

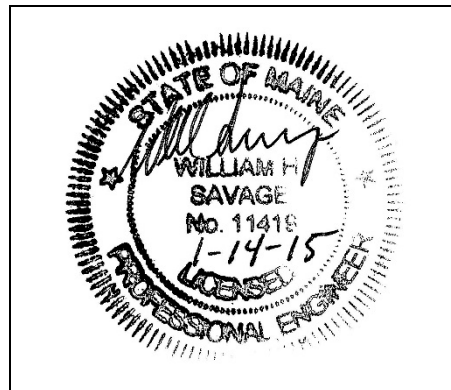
STORMWATER MANAGEMENT **REPORT**

Prepared For:

Redfern Properties, LLC
East Bayside Lofts
89 Anderson Street
Portland, Maine 04101

Prepared By:

Acorn Engineering, Inc.
158 Danforth Street
Portland, Maine 04102



January 2015

INTRODUCTION

Acorn Engineering, Inc. has been retained by Redfern Properties, LLC to provide civil engineering services for the proposed development of East Bayside Lofts, located at 89 Anderson Street in Portland, Maine. East Bayside Lofts is a 53-unit vertical urban infill development located within Portland's East Bayside community. The building is anticipated to be four stories tall; the first story, as presently proposed, will comprise of a restaurant, two additional commercial spaces, and an indoor/outdoor parking facility; and the second through fourth stories will contain a total of 10 studio apartments, 34 one-bedroom apartments, and 9 two-bedroom apartments for a total of 53 rental units within the building. An outdoor parking lot will also be included in the design.

A stormwater analysis will be prepared to demonstrate that the project will meet the following requirements of the City of Portland (the City):

- City of Portland Land Use Ordinance Chapter 14, Article V. Site Plan Section 14-523. Required Approvals and Applicability (F) Level III Site Plan Review.
- City of Portland Technical Manual – Section 5 – Portland Stormwater Management Standards and Maine DEP Chapter 500 Stormwater Management.

On January 6, 2015 representatives of Acorn Engineering met with David Margolis-Pineo and Helen Donaldson to discuss the proposed stormwater connection to the municipal sewer system. Potential locations include conveying flows to the municipal storm drain in either Everett Street or Fox Street.

At the meeting it was confirmed by the City that roadway and drainage improvements were being completed this winter within the Fox Street corridor. Based upon the meeting's discussion, all parties agreed that connecting the proposed East Bayside Lofts storm drainage to the existing Fox Street storm sewer would be the best course of action for the project.

EXISTING CONDITIONS

The proposed project is located at the northeasterly corner of Fox Street and Anderson Street in Portland. The proposed lot is a combination of two properties which presently include Portland Tax Map 012, Block I, Lots 1 and 5. There is an existing auto service building and two smaller associated buildings located on Lot 1 which are to be demolished as part of the proposed project.

Prior to the beginning of this project, the City of Portland has zoned this area as R-6 Residential Zone; this location's prior use was a non-conforming use as an automobile repair garage. In recognition of this project, this location has been re-zoned as a B-1b zone. An existing conditions plan has been prepared by Nadeau Land Surveys of Portland, Maine. The stormwater analysis is documented with supporting calculations and reports attached to this narrative. An existing conditions plan has been prepared by Nadeau Land Surveys of Portland, Maine dated 10/24/2014.

Abutting Uses:

- Northeast R-6 Zone - Single and Multi-Family Residential
- Southeast R-6 Zone - Single and Multi-Family Residential
- Southwest ROS Zone – Kennedy Park
- Northwest ILb Zone – Neap Tide LLC.

The majority of the existing project area is comprised of a paved and gravel parking area, as well as two buildings. Existing impervious areas include the existing buildings, as well as paved and compacted gravel parking areas; the entire site is observed to be impervious surfaces. From southeast to northwest the existing grades are relatively gradual with the majority of the existing slope at approximately 0-10%.

The project area presently drains towards the intersection of Anderson Street and Fox Street before entering the municipal sewer system. Drainage and sewer improvements are anticipated to be completed within the Fox Street and Anderson Street corridors, Winter/Spring 2015.

The project team is not aware of the presence of any existing significant natural features located on the site. Given the urban setting, existing impervious surfaces, and existing free-draining soils a field inventory of significant natural feature was not undertaken. The project is not located within a watershed classified as an Urban Impaired Stream.

PROPOSED DEVELOPMENT

East Bayside Lofts is a 53-unit vertical urban infill development that is located at the northeastern corner of Anderson Street and Fox Street. The first floor of the development will include commercial spaces, mechanical and electrical facilities for the development, as well as green spaces, and indoor and outdoor parking spaces.

The parking lot grading topography will generally be kept level, with 1% to 3% slopes directing stormwater towards internal catch basins on the western side of the development. Terracing will be completed through a stepped foundation and a retaining wall to ensure that access to locations of the building that are at differing ground elevations will be possible.

The project landscaping is anticipated to include planting of perennials and shrubs. Currently, only a few small trees and overgrown brush populate the site. The anticipated landscaping will be designed to complement the contemporary development while offering environmental benefits such as reducing the heat island effect, stormwater quality treatment, erosion reduction, and creation of urban wildlife habitat.

The development is anticipated to be served by the Portland Water District, underground power/cable/communications, natural gas and the municipal sewer system. Solid waste and recycling will be contracted through a private waste disposal and recycling provider.

GENERAL STANDARDS - WATER QUALITY

It is our understanding that the project will not be required to meet the General Standards because of the exception set forth in the City of Portland Technical Manual – Section 5 – Portland Stormwater Management Standards and Maine DEP Chapter 500, B. General Standards (3) Exception from the general standards, (e).

“Stormwater Management Law project including redevelopment. For a project requiring a Stormwater Management Law permit that includes redevelopment of impervious area that was in existence as of November 16, 2005 (the effective date of Chapter 500 revisions), the redevelopment of that impervious area is not required to meet General standards provided

the department determines that the new use of the existing impervious area is not likely to increase stormwater impacts resulting from the proposed project's stormwater runoff beyond the level of impact already caused by the runoff from the existing impervious area. The requirements of Appendix D must still be met, if applicable.”

Although additional stormwater treatment is not required, the project has been designed to improve upon the existing condition for the following reasons:

- The stabilization of the existing gravel areas with pavement or landscaping.
- The elimination surface stormwater flows directly to the municipal sewer.
- The installation of catch basins with catch basin hoods to mitigate transport of oil, floating debris, and larger suspended particles into the storm drain piping.
- The installation of catch basins which incorporates a deeper 3-ft (2 ft typ.) sump to store items listed above until routine cleaning is performed.

FLOODING STANDARD – WATER QUANTITY

To review the Section E. Flooding Standard, the proposed development was modeled using HydroCAD to verify that the post-development conditions do not exceed the pre-development conditions. A 24-hour SCS Type III storm distribution for the 2, 10, and 25 year storm events were used. The corresponding rainfall amounts for these storms are 3.00”, 4.70”, and 5.50” respectively.

Due to the numerous variables, and inherent inaccuracies with the modeling program used to calculate stormwater runoff it is custom at Acorn Engineering, Inc. to round to the nearest whole number. However due to the small size of the project the stormwater runoff shall be rounded to the nearest tenth of a cubic feet per second (cfs). Given the relatively small watershed areas, urban setting, and predominance of impervious area, a 5 minute time of concentration (T_c) was applied to each subcatchment for both the pre and post-development conditions.

Pre-development Calculations

The pre-development condition was modeled as two subcatchments. Subcatchment #1 is tributary to the catch basin at the intersection of Anderson Street and Fox Street. Subcatchment 2 is tributary to the catch basin within Everett Street, upgradient from Anderson Street. The storm drain within Everett Street is then tributary to the municipal sewer (POI#1) near the intersection of Fox Street and Anderson Street.

- Subcatchment 1, Existing West Subcatchment – Area (21,296 sf, 0.49 acres) tributary to the existing municipal sewer (POI#1) near the intersection of Fox Street and Anderson Street.
- Subcatchment 2, Existing East Subcatchment – Area (1,930 sf, 0.04 acres) tributary to the existing municipal storm drain catch basin within Everett Street. The storm drain within Everett Street is then tributary to the municipal sewer (POI#1) near the intersection of Fox Street and Anderson Street.

The surface flows tributary to the municipal storm sewer are also included below. A Pre-development Watershed Map developed for this project can be viewed in Attachment A, and a copy of the HydroCAD calculations is included within Attachment D of this report. Peak flow rates for the storm events are as follows:

Drainage Area	2 – Year Storm Event (cfs)	10 – Year Storm Event (cfs)	25 – Year Storm Event (cfs)
Subcatchment 1	1.4	2.3	2.7
Subcatchment 2	0.1	0.2	0.2
Point of Interest #1	1.6	2.5	2.9

Post-development Calculations:

The post-development condition was modeled as one subcatchment with the same point of interest, as all stormwater is anticipated to leave the site through one location and connect to the existing 21” ductile iron storm drain. The proposed Grading and Drainage Plan was designed to maintain the historical area tributary to the municipal sewer near the intersection of Fox Street and Anderson Street.

- Subcatchment 1 – Area (0.53 acres) tributary to the existing municipal sewer within Fox Street

The post development calculations include changes to the land use. The change in land use did not result in a net stormwater increase. The change in land use from impervious soils to grass resulted in a comparatively larger decrease in peak flows than the minimal increase in stormwater flows from an increase in pavement and building area. The post-development conditions now convey all stormwater flows to the municipal sewer near the intersection of Fox Street and Anderson Street (POI #1). The following table represents comparison of predevelopment and post-development condition peak runoff rates at the respective point of interest.

Drainage Area	2 – Year Storm Event (cfs)		10 – Year Storm Event (cfs)		25 – Year Storm Event (cfs)	
	Pre	Post	Pre	Post	Pre	Post
POI #1	1.6	1.5	2.5	2.5	2.9	2.9

As shown in Table 2, the post development peak flows shall remain at or below the predevelopment levels. A Post-development Watershed Map developed for this project can be viewed in Attachment B, and a copy of the HydroCAD calculations is included within Attachment D, of this report.

