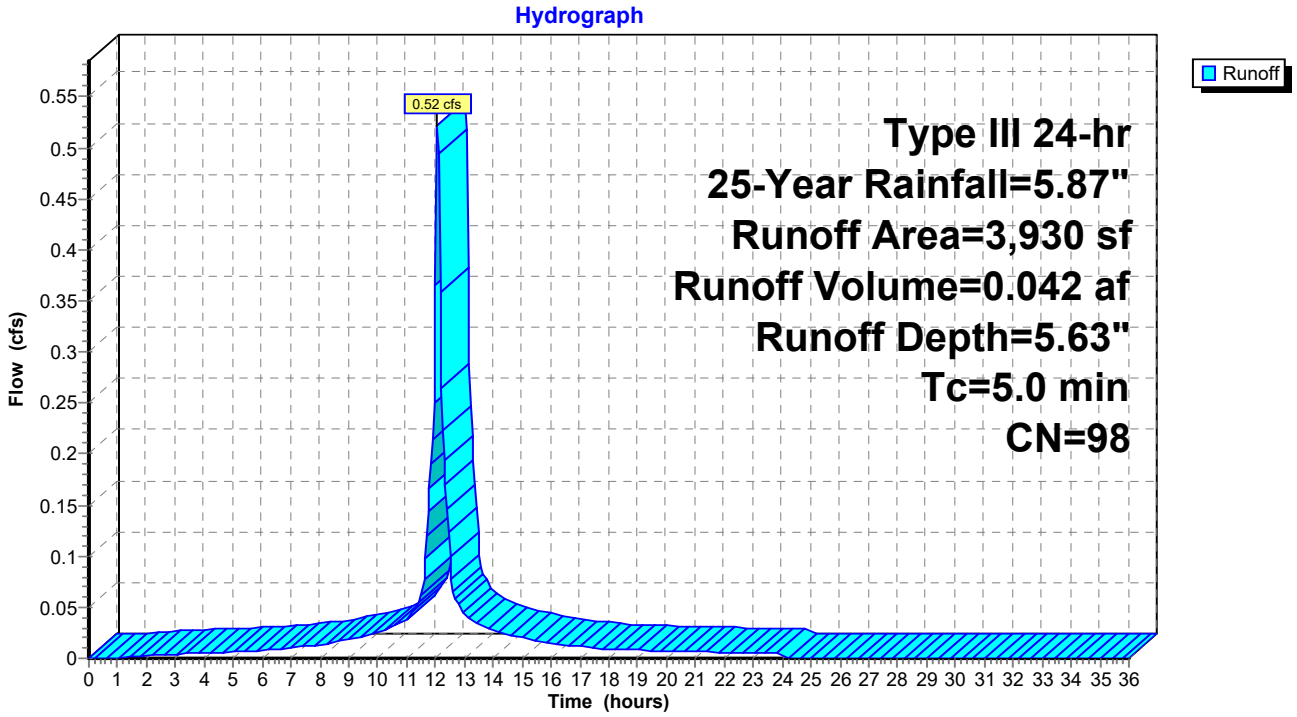
SubcatchmentS2: Road L - Area Subject to Runoff Area=3,930 sf 98.63% Impervious Runoff Depth=5.63"
Tc=5.0 min CN=98 Runoff=0.52 cfs 0.042 af

SubcatchmentS3: XMBLY - Area Not Runoff Area=76,042 sf 87.15% Impervious Runoff Depth=5.40"
Tc=5.0 min CN=96 Runoff=9.98 cfs 0.785 af

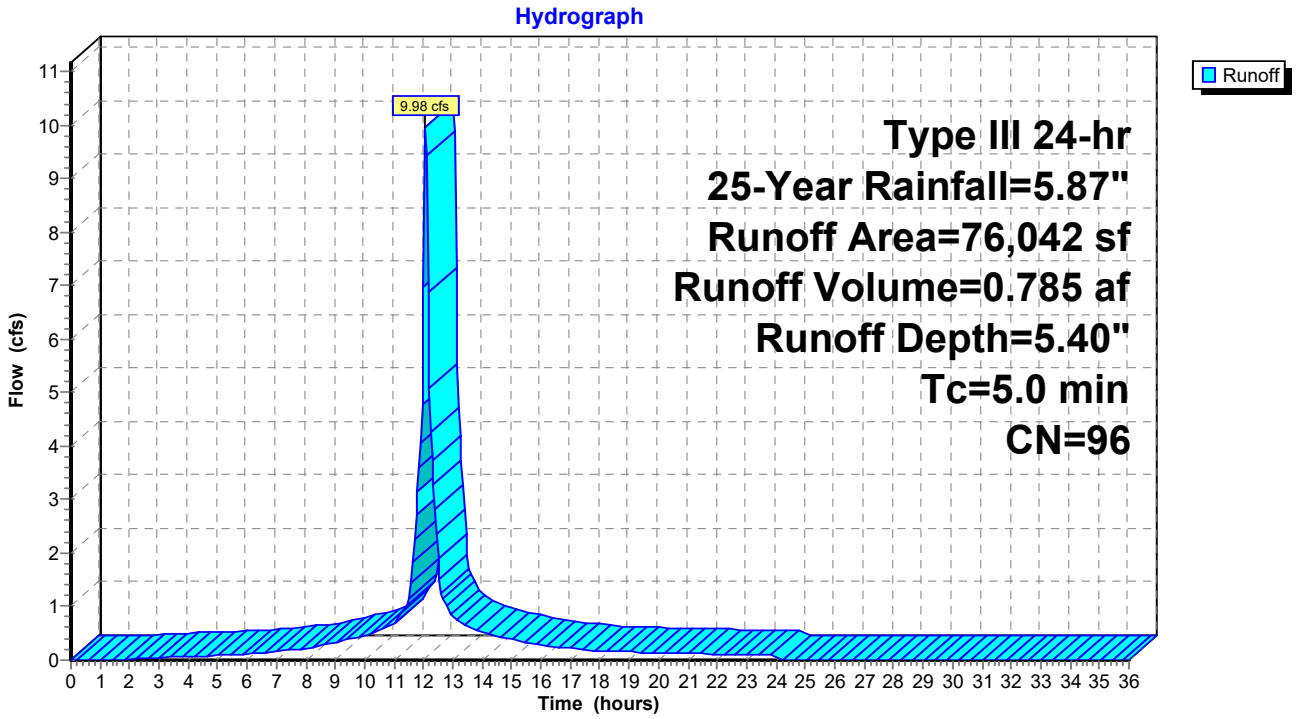
Link DP-1: Exist 72" Outfall Inflow=10.50 cfs 0.828 af
Primary=10.50 cfs 0.828 af

Total Runoff Area = 1.836 ac Runoff Volume = 0.828 af Average Runoff Depth = 5.41"
12.28% Pervious = 0.226 ac 87.72% Impervious = 1.610 ac

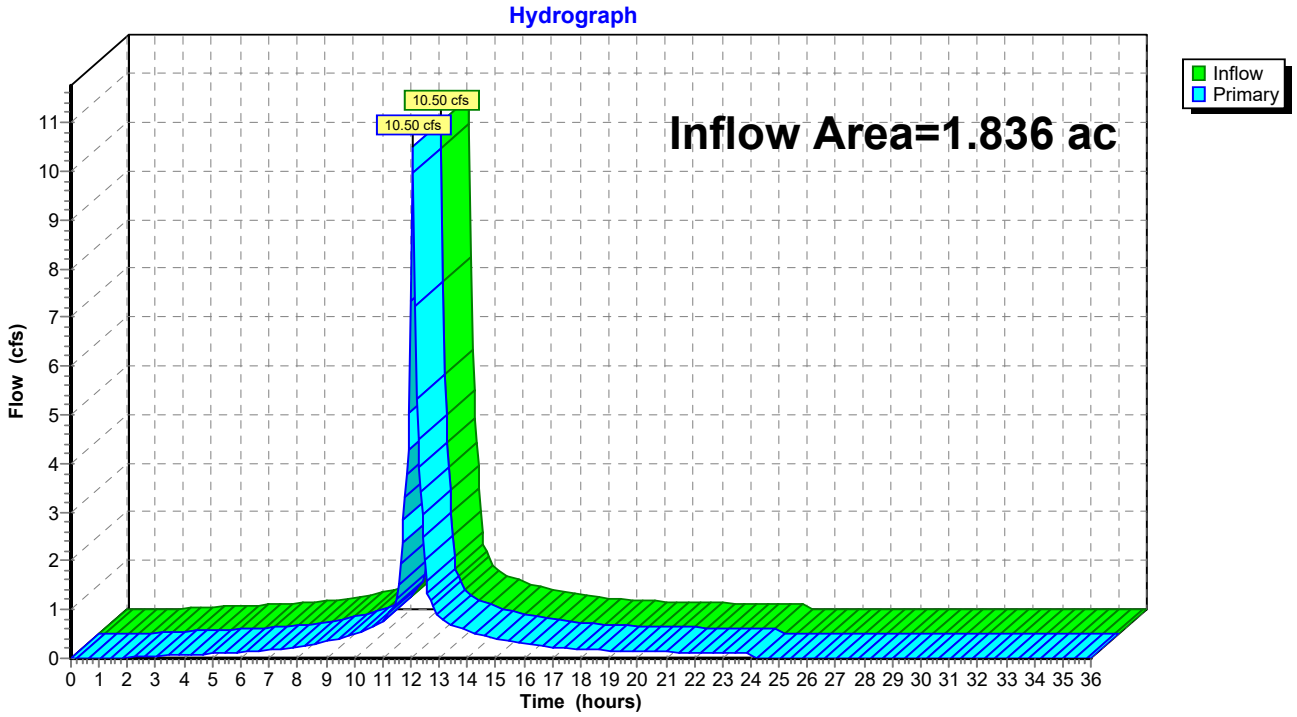
Subcatchment S2: Road L - Area Subject to Condition #62