Pipe sizes were generated using the rational method.

SOILS

Onsite soil information includes the following:

- Summit Geoengineering Services – Soil Boring Logs, dated November 25, 2014. A formal Geotechnical Report will be prepared by Summit Geoengineering Services for the project.
- Soil Conservation Service Medium Intensity Soil Survey for Cumberland County.

Given the soils information, listed above, and the fact that greater than 50% of the proposed development site is currently developed, it is Acorn Engineering's professional opinion that a more intense hydric soil boundary delineation is not required because the waiver requirements set forth in the City of Portland Technical Manual – Section 7 – Soil Survey, Rev. 6/17/11 are met.

The area within and surrounding the project includes soils types listed in the table below. The susceptibility of soils to erosion is indicated on a relative "K" scale of values over a range of 0.02 to 0.69. Higher "K" values indicate more erodible soils.

Table 1 - "K" Value		
Soils Type	Subsurface	Substratum
Au Gres	.15	.15
Deerfield	.17	.17
Hinckley	.17	.17

The soil "K" values for the soils, listed above, indicate a low susceptibility to erosion. The site's susceptibility to erosion is from the Soil Conservation Service Medium Intensity Soil Survey for Cumberland County. The site's soils map from the Soil Conservation Service Medium Intensity Soil Survey for Cumberland County is included as Attachment C.

Conclusion

The proposed development was designed to meet the requirements implemented by the MDEP under the Stormwater Management Statute (38 M.R.S.A. § 420-D) as well as the City of Portland Technical Manual – Section 5 – Portland Stormwater Management Standards. The proposed project as envisioned shall improve upon the existing stormwater management.

Attachments

Attachment A: Pre Development Watershed Map

Attachment B: Post Development Watershed Map

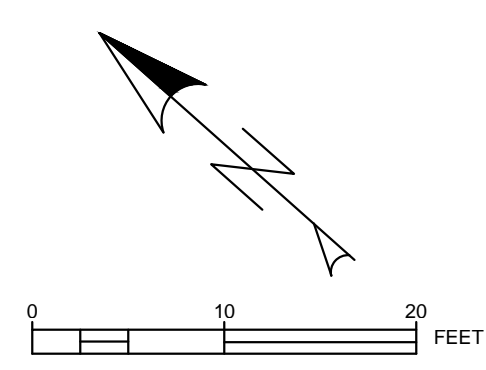
Attachment C: Soils Map

Attachment D: HydroCAD Calculations

Attachment E: Summit Geoengineering Services – Soil Boring Logs, dated November 25, 2014

- GENERAL NOTES:
1. REFER TO STORMWATER REPORT FOR MORE INFORMATION
 2. GIVEN THE URBAN SETTING, SMALL WATERSHED AREA AND PREDOMINANCE OF IMPERVIOUS AREAS A 5 MINUTE TIME OF CONCENTRATION WAS USED FOR BOTH THE PRE-DEVELOPMENT AND POST-DEVELOPMENT CONDITIONS.

ROOF OUTLINE
 GREEN SPACE OUTLINE
1 SUBCATCHMENT NUMBER
 SUBCATCHMENT OUTLINE
1 POINT OF INTEREST (POI)



ISSUED FOR	BY
PRELIMINARY SUB	WHS
	DATE
	12/12/13
REVISION	REV. DATE

DRAWING NAME: **POST-DEVELOPMENT STORMWATER PLAN**
 PROJECT NAME: **EAST BAYSIDE LOFTS**
 CLIENT: **REDFERN PROPERTIES, LLC.**
 P.O. BOX 8816 PORTLAND, ME 04104

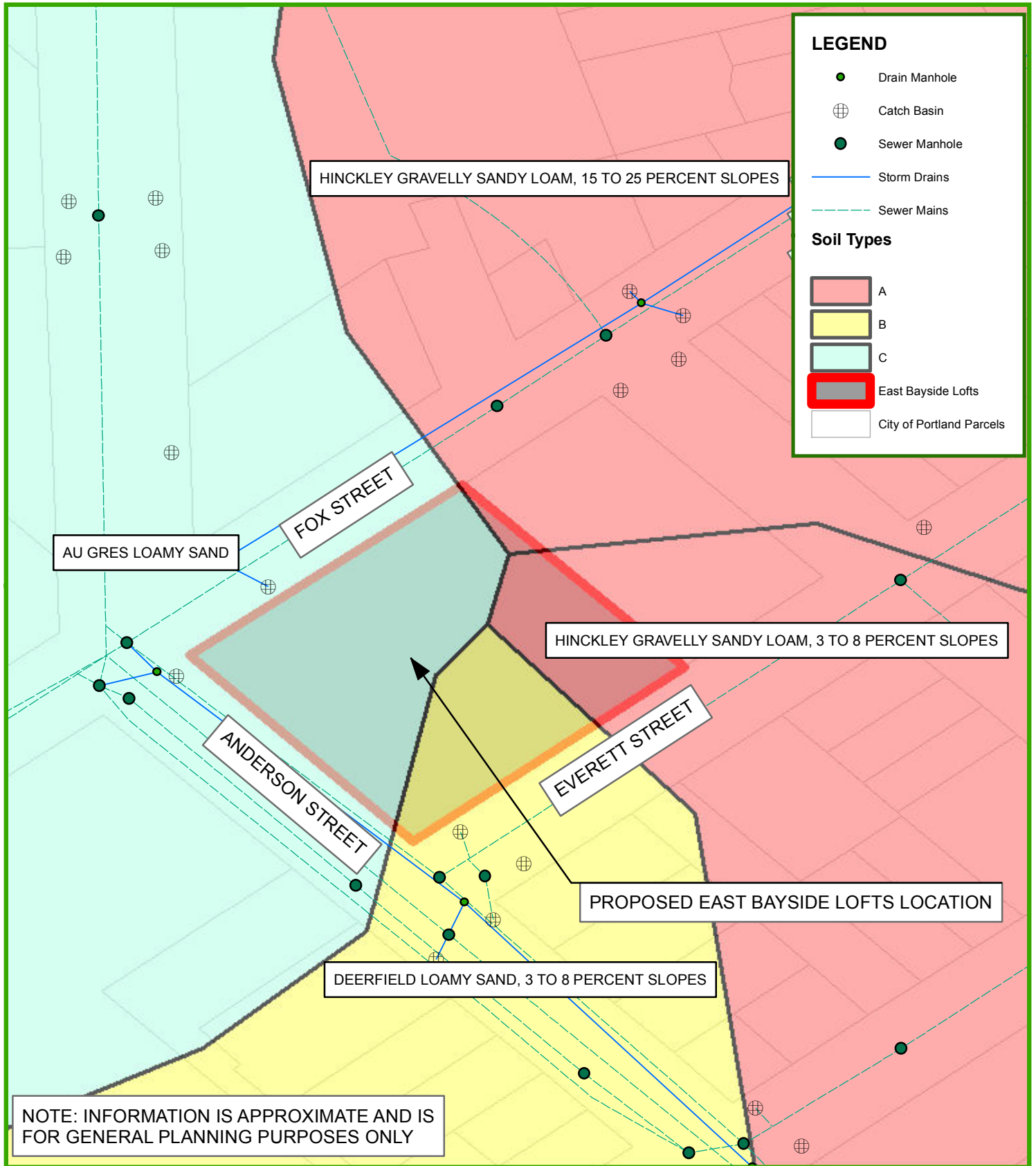
A C O R N
ENGINEERING, INC.

THIS PLAN SHALL NOT BE MODIFIED WITHOUT WRITTEN PERMISSION FROM ACORN ENGINEERING, INC. ANY OTHERS SHALL BE AT THE USER'S SOLE RISK AND WITHOUT LIABILITY TO ACORN ENGINEERING, INC.
 158 DANFORTH STREET, PORTLAND MAINE 04102
 (207) 775-2825

FILE:	1053_CIVIL_11-15-14
DATE:	10/15/2014
JN:	1053
SCALE:	1" = 10'
DESIGNED BY:	WHS
DRAWN BY:	MAG
CHECKED BY:	WHS

PRELIMINARY APP.
SUBMISSION

DRAWING NO.
POST



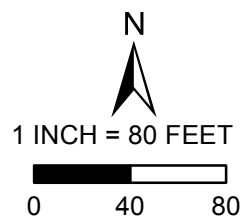
EAST BAYSIDE LOFTS DEVELOPMENT

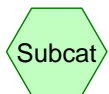
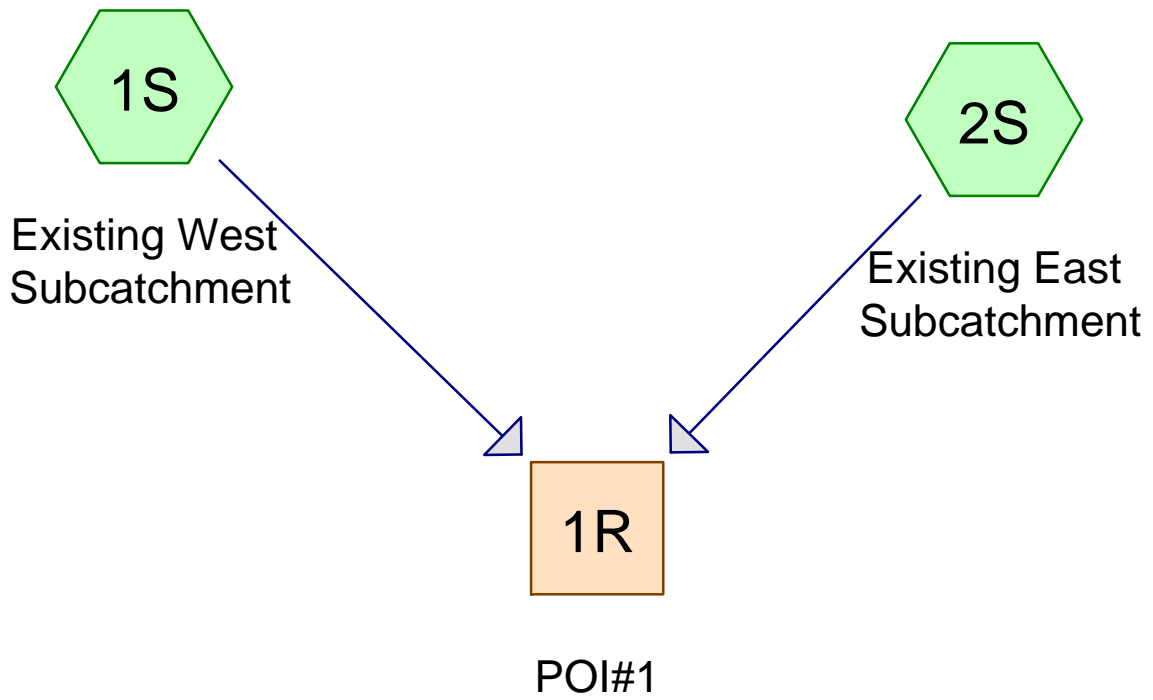
SOILS ADJACENT TO DEVELOPMENT

89 ANDERSON STREET, PORTLAND, MAINE

Data Sources: MEGIS, City of Portland, Acorn Engineering, Inc.

Date: 12/18/14 by Acorn Engineering, Inc. for Redfern Properties, LLC

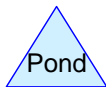




Subcat



Reach



Pond



Link

Drainage Diagram for EBL Pre-Development 1-14-15
Prepared by Acorn Engineering, Inc., Printed 1/14/2015
HydroCAD® 8.50 s/n 000620 © 2007 HydroCAD Software Solutions LLC

EBL Pre-Development 1-14-15

Prepared by Acorn Engineering, Inc.

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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.250	96	Gravel (1S,2S)
0.135	98	Building (1S)
0.148	98	Pavement (1S)
0.533		TOTAL AREA

EBL Pre-Development 1-14-15

Prepared by Acorn Engineering, Inc.

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Page 3

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.533	Other	1S, 2S
0.533		TOTAL AREA

EBL Pre-Development 1-14-15

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Type III 24-hr 2-year Rainfall=3.00"

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Time span=5.00-20.00 hrs, dt=0.04 hrs, 376 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment 1S: Existing West

Runoff Area=0.489 ac 57.87% Impervious Runoff Depth>2.50"
Tc=5.0 min CN=97 Runoff=1.43 cfs 0.102 af

Subcatchment 2S: Existing East

Runoff Area=0.044 ac 0.00% Impervious Runoff Depth>2.41"
Tc=5.0 min CN=96 Runoff=0.13 cfs 0.009 af

Reach 1R: POI#1

Inflow=1.55 cfs 0.111 af
Outflow=1.55 cfs 0.111 af

Total Runoff Area = 0.533 ac Runoff Volume = 0.111 af Average Runoff Depth = 2.49"
46.90% Pervious = 0.250 ac 53.10% Impervious = 0.283 ac

Summary for Subcatchment 1S: Existing West Subcatchment

Runoff = 1.43 cfs @ 12.07 hrs, Volume= 0.102 af, Depth> 2.50"

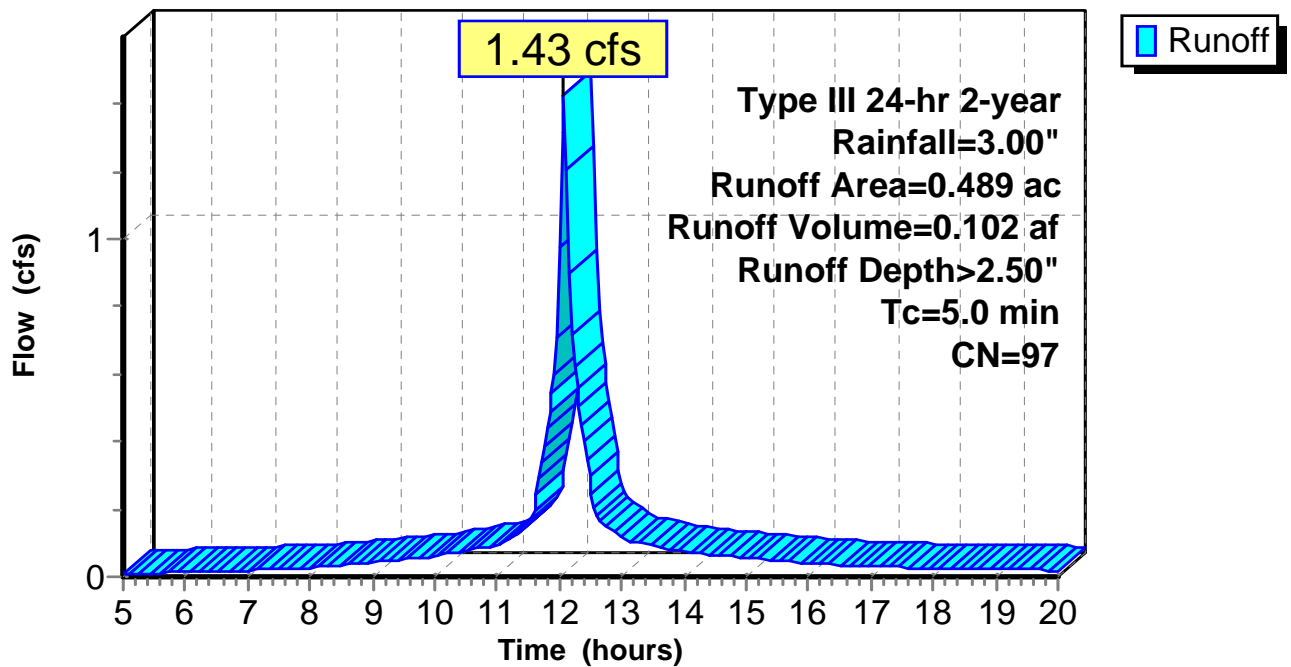
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.04 hrs
 Type III 24-hr 2-year Rainfall=3.00"

Area (ac)	CN	Description
* 0.148	98	Pavement
* 0.135	98	Building
* 0.206	96	Gravel
0.489	97	Weighted Average
0.206		Pervious Area
0.283		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum 5

Subcatchment 1S: Existing West Subcatchment

Hydrograph



Summary for Subcatchment 2S: Existing East Subcatchment

Runoff = 0.13 cfs @ 12.07 hrs, Volume= 0.009 af, Depth> 2.41"

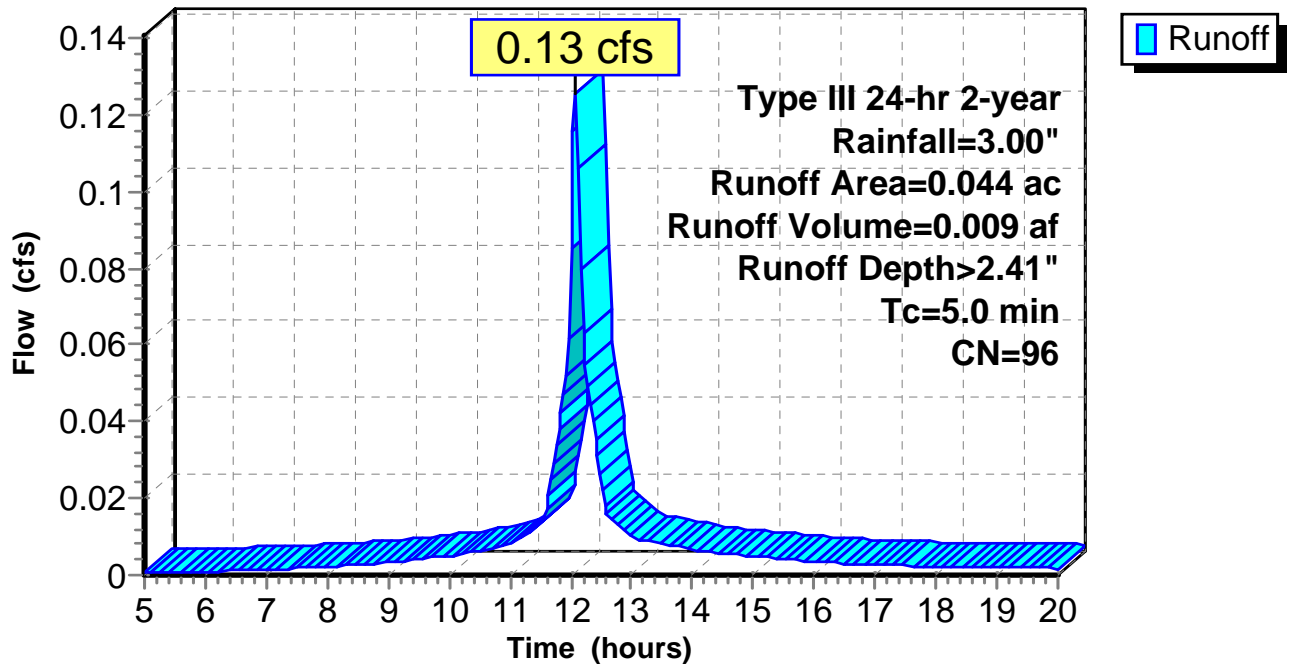
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.04 hrs
 Type III 24-hr 2-year Rainfall=3.00"

Area (ac)	CN	Description
* 0.044	96	Gravel
0.044		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum 5