Subcatchment S3: XMBLY - Area Not Subject to Condition #62



Link DP-1: Exist 72" Outfall



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

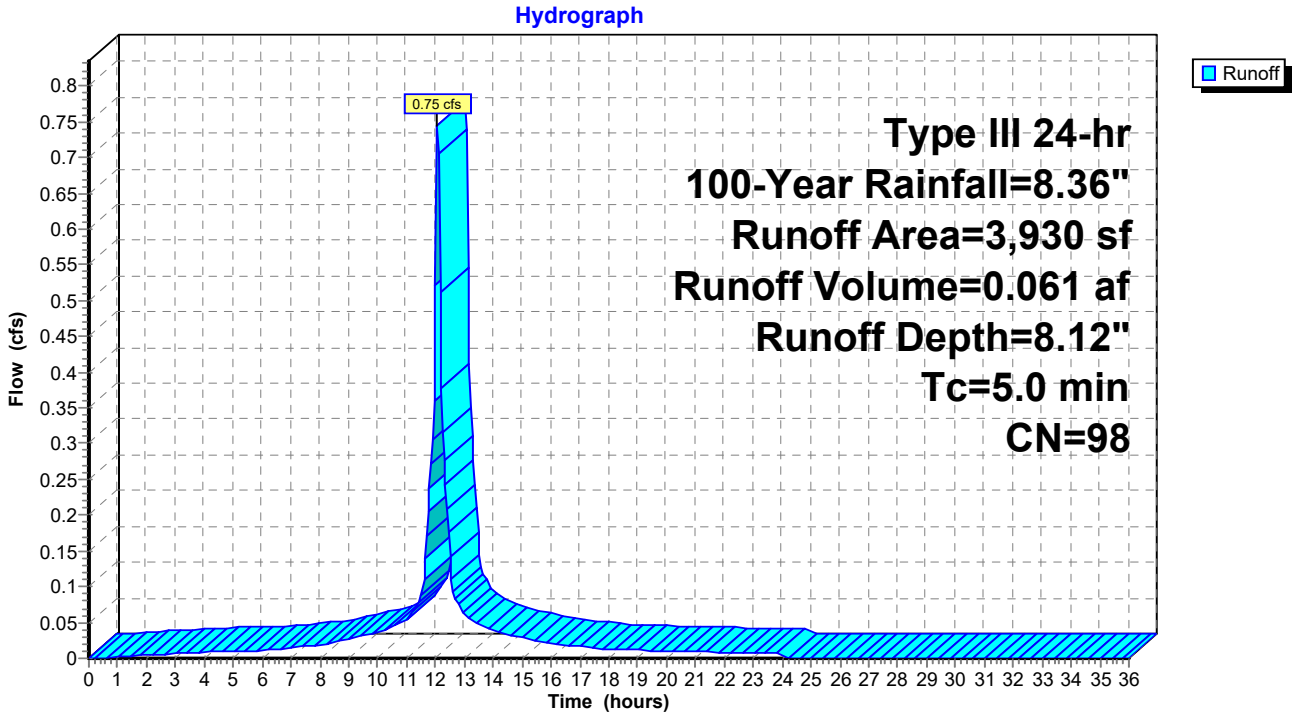
SubcatchmentS2: Road L - Area Subject to Runoff Area=3,930 sf 98.63% Impervious Runoff Depth=8.12"
Tc=5.0 min CN=98 Runoff=0.75 cfs 0.061 af

SubcatchmentS3: XMBLY - Area Not Runoff Area=76,042 sf 87.15% Impervious Runoff Depth=7.88"
Tc=5.0 min CN=96 Runoff=14.33 cfs 1.146 af

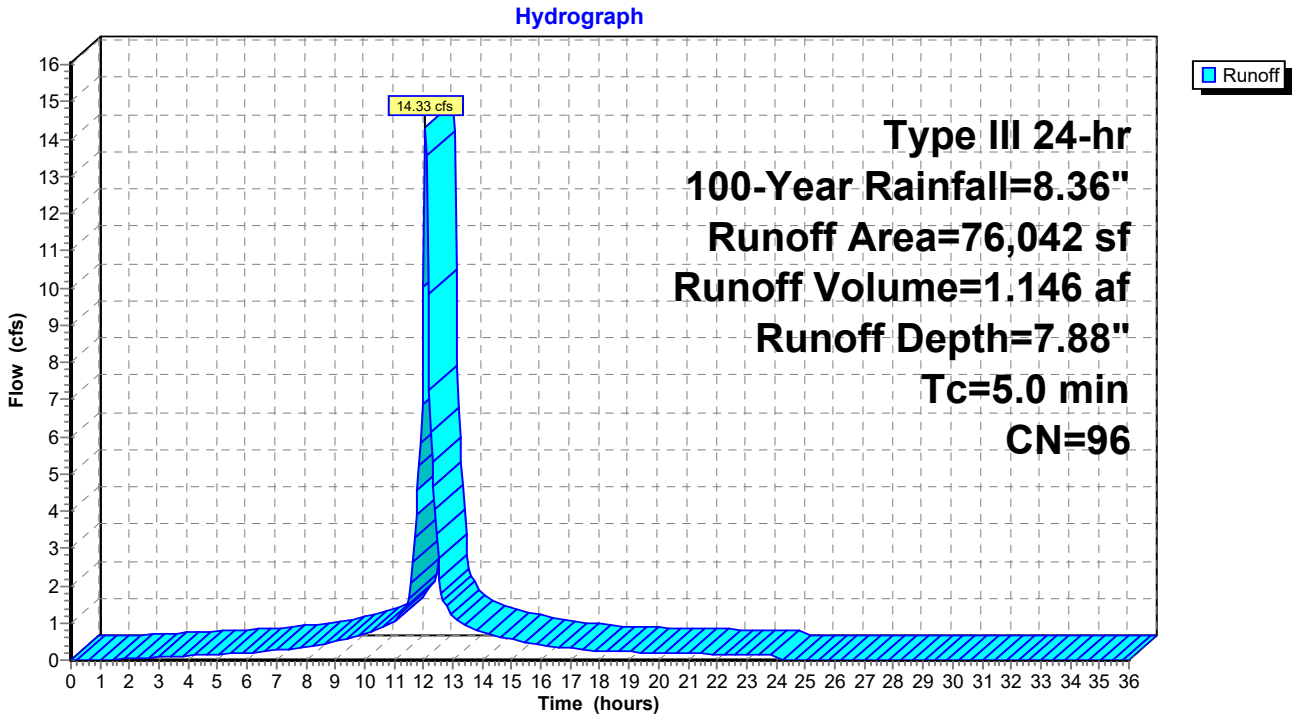
Link DP-1: Exist 72" Outfall Inflow=15.08 cfs 1.207 af
Primary=15.08 cfs 1.207 af

Total Runoff Area = 1.836 ac Runoff Volume = 1.207 af Average Runoff Depth = 7.89"
12.28% Pervious = 0.226 ac 87.72% Impervious = 1.610 ac

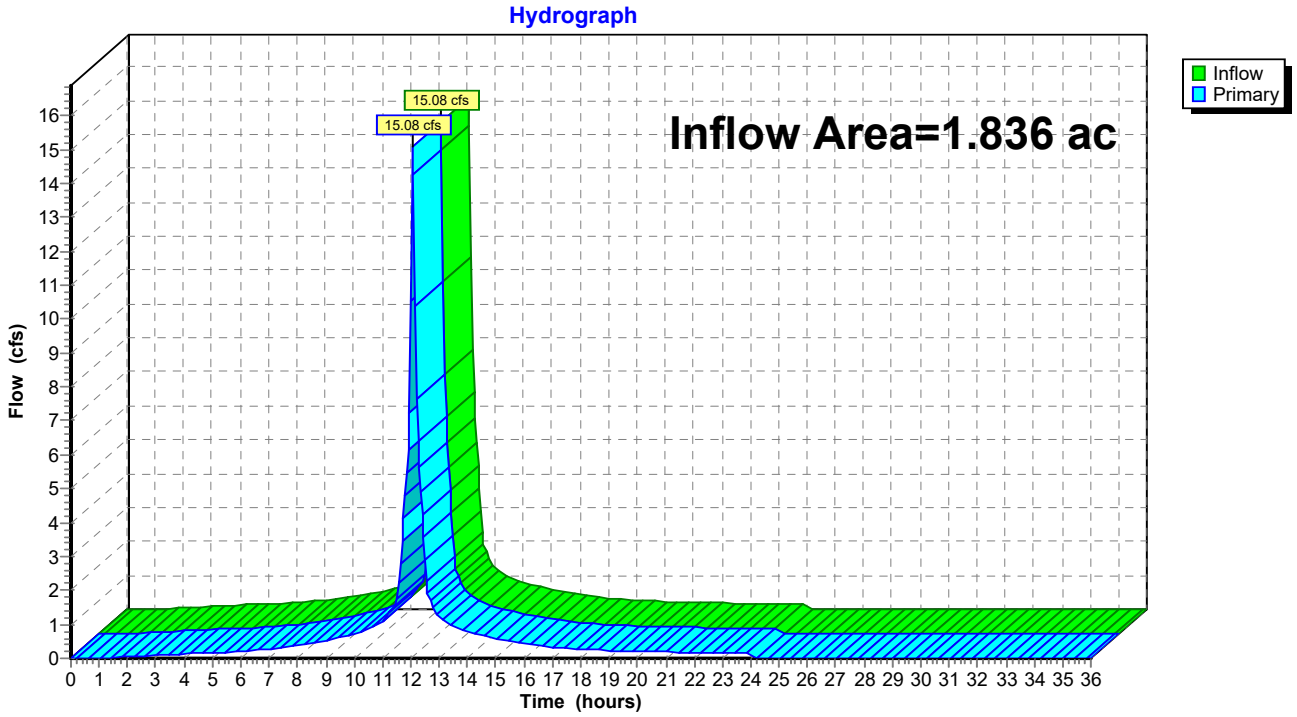
Subcatchment S2: Road L - Area Subject to Condition #62

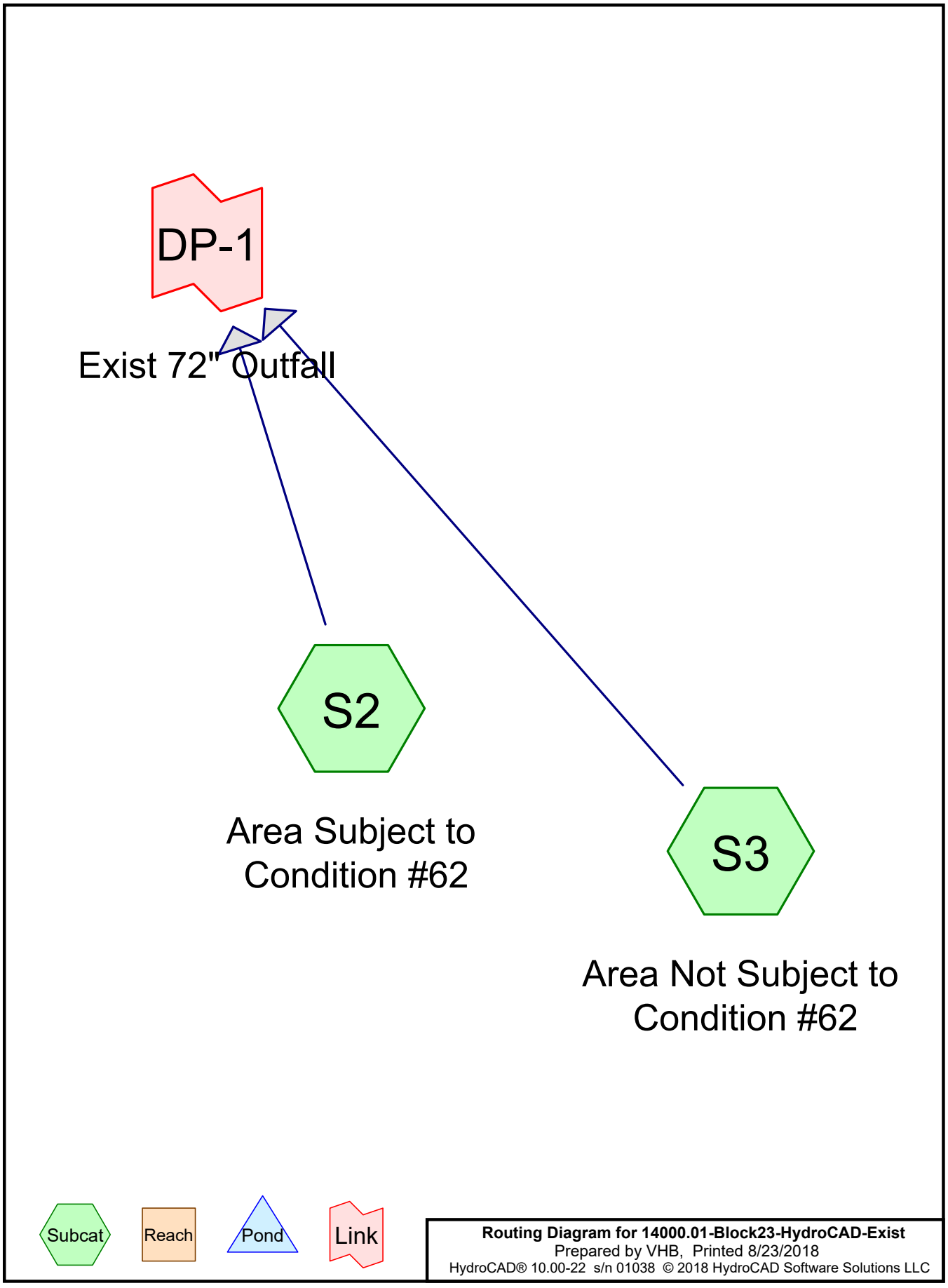


Subcatchment S3: XMBLY - Area Not Subject to Condition #62



Link DP-1: Exist 72" Outfall




DP-1
Exist 72" Outfall
S2
Area Subject to
Condition #62
S3
Area Not Subject to
Condition #62
Subcat
Reach
Pond
Link
Routing Diagram for 14000.01-Block23-HydroCAD-Exist
Prepared by VHB, Printed 8/23/2018
HydroCAD® 10.00-22 s/n 01038 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.364	89	<50% Grass cover, Poor, HSG D (S2, S3)
1.425	98	Paved parking, HSG D (S3)
0.048	98	Unconnected pavement, HSG D (S2)
1.836	**96**	**TOTAL AREA**

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

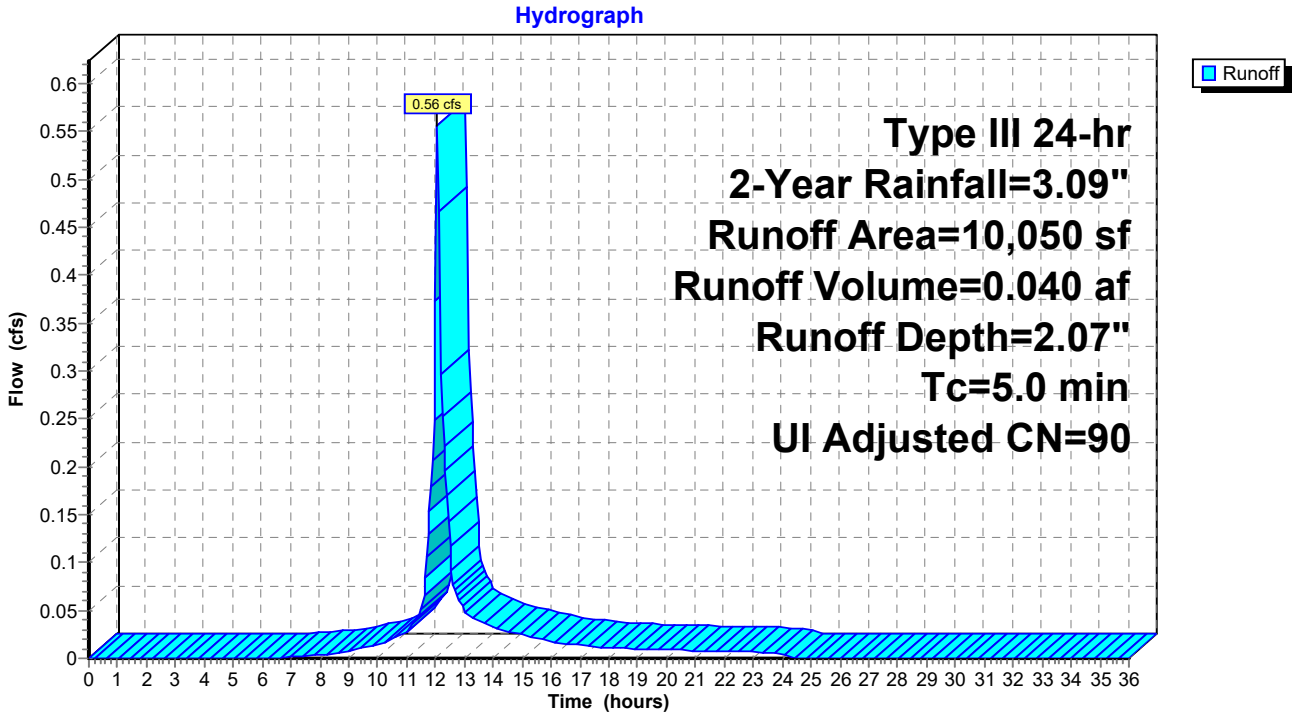
SubcatchmentS2: Area Subject to Runoff Area=10,050 sf 20.66% Impervious Runoff Depth=2.07"
Tc=5.0 min UI Adjusted CN=90 Runoff=0.56 cfs 0.040 af

SubcatchmentS3: Area Not Subject to Runoff Area=69,923 sf 88.74% Impervious Runoff Depth=2.75"
Tc=5.0 min CN=97 Runoff=4.76 cfs 0.368 af

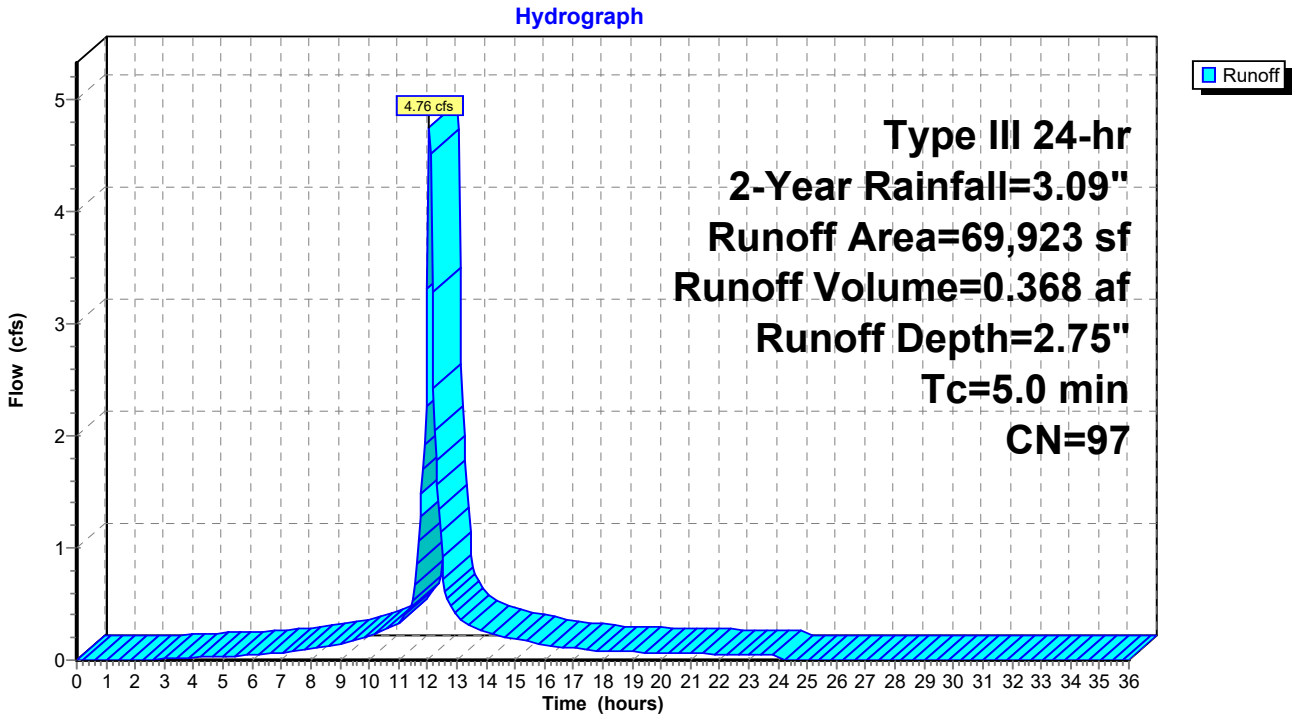
Link DP-1: Exist 72" Outfall Inflow=5.32 cfs 0.407 af
Primary=5.32 cfs 0.407 af

Total Runoff Area = 1.836 ac Runoff Volume = 0.407 af Average Runoff Depth = 2.66"
19.81% Pervious = 0.364 ac 80.19% Impervious = 1.472 ac