Subcatchment 2S: Existing East Subcatchment

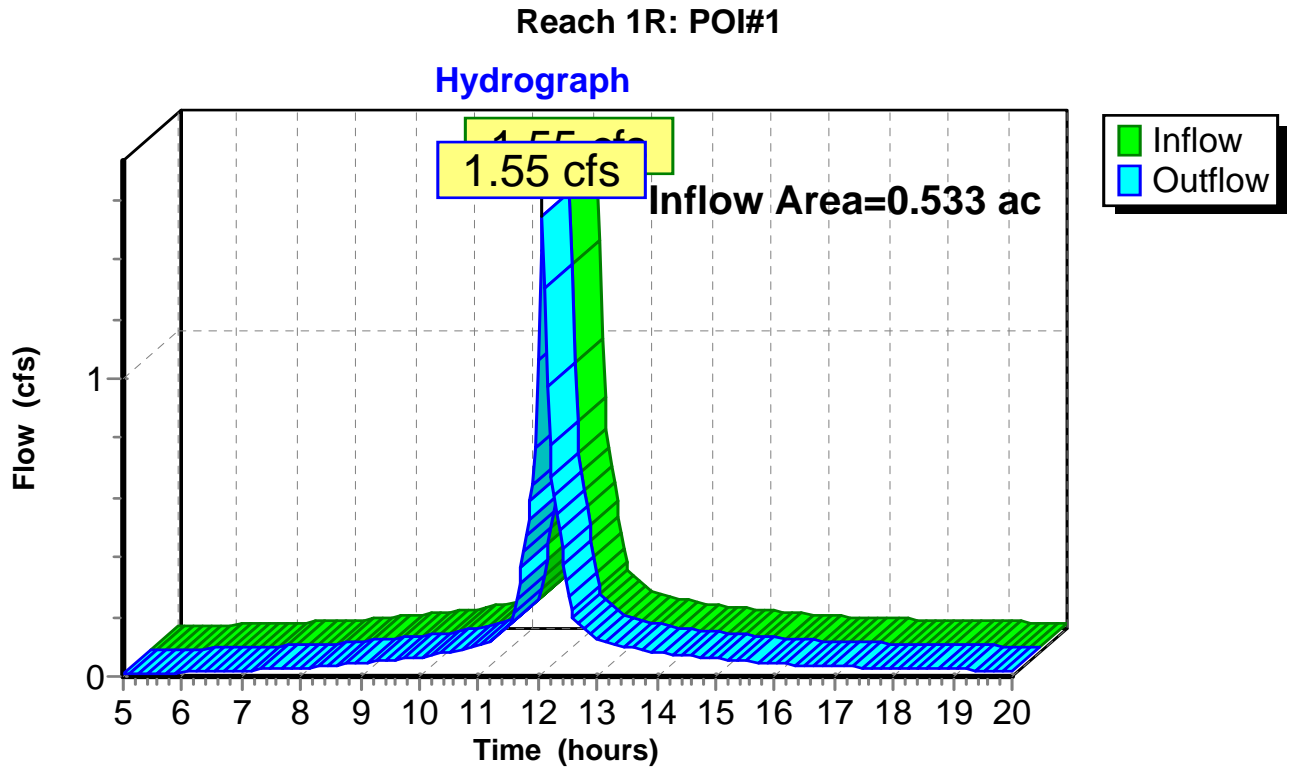
Hydrograph



Summary for Reach 1R: POI#1

Inflow Area = 0.533 ac, 53.10% Impervious, Inflow Depth > 2.49" for 2-year event
Inflow = 1.55 cfs @ 12.07 hrs, Volume= 0.111 af
Outflow = 1.55 cfs @ 12.07 hrs, Volume= 0.111 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.04 hrs



EBL Pre-Development 1-14-15

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Type III 24-hr 10-year Rainfall=4.70"

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Time span=5.00-20.00 hrs, dt=0.04 hrs, 376 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment 1S: Existing West

Runoff Area=0.489 ac 57.87% Impervious Runoff Depth>4.07"
Tc=5.0 min CN=97 Runoff=2.28 cfs 0.166 af

Subcatchment 2S: Existing East

Runoff Area=0.044 ac 0.00% Impervious Runoff Depth>3.98"
Tc=5.0 min CN=96 Runoff=0.20 cfs 0.015 af

Reach 1R: POI#1

Inflow=2.48 cfs 0.180 af
Outflow=2.48 cfs 0.180 af

Total Runoff Area = 0.533 ac Runoff Volume = 0.180 af Average Runoff Depth = 4.06"
46.90% Pervious = 0.250 ac 53.10% Impervious = 0.283 ac

Summary for Subcatchment 1S: Existing West Subcatchment

Runoff = 2.28 cfs @ 12.07 hrs, Volume= 0.166 af, Depth> 4.07"

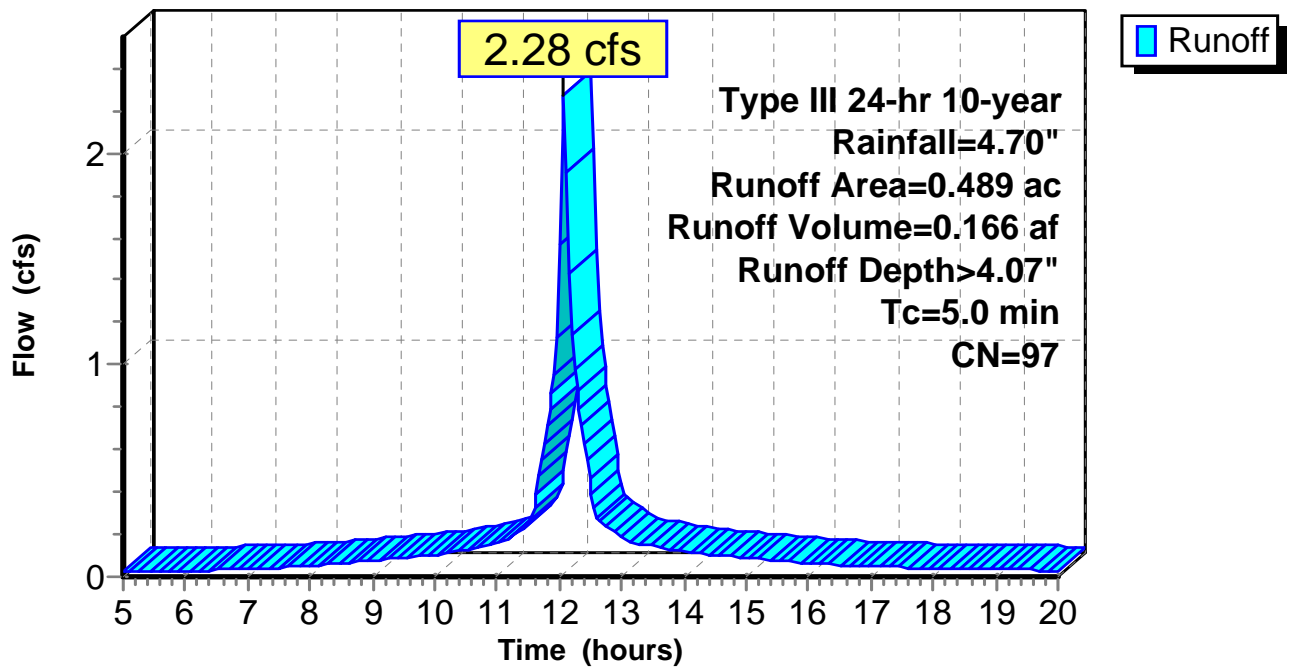
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.04 hrs
 Type III 24-hr 10-year Rainfall=4.70"

Area (ac)	CN	Description
* 0.148	98	Pavement
* 0.135	98	Building
* 0.206	96	Gravel
0.489	97	Weighted Average
0.206		Pervious Area
0.283		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum 5

Subcatchment 1S: Existing West Subcatchment

Hydrograph



Summary for Subcatchment 2S: Existing East Subcatchment

Runoff = 0.20 cfs @ 12.07 hrs, Volume= 0.015 af, Depth> 3.98"

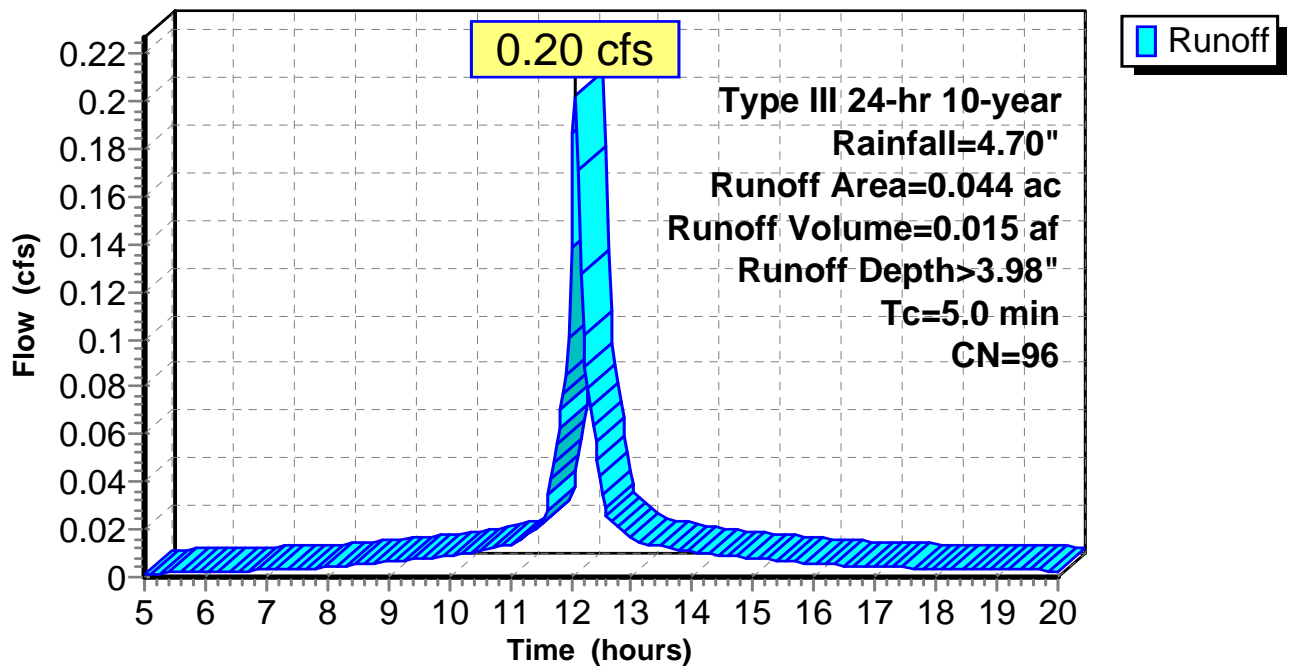
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.04 hrs
 Type III 24-hr 10-year Rainfall=4.70"

Area (ac)	CN	Description
* 0.044	96	Gravel
0.044		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum 5

Subcatchment 2S: Existing East Subcatchment

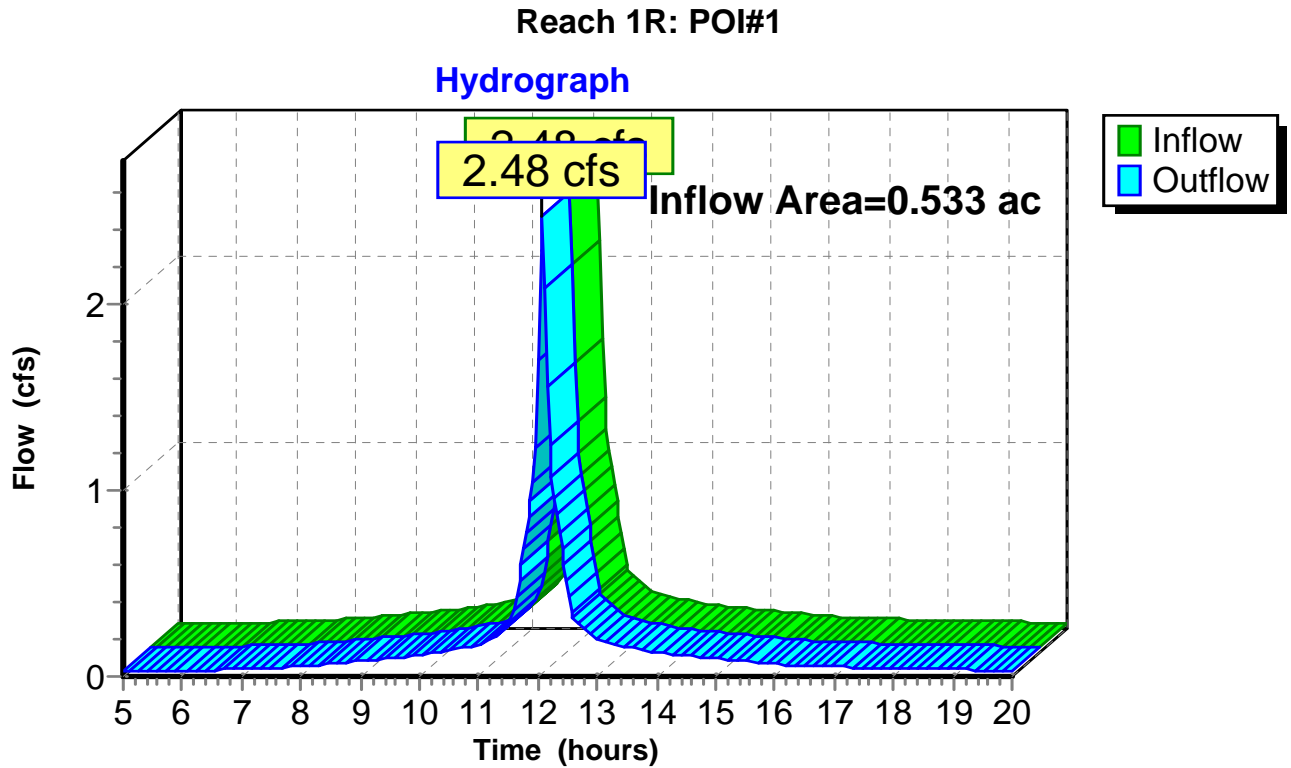
Hydrograph



Summary for Reach 1R: POI#1

Inflow Area = 0.533 ac, 53.10% Impervious, Inflow Depth > 4.06" for 10-year event
Inflow = 2.48 cfs @ 12.07 hrs, Volume= 0.180 af
Outflow = 2.48 cfs @ 12.07 hrs, Volume= 0.180 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.04 hrs



EBL Pre-Development 1-14-15

Prepared by Acorn Engineering, Inc.

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Type III 24-hr 25-year Rainfall=5.50"

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Time span=5.00-20.00 hrs, dt=0.04 hrs, 376 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment 1S: Existing West

Runoff Area=0.489 ac 57.87% Impervious Runoff Depth>4.80"
Tc=5.0 min CN=97 Runoff=2.67 cfs 0.196 af

Subcatchment 2S: Existing East

Runoff Area=0.044 ac 0.00% Impervious Runoff Depth>4.71"
Tc=5.0 min CN=96 Runoff=0.24 cfs 0.017 af

Reach 1R: POI#1

Inflow=2.91 cfs 0.213 af
Outflow=2.91 cfs 0.213 af

Total Runoff Area = 0.533 ac Runoff Volume = 0.213 af Average Runoff Depth = 4.79"
46.90% Pervious = 0.250 ac 53.10% Impervious = 0.283 ac

Summary for Subcatchment 1S: Existing West Subcatchment

Runoff = 2.67 cfs @ 12.07 hrs, Volume= 0.196 af, Depth> 4.80"

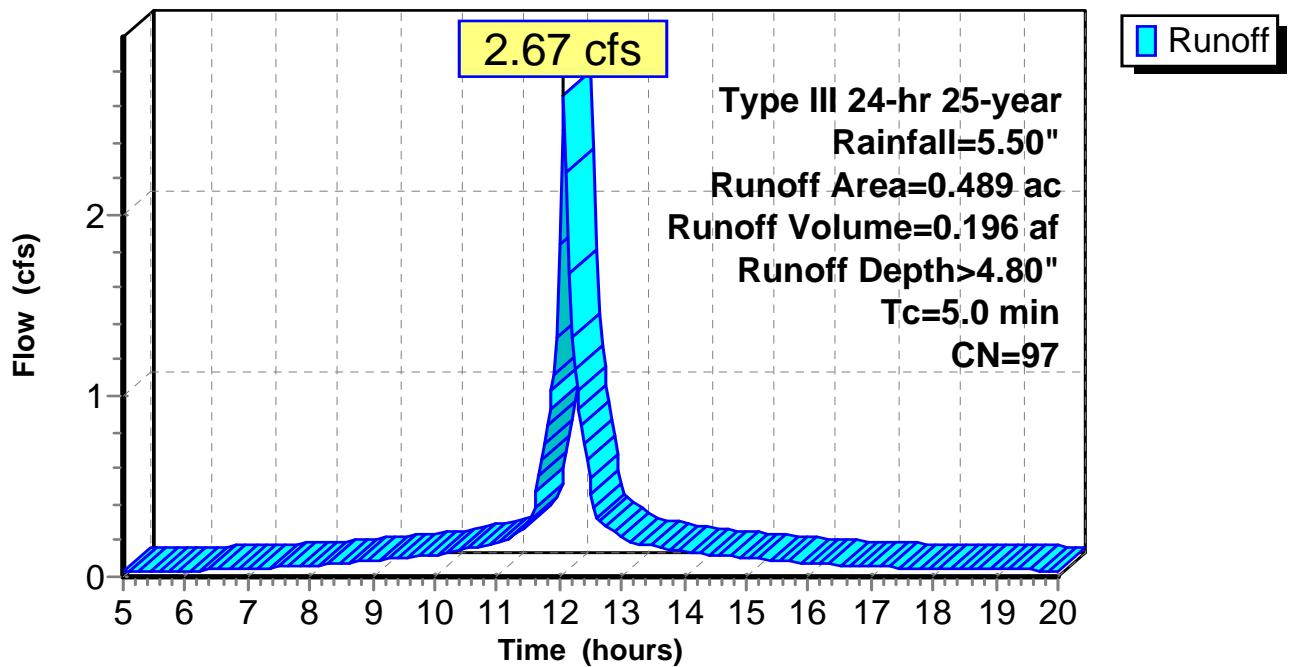
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 Type III 24-hr 25-year Rainfall=5.50"

Area (ac)	CN	Description
* 0.148	98	Pavement
* 0.135	98	Building
* 0.206	96	Gravel
0.489	97	Weighted Average
0.206		Pervious Area
0.283		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum 5

Subcatchment 1S: Existing West Subcatchment

Hydrograph



Summary for Subcatchment 2S: Existing East Subcatchment

Runoff = 0.24 cfs @ 12.07 hrs, Volume= 0.017 af, Depth> 4.71"