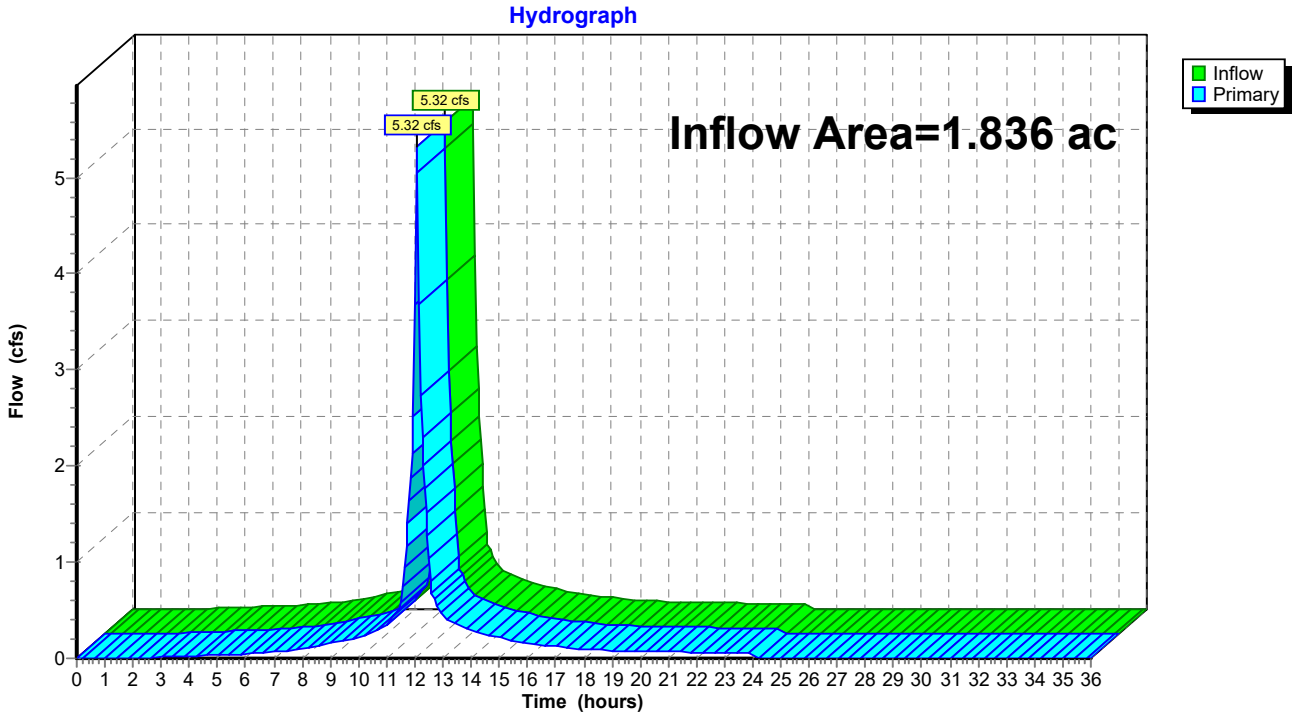
Subcatchment S2: Area Subject to Condition #62



Subcatchment S3: Area Not Subject to Condition #62



Link DP-1: Exist 72" Outfall



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

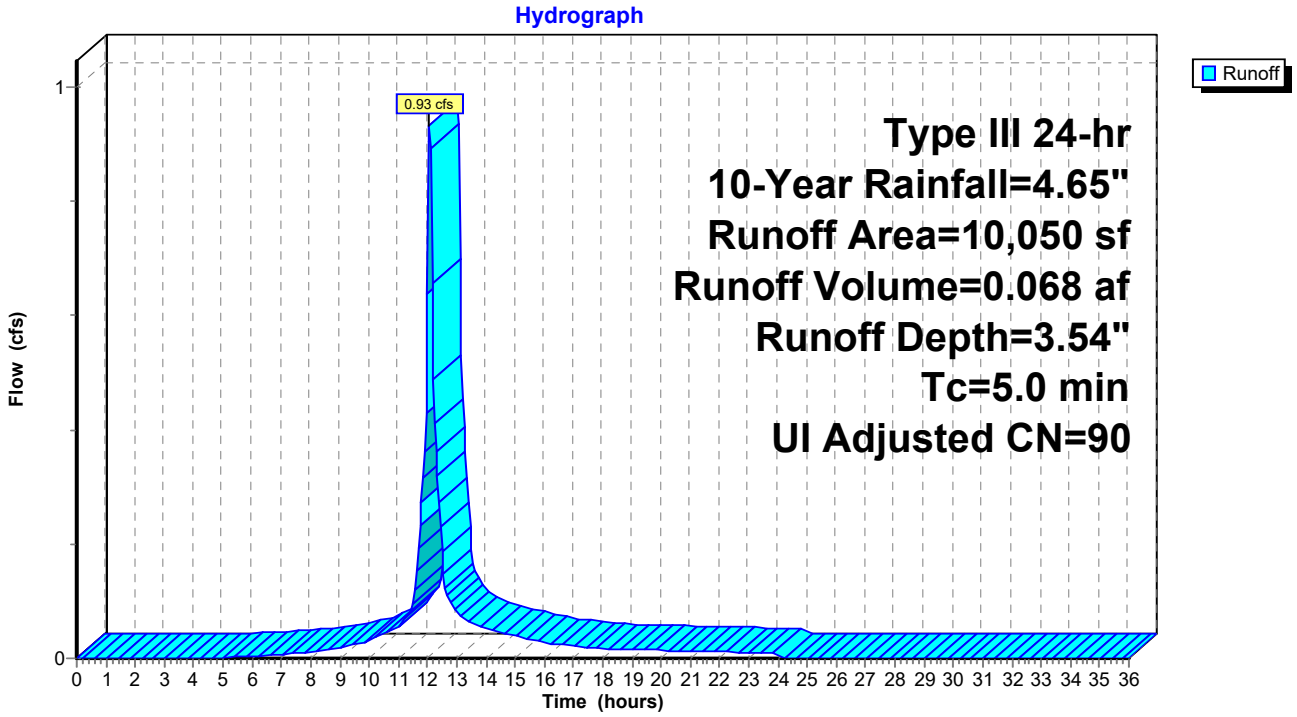
SubcatchmentS2: Area Subject to Runoff Area=10,050 sf 20.66% Impervious Runoff Depth=3.54"
Tc=5.0 min UI Adjusted CN=90 Runoff=0.93 cfs 0.068 af

SubcatchmentS3: Area Not Subject to Runoff Area=69,923 sf 88.74% Impervious Runoff Depth=4.30"
Tc=5.0 min CN=97 Runoff=7.28 cfs 0.575 af

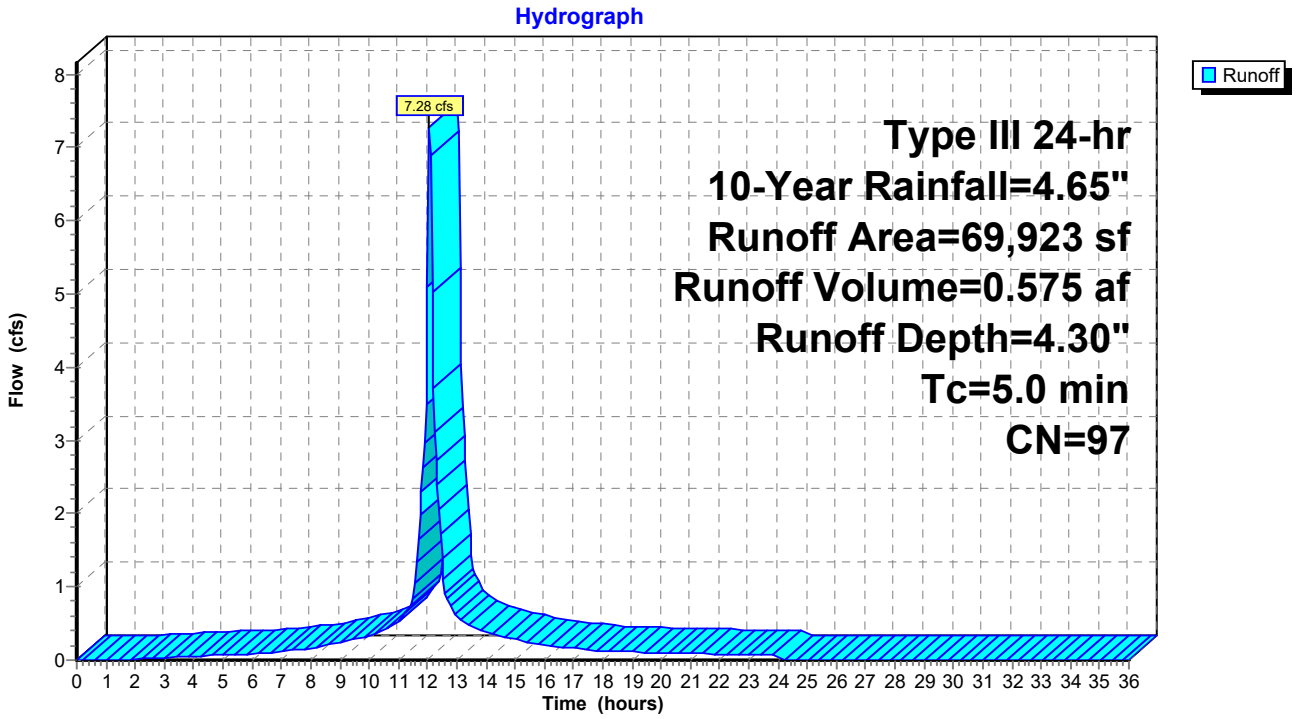
Link DP-1: Exist 72" Outfall Inflow=8.22 cfs 0.643 af
Primary=8.22 cfs 0.643 af

Total Runoff Area = 1.836 ac Runoff Volume = 0.643 af Average Runoff Depth = 4.20"
19.81% Pervious = 0.364 ac 80.19% Impervious = 1.472 ac