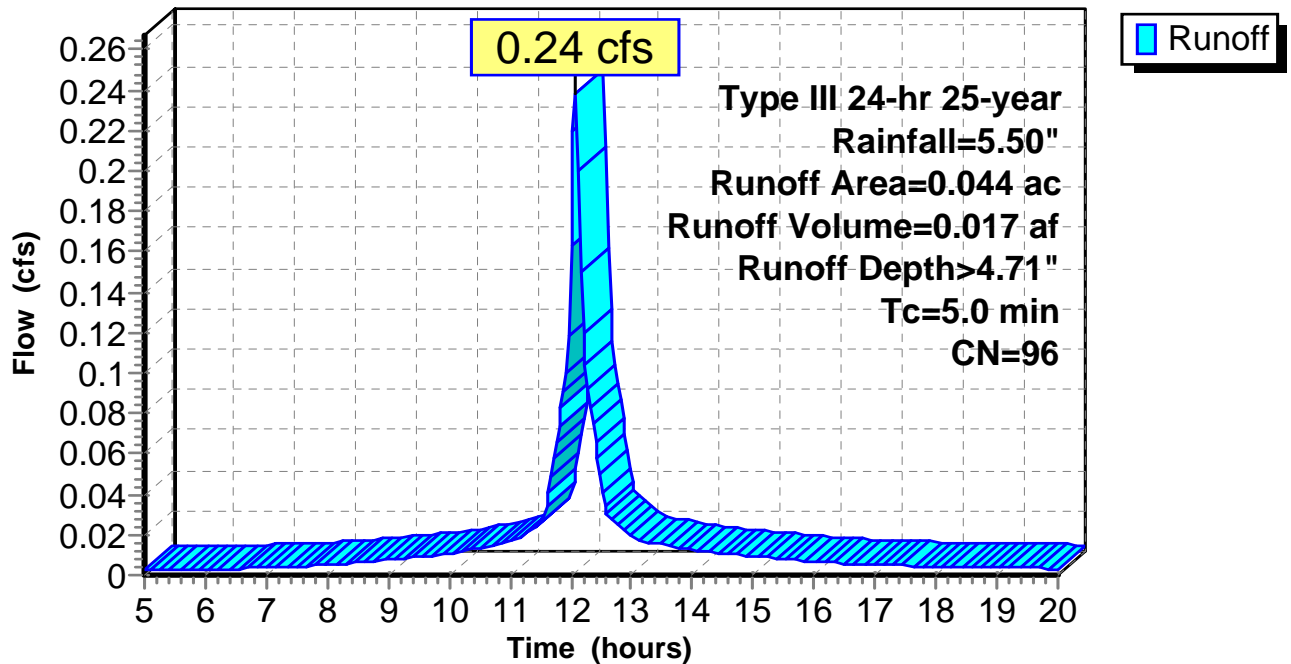
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.04 hrs
 Type III 24-hr 25-year Rainfall=5.50"

Area (ac)	CN	Description
* 0.044	96	Gravel
0.044		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum 5

Subcatchment 2S: Existing East Subcatchment

Hydrograph

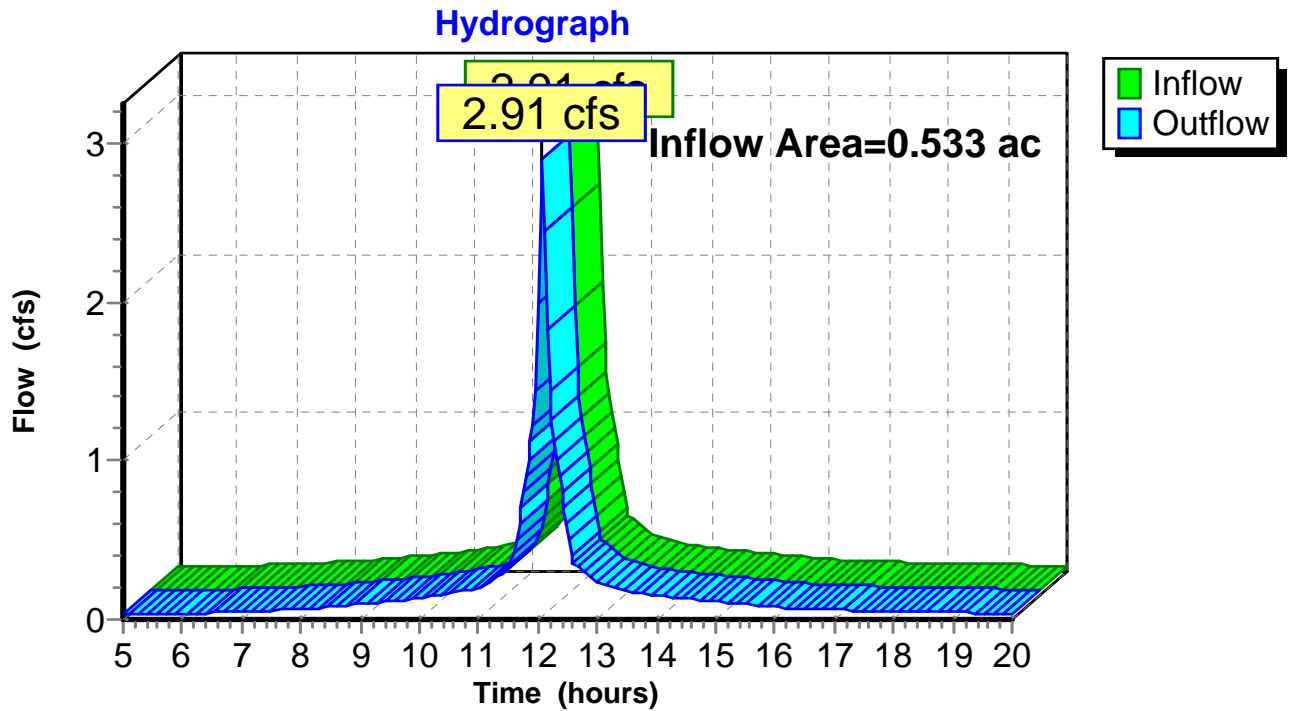


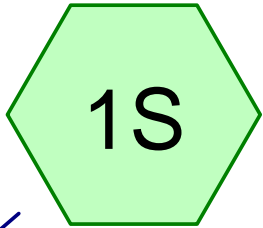
Summary for Reach 1R: POI#1

Inflow Area = 0.533 ac, 53.10% Impervious, Inflow Depth > 4.79" for 25-year event
Inflow = 2.91 cfs @ 12.07 hrs, Volume= 0.213 af
Outflow = 2.91 cfs @ 12.07 hrs, Volume= 0.213 af, Atten= 0%, Lag= 0.0 min

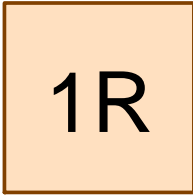
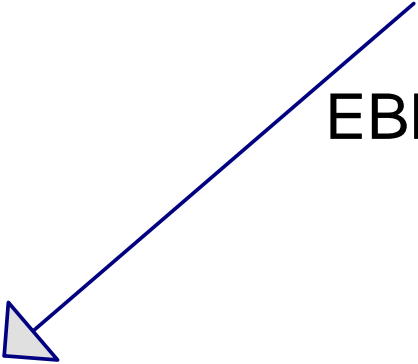
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.04 hrs

Reach 1R: POI#1

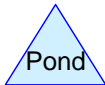
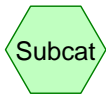




EBL Proposed



POI#1



EBL Post-Development_1-14-15

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.048	79	Landscaped Area - 50-75% Grass cover, Fair, HSG C (1S)
0.319	98	Building (1S)
0.166	98	Parking (1S)
0.533		TOTAL AREA

EBL Post-Development_1-14-15

Prepared by Acorn Engineering, Inc.

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Page 3

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.048	HSG C	1S
0.000	HSG D	
0.485	Other	1S
0.533		TOTAL AREA

EBL Post-Development_1-14-15

Prepared by Acorn Engineering, Inc.

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Type III 24-hr 2-year Rainfall=3.00"

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Time span=5.00-20.00 hrs, dt=0.04 hrs, 376 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment 1S: EBL Proposed

Runoff Area=0.533 ac 90.99% Impervious Runoff Depth>2.41"

Tc=5.0 min CN=96 Runoff=1.52 cfs 0.107 af

Reach 1R: POI#1

Inflow=1.52 cfs 0.107 af

Outflow=1.52 cfs 0.107 af

Total Runoff Area = 0.533 ac Runoff Volume = 0.107 af Average Runoff Depth = 2.41"
9.01% Pervious = 0.048 ac 90.99% Impervious = 0.485 ac

Summary for Subcatchment 1S: EBL Proposed

Runoff = 1.52 cfs @ 12.07 hrs, Volume= 0.107 af, Depth> 2.41"

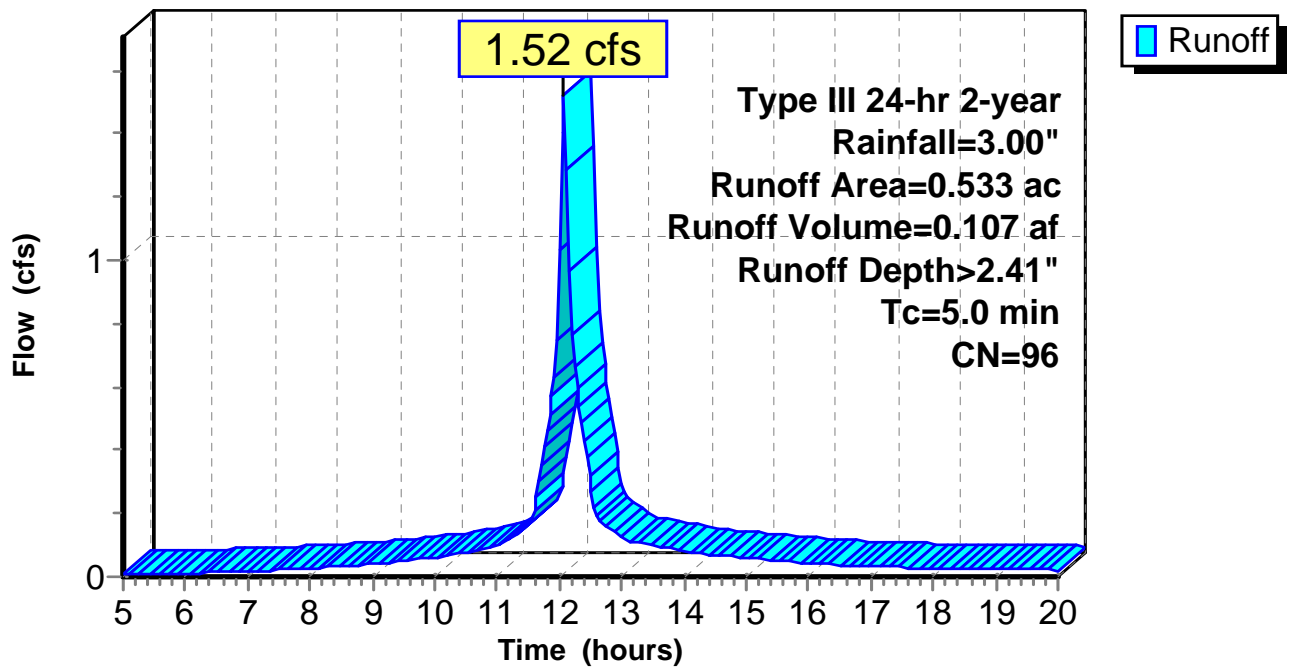
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.04 hrs
Type III 24-hr 2-year Rainfall=3.00"