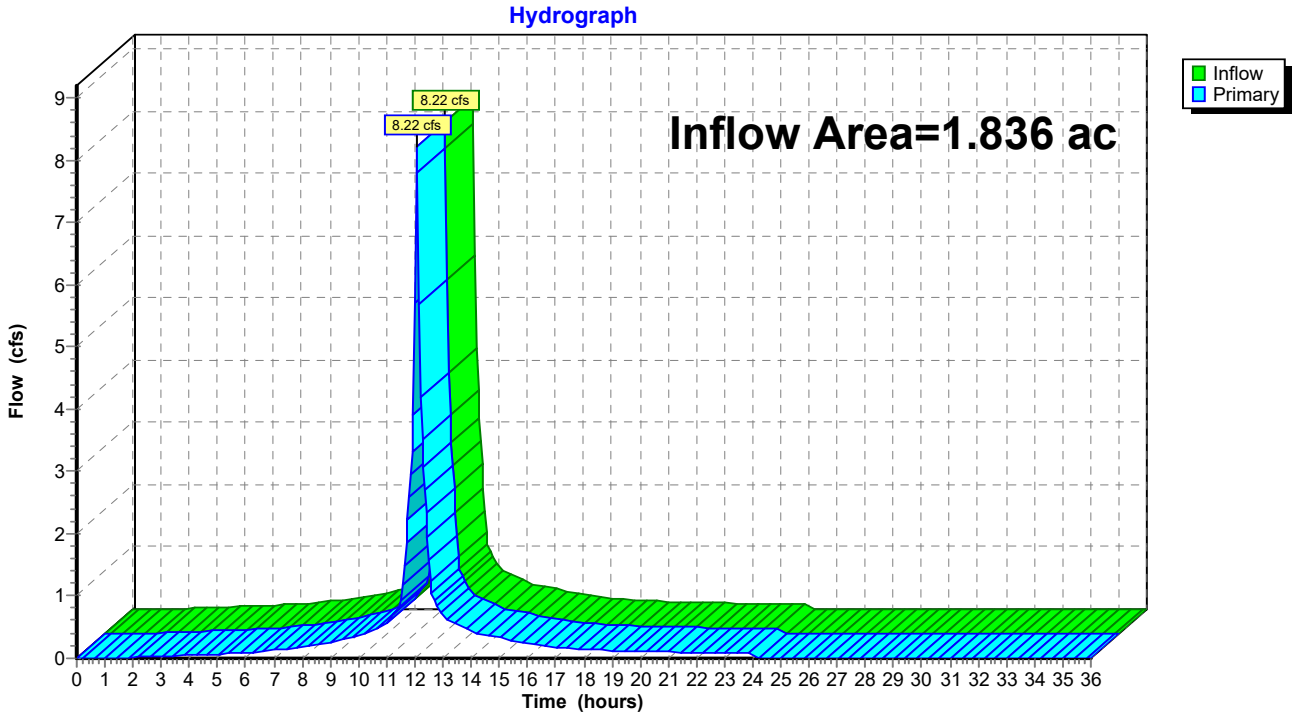
Subcatchment S2: Area Subject to Condition #62



Subcatchment S3: Area Not Subject to Condition #62



Link DP-1: Exist 72" Outfall



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

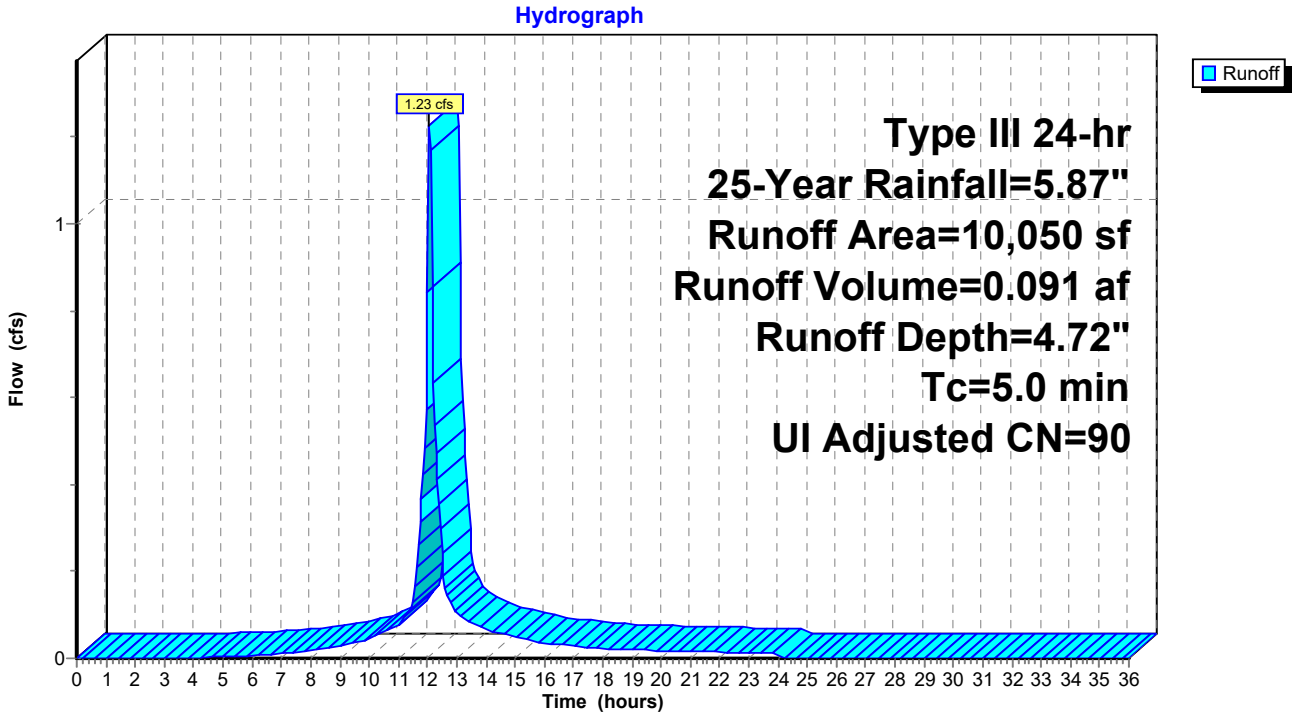
SubcatchmentS2: Area Subject to Runoff Area=10,050 sf 20.66% Impervious Runoff Depth=4.72"
Tc=5.0 min UI Adjusted CN=90 Runoff=1.23 cfs 0.091 af

SubcatchmentS3: Area Not Subject to Runoff Area=69,923 sf 88.74% Impervious Runoff Depth=5.51"
Tc=5.0 min CN=97 Runoff=9.24 cfs 0.738 af

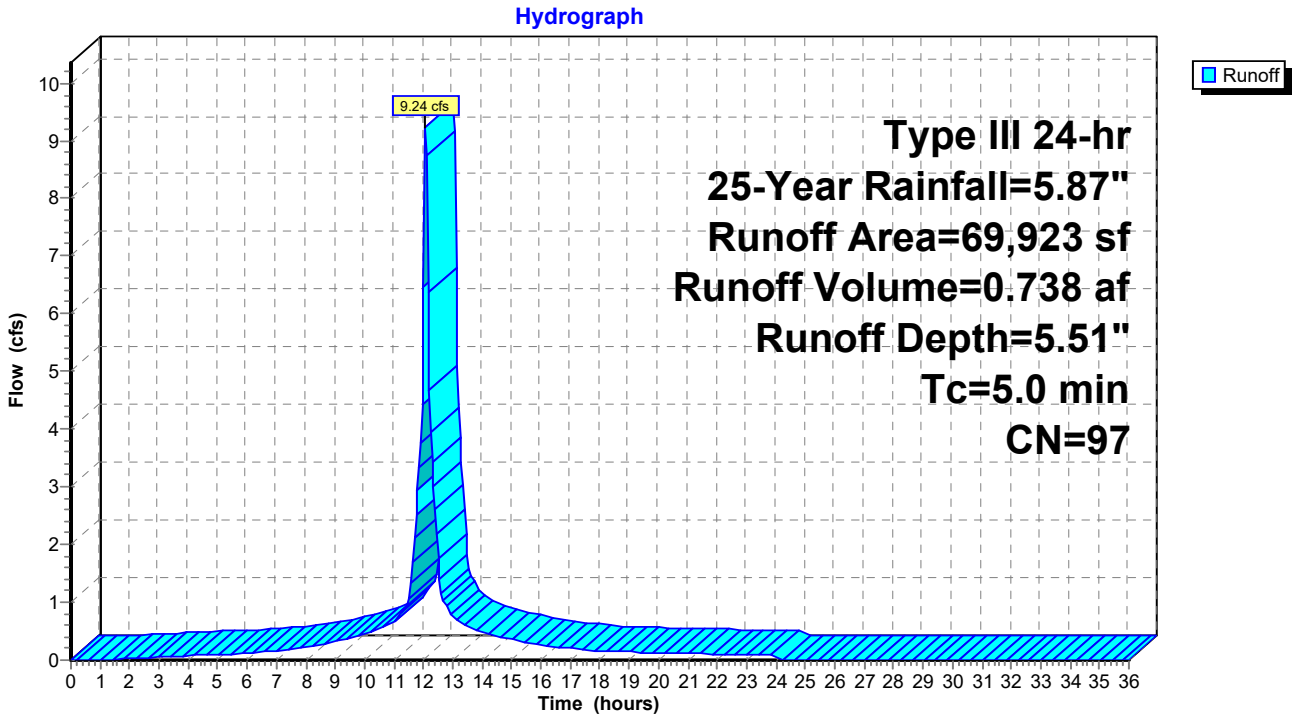
Link DP-1: Exist 72" Outfall Inflow=10.47 cfs 0.828 af
Primary=10.47 cfs 0.828 af

Total Runoff Area = 1.836 ac Runoff Volume = 0.828 af Average Runoff Depth = 5.41"
19.81% Pervious = 0.364 ac 80.19% Impervious = 1.472 ac

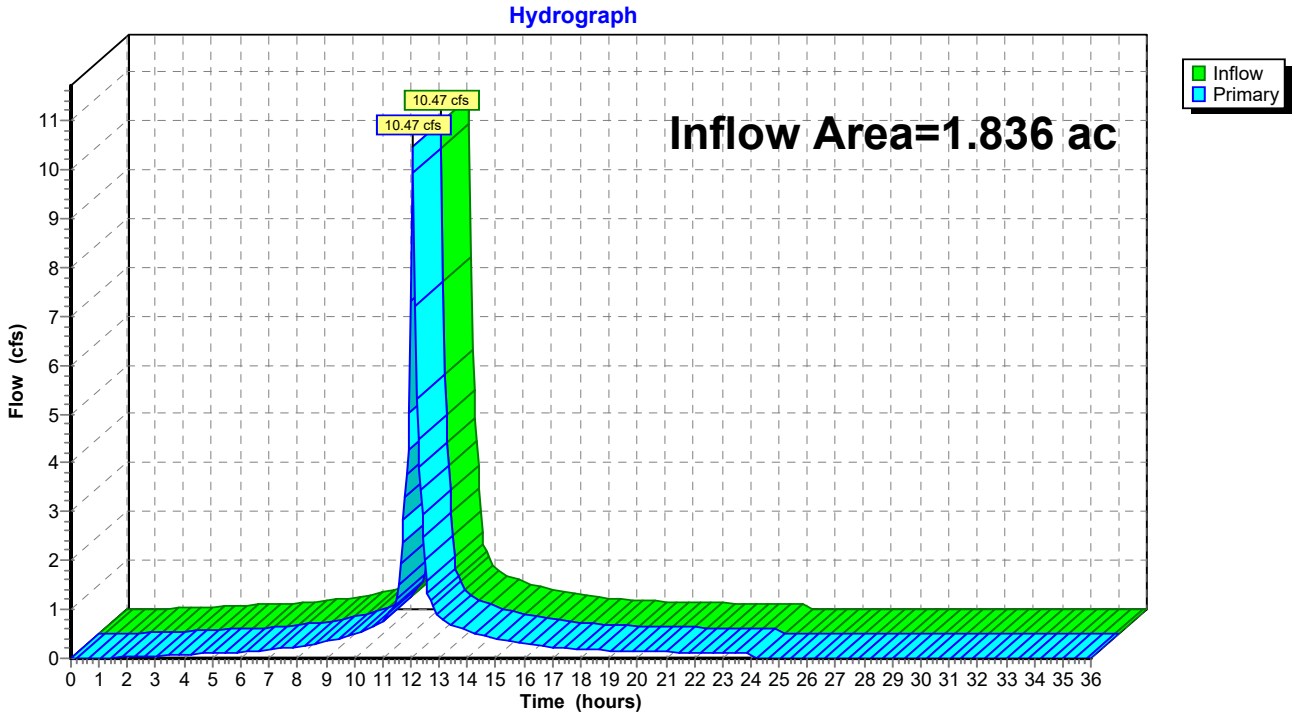
Subcatchment S2: Area Subject to Condition #62



Subcatchment S3: Area Not Subject to Condition #62



Link DP-1: Exist 72" Outfall



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

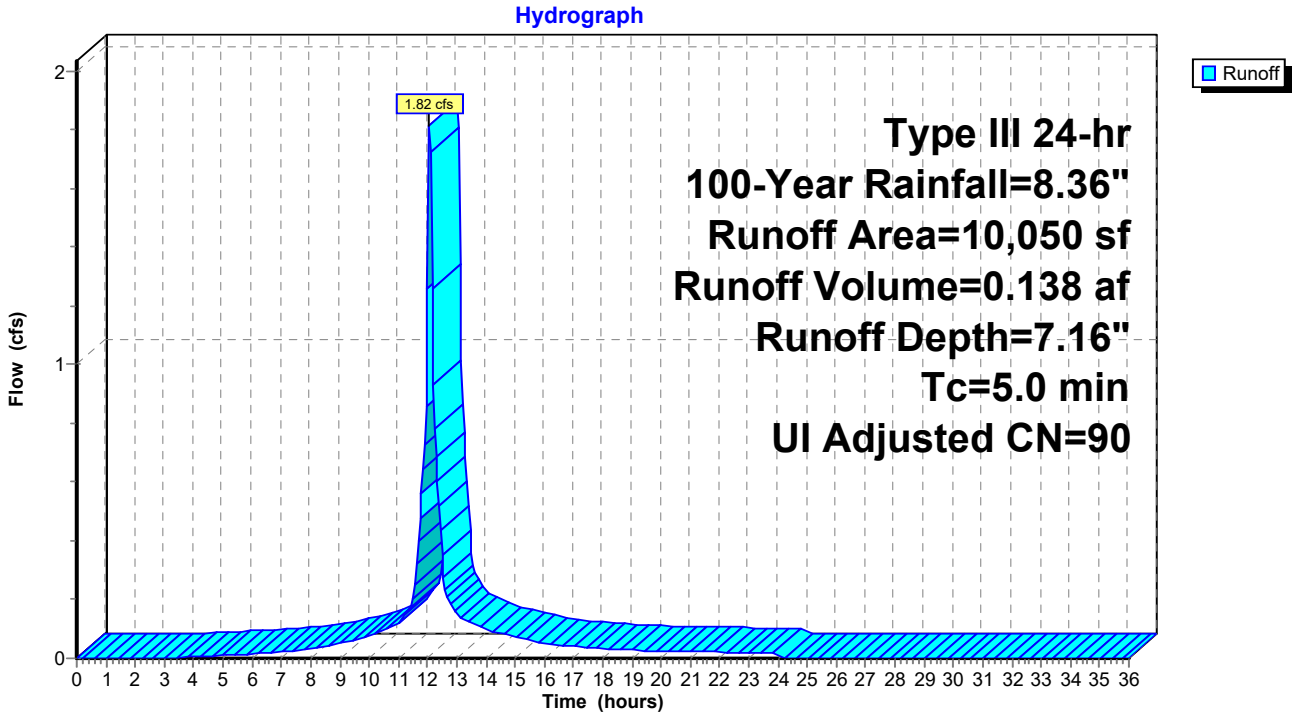
SubcatchmentS2: Area Subject to Runoff Area=10,050 sf 20.66% Impervious Runoff Depth=7.16"
Tc=5.0 min UI Adjusted CN=90 Runoff=1.82 cfs 0.138 af

SubcatchmentS3: Area Not Subject to Runoff Area=69,923 sf 88.74% Impervious Runoff Depth=8.00"
Tc=5.0 min CN=97 Runoff=13.23 cfs 1.070 af

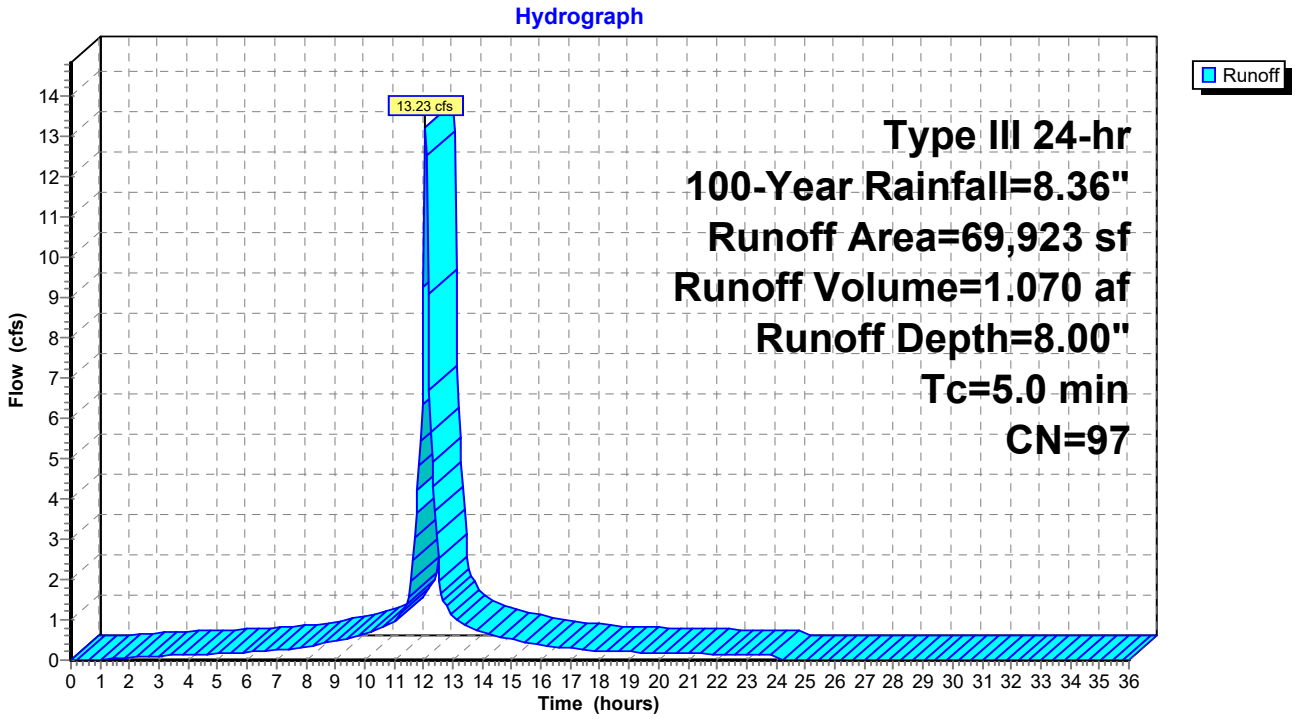
Link DP-1: Exist 72" Outfall Inflow=15.04 cfs 1.208 af
Primary=15.04 cfs 1.208 af

Total Runoff Area = 1.836 ac Runoff Volume = 1.208 af Average Runoff Depth = 7.89"
19.81% Pervious = 0.364 ac 80.19% Impervious = 1.472 ac

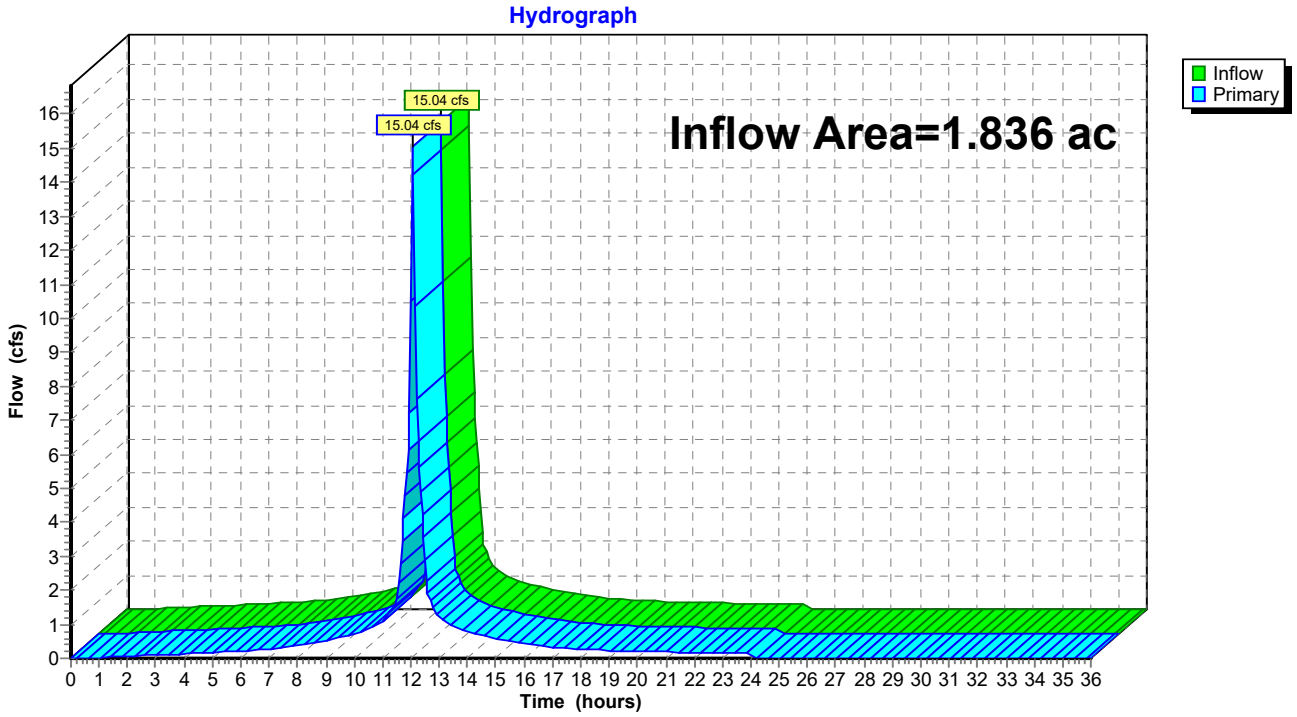
Subcatchment S2: Area Subject to Condition #62



Subcatchment S3: Area Not Subject to Condition #62



Link DP-1: Exist 72" Outfall



Attachment 4

- Long Term Stormwater Pollution Prevention Plan Operations and Maintenance (O&M)
- O&M Checklist
- Stormceptor's Owner's Manual

Long-Term Pollution Prevention Plan

This Long-Term Pollution Prevention Plan has been developed to establish site management practices that improve the quality of stormwater discharges from Alta XMBLY and Road L at the XMBLY Master Plan Development (the "Project").