Area (ac)	CN	Description
* 0.166	98	Parking
* 0.319	98	Building
* 0.048	79	Landscaped Area - 50-75% Grass cover, Fair, HSG C
0.533	96	Weighted Average
0.048		Pervious Area
0.485		Impervious Area

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

Subcatchment 1S: EBL Proposed

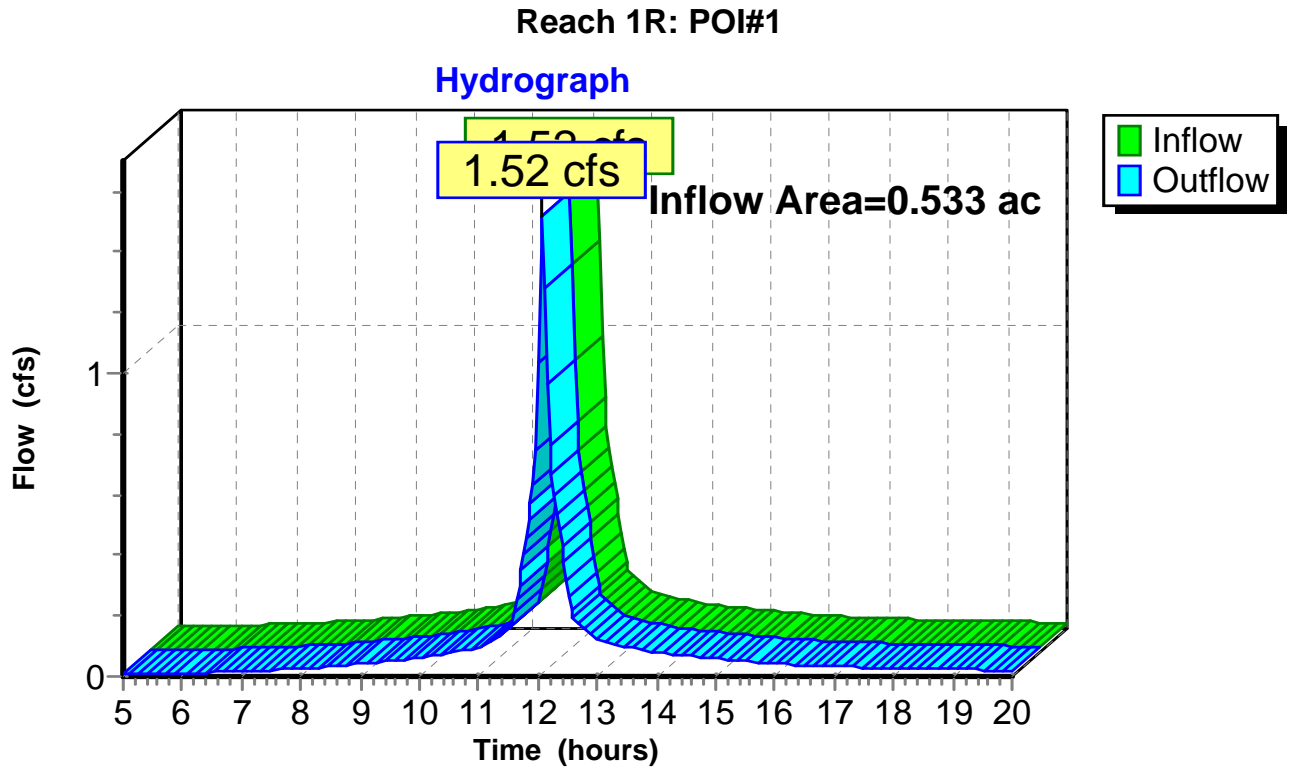
Hydrograph



Summary for Reach 1R: POI#1

Inflow Area = 0.533 ac, 90.99% Impervious, Inflow Depth > 2.41" for 2-year event
Inflow = 1.52 cfs @ 12.07 hrs, Volume= 0.107 af
Outflow = 1.52 cfs @ 12.07 hrs, Volume= 0.107 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.04 hrs



EBL Post-Development_1-14-15

Type III 24-hr 10-year Rainfall=4.70"

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Time span=5.00-20.00 hrs, dt=0.04 hrs, 376 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment 1S: EBL Proposed

Runoff Area=0.533 ac 90.99% Impervious Runoff Depth>3.98"

Tc=5.0 min CN=96 Runoff=2.45 cfs 0.177 af

Reach 1R: POI#1

Inflow=2.45 cfs 0.177 af

Outflow=2.45 cfs 0.177 af

Total Runoff Area = 0.533 ac Runoff Volume = 0.177 af Average Runoff Depth = 3.98"
9.01% Pervious = 0.048 ac 90.99% Impervious = 0.485 ac

Summary for Subcatchment 1S: EBL Proposed

Runoff = 2.45 cfs @ 12.07 hrs, Volume= 0.177 af, Depth> 3.98"

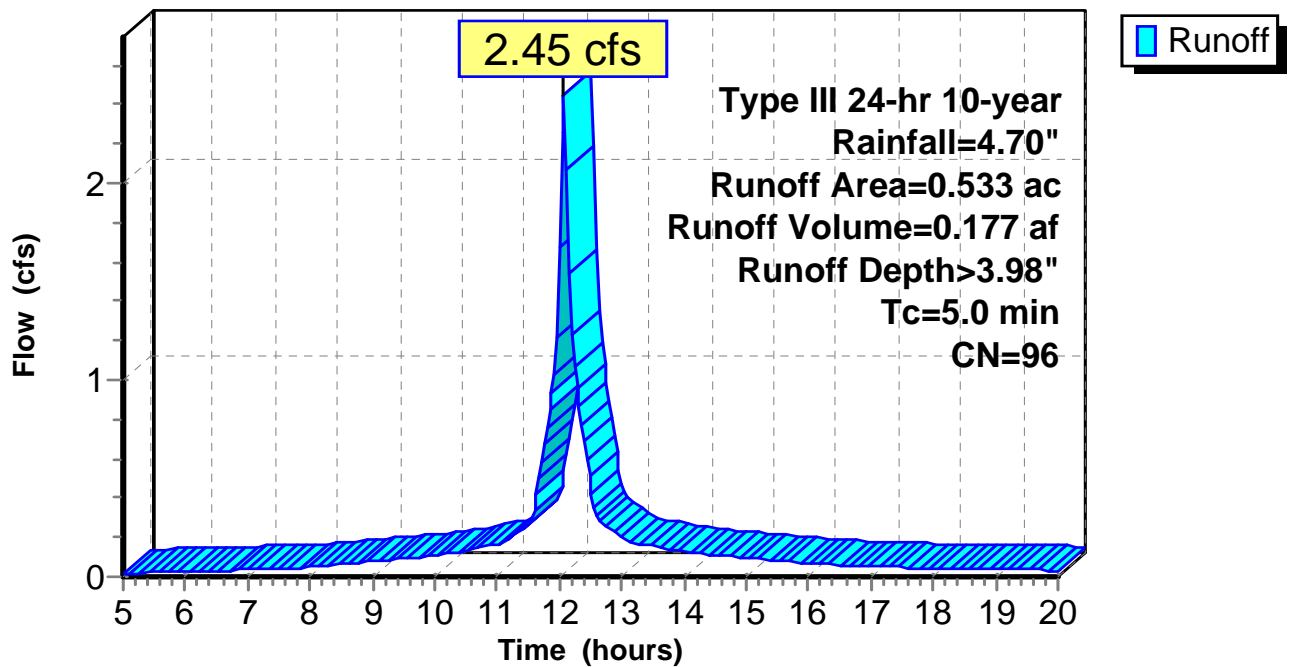
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-year Rainfall=4.70"

Area (ac)	CN	Description
* 0.166	98	Parking
* 0.319	98	Building
* 0.048	79	Landscaped Area - 50-75% Grass cover, Fair, HSG C
0.533	96	Weighted Average
0.048		Pervious Area
0.485		Impervious Area