Description of Pollutant Sources

The proposed Project and the adjacent Road L located at 5 Middlesex Avenue in Somerville, Massachusetts (the "Site") is a pollutant source that will generate stormwater runoff that may collect pollutants such as oil, grease, trash, and sediments. The management and maintenance of this potential pollutant source is further described in this section.

Pollutant Control Approach

Maintenance of Pavement Systems

Standard Asphalt Pavement

Regular maintenance of pavement surfaces will prevent pollutants such as oil and grease, trash, and sediments from entering the stormwater management system. The following practices should be performed:

- Sweep or vacuum asphalt pavement areas bi-annually with a commercial cleaning unit and dispose of removed material.
- Routinely pick up and remove litter from the roadways, sidewalks, and landscaping.

Permeable Pavers

The primary maintenance requirement for permeable pavers is to clean the surface drainage voids. Fine debris and dirt accumulate in the drainage openings and reduce the pavement's flow capacity. Even though some irreplaceable loss in permeability should be expected over the paver's lifetime, one can increase the longevity of the system by following the maintenance schedule for vacuum

sweeping and high-pressure washing, restricting the area's use by heavy vehicles, limiting the use of de-icing chemicals and sand, and implementing a stringent sediment control plan.

Preventing Clogging of Permeable Paver Surface Areas

- Patio areas and/or other areas with permeable pavers shall be cleaned annually with vacuums or washed with high pressure washers.
- Do not allow construction staging, soil/mulch storage, etc. on unprotected pavement surfaces.
- Maintain vegetated areas adjacent to areas with permeable pavers to prevent washout of soil onto surface.
- Do not apply any type of sealant to permeable pavers.

Inspecting the System

- Inspect areas paved with permeable pavers monthly for the first three months after construction to ensure proper functioning and correct any areas that have settled or experienced washouts.
- Inspect areas paved with permeable pavers annually after initial three month period. Annual inspections should take place after large storms, when puddles will make any clogging obvious.

Maintenance of Vegetated Areas

Proper maintenance of vegetated areas can prevent the pollution of stormwater runoff by controlling the source of pollutants such as suspended sediments, excess nutrients, and chemicals from landscape care products. Practices that should be followed under the regular maintenance of the vegetated landscape include:

- Inspect planted areas on a semi-annual basis and remove any litter.
- Maintain planted areas adjacent to pavement to prevent soil washout.
- Immediately clean any soil deposited on pavement.
- Re-seed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming.
- Plant alternative mixture of grass species in the event of unsuccessful establishment.
- The grass vegetation should be cut to a height between three and four inches.
- Pesticide/Herbicide Usage – No pesticides are to be used unless a single spot treatment is required for a specific control application.
- Fertilizer usage should be avoided. If deemed necessary, slow release fertilizer should be used. Fertilizer may be used to begin the establishment of vegetation in bare or damaged areas, but should not be applied on a regular basis unless necessary.

- Pet waste provision if applicable.

Management of Snow and Ice

Storage and Disposal

Snow shall be stockpiled on standard pavement surfaces so sand and salt may be swept in the spring or removed as snow melts and drains through the stormwater management system. Recommended locations for snow storage are shown on the attached Snow Storage Plan. Key practices for the safe storage and disposal of snow include:

- Under no circumstances shall snow be disposed or stored in wetland resource areas.
- Under no circumstances shall snow be disposed or stored in stormwater basins, ponds, rain gardens, swales, channels, or trenches.
- Do not stockpile snow on permeable pavement surfaces. Sand and grit in snow will clog pavement.
- Plow parking areas paved with permeable asphalt pavement carefully. Plow blades should be set approximately 1" higher than usual to avoid scarring the pavement and loosening material that could potentially clog surface pores.
- Do not apply abrasives such as sand or grit on or adjacent to permeable asphalt pavement.
- Monitor application rates of deicing materials on permeable pavement areas and reduce application rate accordingly. Permeable pavements tend to require less deicer per unit area because the water is not required to remain liquid over the entire parking surface area before discharge.
- Do not apply abrasives such as sand or grit on or adjacent to permeable pavers.
- Avoid plowing of areas with permeable pavers.

Salt and Deicing Chemicals

The amount of salt and deicing chemicals to be used on the site shall be reduced to the minimum amount needed to provide safe pedestrian and vehicle travel. The following practices should be followed to control the amount of salt and deicing materials that come into contact with stormwater runoff:

- Devices used for spreading salt and deicing chemicals should be capable of varying the rate of application based on the site specific conditions.
- Sand and salt should be stockpiled under covered storage facilities that prevent precipitation and adjacent runoff from coming in contact with the deicing materials.

- Sodium Chloride (NaCl) will not be used for deicing.
- The snow removal contractor will incorporate anti-icing strategies to reduce total materials applications. This may include strategies such as the application of calcium brines to prevent icing and facilitate snow removal.
- Calcium Magnesium Acetate (CMA) blends are recommended for walkways and small areas where hand-applications are anticipated.
- A 4:1 sand to calcium ratio should be used.

Spill Prevention and Response Plan

Spill prevention equipment and training will be provided by the property management company.

Initial Notification

In the event of a spill the facility and/or construction manager or supervisor will be notified immediately.

FACILITY MANAGER

Name:	TBD	Home Phone:	TBD
Phone:	TBD	E-mail:	TBD

CONSTRUCTION MANAGER

Name:	TBD	Home Phone:	TBD
Phone:	TBD	E-mail:	TBD

The supervisor will first contact the Fire Department and then notify the Police Department, the Public Health Commission and the Conservation Commission. The Fire Department is ultimately responsible for matters of public health and safety and should be notified immediately.

Further Notification

Based on the assessment from the Fire Chief, additional notification to a cleanup contractor may be made. The Massachusetts Department of Environmental Protection (MassDEP) and the EPA may be notified depending upon the nature and severity of the spill. The Fire Chief will be responsible for determining the level of cleanup and notification required. The attached list of emergency phone numbers shall be posted in the main construction/facility office and readily accessible to all employees. A hazardous waste spill report shall be completed as necessary using the attached form.

Emergency Notification Phone Numbers

1. FACILITY MANAGER

Name: TBD Home Phone: TBD

Phone: TBD E-mail: TBD

ALTERENATE

Name: TBD Home Phone: TBD

Phone: TBD E-mail: TBD

2. FIRE DEPARTMENT

Emergency: **911**

Business: (617) 623-8866

POLICE DEPARTMENT

Emergency: **911**

Business: (617) 625-1600

3. CLEANUP CONTRACTOR:

Address: TBD

Phone: TBD

4. MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION

Emergency: (617) 292-5500

Northeast Region – Wilmington Office: (978) 694-3200

5. NATIONAL RESPONSE CENTER

Phone: (800) 424-8802

ALTERNATE: U.S. ENVIRONMENTAL PROTECTION AGENCY

Emergency: 1-800-424-8802

Business: (888) 372-7341

6. SOMERVILLE CONSERVATION COMMISSION

Contact: Vanessa Boukili

Phone: (617) 625-6600 ext 2516

SOMERVILLE BOARD OF HEALTH

Contact: Doug Kress

Phone: (617) 625-6600 ext 4300

Hazardous Waste / Oil Spill Report

Date _____ Time _____ AM / PM

Exact location (Transformer #) _____

Type of equipment _____ Make _____ Size _____

S / N _____ Weather Conditions _____

On or near Water ☐ Yes If Yes, name of body of Water: _____

☐ No _____

Type of chemical/oil spilled _____

Amount of chemical/oil spilled _____

Cause of Spill _____

Measures taken to contain or clean up spill _____

Amount of chemical/oil recovered _____ Method _____

Material collected as a result of cleanup:

_____ Drums containing _____

_____ Drums containing _____

_____ Drums containing _____

Location and method of debris disposal

_____

Name and address of any person, firm, or corporation suffering damages:

_____

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

_____

Spill reported to General Office by _____ Time _____ AM / PM

Spill reported to DEP / National Response Center by _____

DEP Date _____ Time _____ AM / PM Inspector _____

NRC Date _____ Time _____ AM / PM Inspector _____

Additional comments: _____

Assessment - Initial Containment

The supervisor or manager will assess the incident and initiate containment control measures with the appropriate spill containment equipment included in the spill kit kept on-site. A list of recommended spill equipment to be kept on site is included on the following page.

Fire / Police Department	911
Somerville Health Department	(617) 625-6600 ext 4300
Somerville Conservation Commission:	(617) 625-6600 ext 2516

Emergency Response Equipment

The following equipment and materials shall be maintained at all times and stored in a secure area for long-term emergency response need.

Supplies		***Recommended Suppliers***
SORBENT PILLOWS/"PIGS"	**2**	http://www.newpig.com Item # KIT276 — mobile container with two pigs, 26 feet of sock, 50 pads, and five pounds of absorbent (or equivalent) http://www.forestry-suppliers.com Item # 43210 — Manhole cover pick (or equivalent) Item # 33934 — Shovel (or equivalent) Item # 90926 — Gloves (or equivalent) *Item # 23334 — Goggles (or equivalent)*
SORBENT BOOM/SOCK	**25 FEET**	
SORBENT PADS	**50**	
LITE-DRI® ABSORBENT	**5 POUNDS**	
SHOVEL	**1**	
PRY BAR	**1**	
GOGGLES	**1 PAIR**	
GLOVES – HEAVY	**1 PAIR**	

Stormwater Operation and Maintenance Plan

Project Information

Site

XMBLY
5 Middlesex Avenue
Somerville, MA 02145

Owner

Wood Partners
91 Hartwell Avenue
Lexington, MA 02421
Phone: (781) 541-5821

Site Supervisor

TBD
Site Manager Address
Site Manager City, State Zip
Site Manager Phone Number

Name: _____

Telephone: _____

Cell phone: _____

Email: _____

Description of Stormwater Maintenance Measures

The following Operation and Maintenance (O&M) program is proposed to ensure the continued effectiveness of the stormwater management system. Attached to this plan are a Stormwater Best Management Practices Checklist and Maintenance Figure for use during the long term operation and maintenance of the stormwater management system.

Catch Basins

- All catch basins shall be inspected and cleaned a minimum of at least once per year.
- Sediment (if more than six inches deep) and/or floatable pollutants shall be pumped from the basin and disposed of at an approved offsite facility in accordance with all applicable regulations.
- Any structural damage or other indication of malfunction will be reported to the site manager and repaired as necessary
- During colder periods, the catch basin grates must be kept free of snow and ice.
- During warmer periods, the catch basin grates must be kept free of leaves, litter, sand, and debris.

Roof Drain Leaders

- Perform routine roof inspections quarterly.
- Keep roofs clean and free of debris.
- Keep roof drainage systems clear.
- Keep roof access limited to authorized personnel.
- Clean inlets draining to the subsurface bed twice per year as necessary.

Water Quality Unit (Stormceptor)

- The Stormceptor unit shall be inspected after construction, but prior to being put in service
- Inspect for oil and sediment accumulation every six months for the first year of operation
- Four inspections every year after the first year of operation to check for oil and sediment accumulation and cleaned a minimum of once per year
- Clean the unit when the sediment accumulation reaches 15% of the unit's storage capacity
- Inspection and cleanout immediately after an oil, fuel or chemical spill

XMBLY, 5 Middlesex Avenue, Somerville, Massachusetts
Long Term Best Management Practices – Maintenance/ Evaluation Checklist

Best Management Practice	Inspection Frequency (unless otherwise stated in Order of Conditions)	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check	Cleaning/Repair Needed ☐yes ☐no (List Items)	Date of Cleaning/Repair	Performed by
Deep Sump and Hooded Catch Basins	**At Least Four Times per Year**			• Accumulated sand and sediment (if more than six inches deep) and/or floatable pollutants shall be pumped from the basin and disposed of at an approved offsite facility in accordance with all applicable regulations. • Any structural damage or other indication of malfunction will be reported to the site manager and repaired as necessary. • During colder periods, the catch basin grates must be kept free of snow and ice. • During warmer periods, the catch basin grates shall be kept free of leaves, litter, sand, and debris.	☐**yes** ☐**no**		
Permeable Pavers	**Annually**			• Patio areas and/or other areas with permeable pavers shall be cleaned annually with vacuums or washed with high pressure washers. • Do not allow construction staging, soil/mulch storage, etc. on unprotected pavement surfaces. • Maintain vegetated areas adjacent to areas with permeable pavers to prevent washout of soil onto surface. • Do not apply any type of sealant to permeable pavers. • Inspect areas paved with permeable pavers monthly for the first three months after construction to ensure proper functioning and correct any areas that have settled or experienced washouts. • Inspect areas paved with permeable pavers annually after initial three-month period. Annual inspections should take place after large storms, when puddles will make any clogging obvious.	☐**yes** ☐**no**		
Water Quality Unit (Stormceptor or approved equal)	**Bi-Annually**			• The Stormceptor unit shall be inspected after construction, but prior to being put in service • Inspect for oil and sediment accumulation every six months for the first year of operation • Four inspections every year after the first year of operation to check for oil and sediment accumulation and cleaned a minimum of once per year • Clean the unit when the sediment accumulation reaches 15% of the unit's storage capacity • Inspection and cleanout immediately after an oil, fuel or chemical spill	☐**yes** ☐**no**		
Street Sweeping	**N/A**			• Complete four times per year	☐**yes** ☐**no**		

Notes on Stormwater / Drainage Issues:

_____

_____

_____

_____

Stormwater Control Manager _____

Inspection and Maintenance. Easy. Convenient.

When it rains, oils, sediment and other contaminants are captured and contained by over 20,000 Stormceptor units operating worldwide. While Stormceptor's patented scour prevention technology ensures captured pollutants remain in the unit during all rainfall events, the accumulated pollutants must eventually be removed as part of a regular maintenance program.

If neglected, oil and sediment gradually build up and diminish any BMP's efficiency, harming the environment and leaving owners and operators vulnerable to fines, surcharges and bad publicity.

Maintenance is a must

Ease, frequency and cost of maintenance are often overlooked by specifiers when considering the merits of a stormwater treatment system. In reality, maintenance is fundamental to the long-term performance of any stormwater quality treatment device.

While regular maintenance is crucial, it shouldn't be complicated. An ongoing maintenance program with Stormceptor is convenient and practically effortless. With virtually no disruptions, you can concentrate on your core business.

Quick inspections

Inspections are easily carried out above ground from any standard surface access cover through a visual inspection of the orifice and drop tee components. A sludge judge and oil dip-stick are all that are needed for sediment and oil depth measurements.

Easy unit access

Maintenance is typically conducted from the same surface access cover, eliminating the need for confined space entry into the unit. Your site remains undisturbed, saving you time and money.

No muss, no fuss and fast

Maintenance is performed quickly and inexpensively with a standard vacuum truck. Servicing usually takes less than two hours, with no disruption to your site.

A complete stormwater management plan for Stormceptor extends beyond installation and performance to regular maintenance. It's the smart, cost-effective way to ensure your unit continues to remove more pollutants than any other separator for decades to come.

Stormceptor maintenance recommendations

- Units should be inspected post-construction, prior to being put into service.
- Inspect every six months for the first year of operation to determine the oil and sediment accumulation rate.
- In subsequent years, inspections can be based on first-year observations or local requirements.
- Cleaning is required once the sediment depth reaches 15% of storage capacity, (generally taking one year or longer). Local regulations for maintenance frequency may vary.
- Inspect the unit immediately after an oil, fuel or chemical spill.
- A licensed waste management company should remove captured petroleum waste products from any oil, chemical or fuel spills and dispose responsibly.

With over 20,000 units operating worldwide, Stormceptor performs and protects every day, in every storm.

imbrium

www.imbriumsystems.com

USA: (888) 279 8826
CANADA: (800) 565 4801

Attachment 5

- List of Recommended Construction Period Erosion and Sediment Control BMPs
- Construction Period Erosion and Sediment Control BMPs Checklist

Recommended Construction Period Pollution Prevention and Erosion and Sedimentation Control Measures

The following erosion and sedimentation controls are for use during the earthwork and construction phases of the project. The following controls are provided as recommendations for the site contractor and do not constitute or replace the final Stormwater Pollution Prevention Plan that must be fully implemented by the Contractor and owner in Compliance with EPA NPDES regulations.

Catch Basin Protection

Newly constructed catch basins will be protected with silt sacks throughout construction. During construction catch basins shall be cleaned on an as-needed basis, but in no case less frequently than every six months.

Diversion Channels

Diversion channels will be used to collect runoff from construction areas and discharge to either sedimentation basins or protected catch basin inlets.

Temporary Sediment Basins

Temporary sediment basins will be designed either as excavations or bermed stormwater detention structures (depending on grading) that will retain runoff for a sufficient period of time to allow suspended soil particles to settle out prior to discharge. These temporary basins will be located based on construction needs as determined by the contractor and outlet devices will be designed to control velocity and sediment. Points of discharge from sediment basins will be stabilized to minimize erosion.

Vegetative Slope Stabilization

Stabilization of open soil surfaces will be implemented within 14 days after grading or construction activities have temporarily or permanently ceased, unless there is sufficient snow cover to prohibit implementation. Vegetative slope stabilization will be used to minimize erosion on slopes of 3:1 or flatter. Annual grasses, such as annual rye, will be used to ensure rapid germination and production of root mass. Permanent stabilization will be completed with the planting of perennial grasses or legumes. Establishment of temporary and permanent vegetative cover may be established by

hydro-seeding or sodding. A suitable topsoil, good seedbed preparation, and adequate lime, fertilizer and water will be provided for effective establishment of these vegetative stabilization methods. Mulch will also be used after permanent seeding to protect soil from the impact of falling rain and to increase the capacity of the soil to absorb water.

Maintenance

VHB recommends that the following maintenance procedures be followed:

- The on-site contractor will inspect all sediment and erosion control structures periodically and after each rainfall event. Records of the inspections will be prepared and maintained on-site by the contractor.
- Silt shall be removed from behind barriers if greater than 6-inches deep or as needed.
- Damaged or deteriorated items will be repaired immediately after identification.
- The underside of compost filter tubes should be kept in close contact with the earth and reset as necessary.
- Sediment that is collected in structures shall be disposed of properly and covered if stored on-site.
- Erosion control structures shall remain in place until all disturbed earth has been securely stabilized. After removal of structures, disturbed areas shall be regraded and stabilized as necessary.

The sedimentation and erosion control measures are included in the construction plans & details. Temporary erosion and sedimentation control measures, not limited to those previously described, may be required to be implemented to protect discharge areas throughout the construction process. These potential temporary measures are not reflected on the plans.

Construction Best Management Practices – Maintenance/Evaluation Checklist

A reduced version of the Erosion Control Maintenance measures as described above is included in the following checklist for quick reference.

XMBLY, 5 Middlesex Avenue, Somerville, Massachusetts
Construction Best Management Practices – Maintenance/ Evaluation Checklist

Best Management Practice	Inspection Frequency	Date Inspected	Inspector	Minimum Maintenance and Key Items to Check	Cleaning/Repair Needed ☐yes ☐no (List Items)	Date of Cleaning/Repair	Performed by:
Erosion Control Barrier	**Weekly or bi-weekly and after storm events of ¼ inch or greater**			• Accumulated sediment • Separation of silt socks or silt fences with the earth and each other • Damaged or broken silt socks or silt fences	☐**yes** ☐**no**		
Catch Basin Protection	**Weekly or bi-weekly and after storm events of ¼ inch or greater**			• Accumulated sediment within silt sacks • Rips or torn silt sacks	☐**yes** ☐**no**		

Stormwater Control Manager _____