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

Subcatchment 1S: EBL Proposed

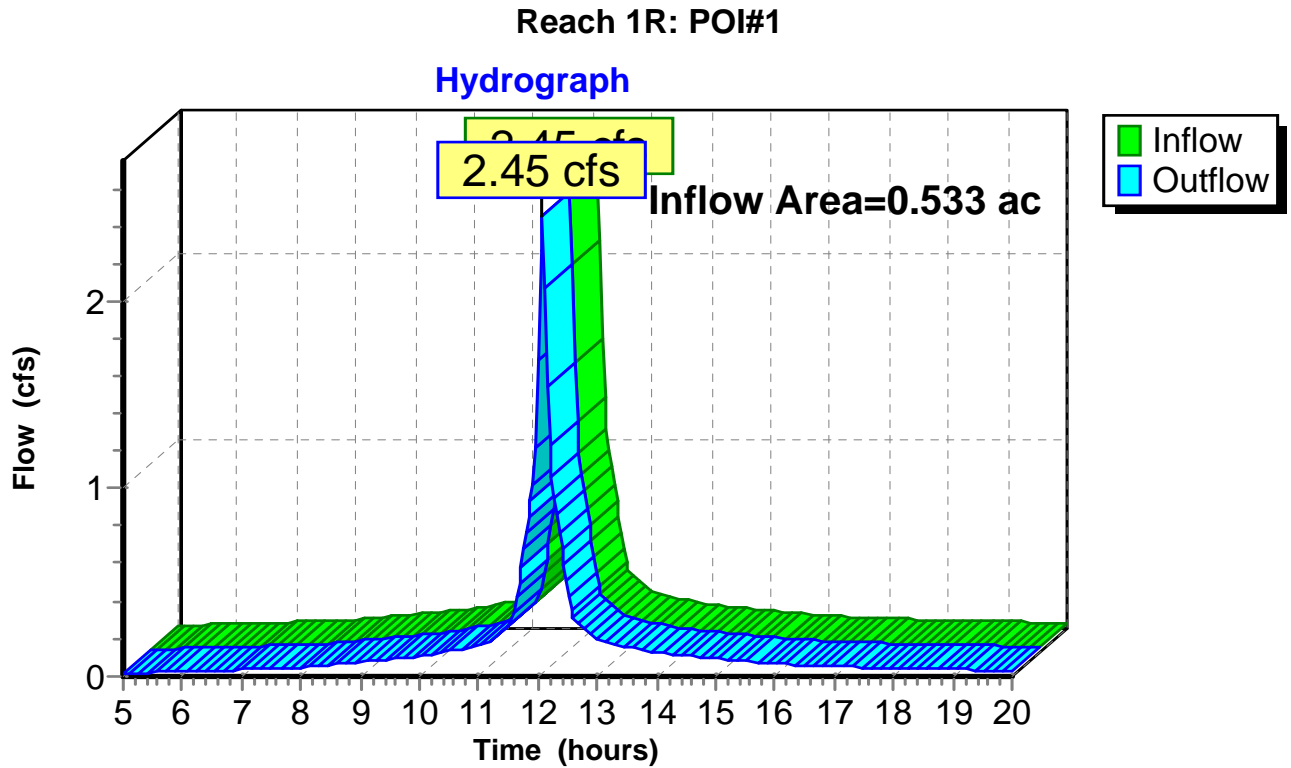
Hydrograph



Summary for Reach 1R: POI#1

Inflow Area = 0.533 ac, 90.99% Impervious, Inflow Depth > 3.98" for 10-year event
Inflow = 2.45 cfs @ 12.07 hrs, Volume= 0.177 af
Outflow = 2.45 cfs @ 12.07 hrs, Volume= 0.177 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.04 hrs



EBL Post-Development_1-14-15

Type III 24-hr 25-year Rainfall=5.50"

Prepared by Acorn Engineering, Inc.

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Time span=5.00-20.00 hrs, dt=0.04 hrs, 376 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment 1S: EBL Proposed

Runoff Area=0.533 ac 90.99% Impervious Runoff Depth>4.71"

Tc=5.0 min CN=96 Runoff=2.89 cfs 0.209 af

Reach 1R: POI#1

Inflow=2.89 cfs 0.209 af

Outflow=2.89 cfs 0.209 af

Total Runoff Area = 0.533 ac Runoff Volume = 0.209 af Average Runoff Depth = 4.71"
9.01% Pervious = 0.048 ac 90.99% Impervious = 0.485 ac

Summary for Subcatchment 1S: EBL Proposed

Runoff = 2.89 cfs @ 12.07 hrs, Volume= 0.209 af, Depth> 4.71"

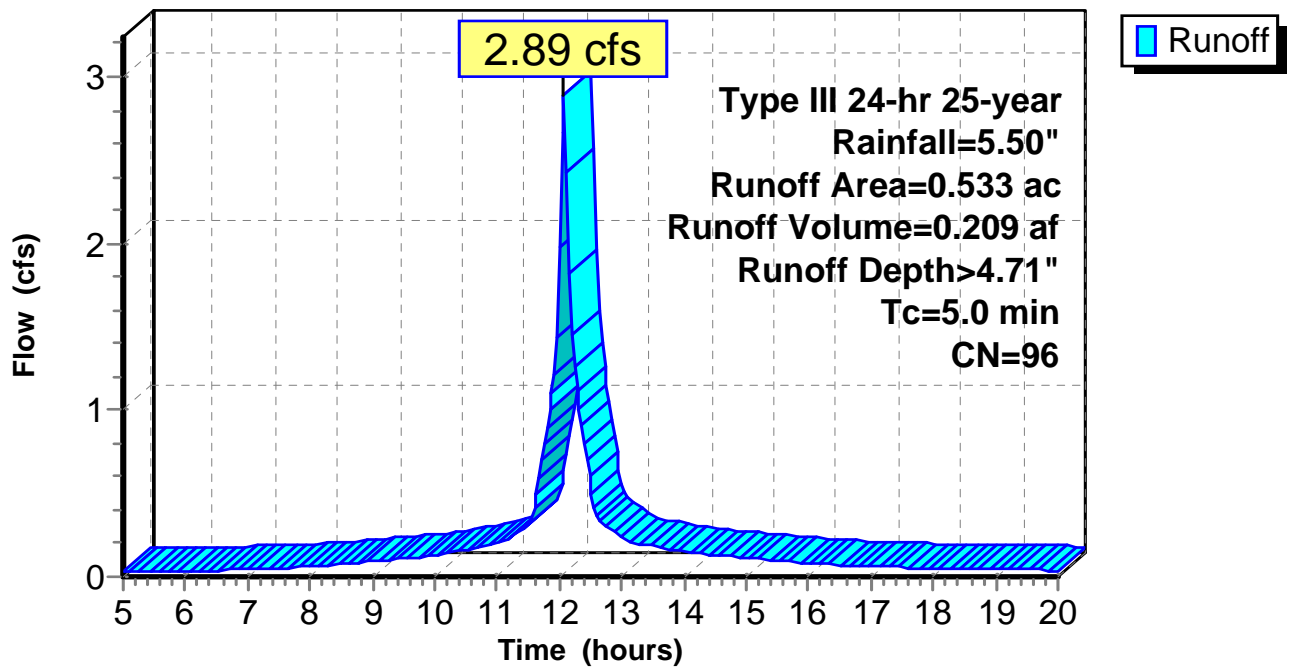
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.04 hrs
 Type III 24-hr 25-year Rainfall=5.50"

Area (ac)	CN	Description
* 0.166	98	Parking
* 0.319	98	Building
* 0.048	79	Landscaped Area - 50-75% Grass cover, Fair, HSG C
0.533	96	Weighted Average
0.048		Pervious Area
0.485		Impervious Area

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

Subcatchment 1S: EBL Proposed

Hydrograph

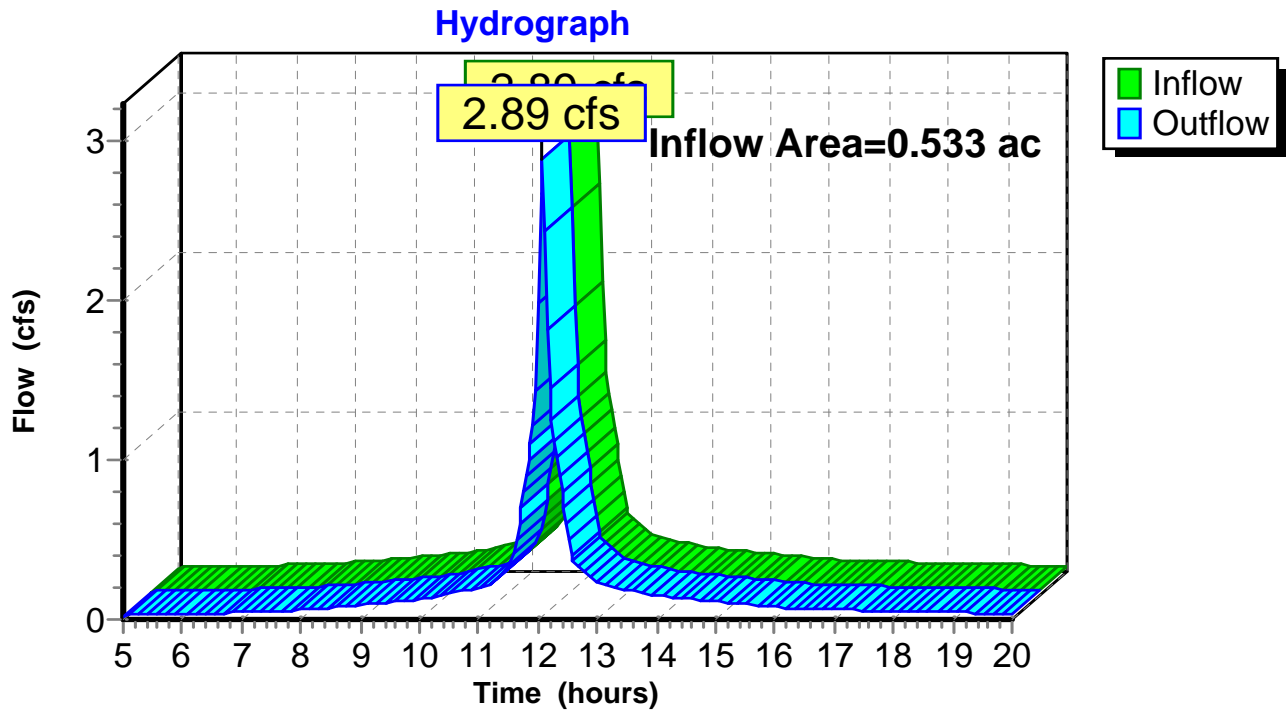


Summary for Reach 1R: POI#1



Inflow Area = 0.533 ac, 90.99% Impervious, Inflow Depth > 4.71" for 25-year event
Inflow = 2.89 cfs @ 12.07 hrs, Volume= 0.209 af
Outflow = 2.89 cfs @ 12.07 hrs, Volume= 0.209 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.04 hrs

Reach 1R: POI#1

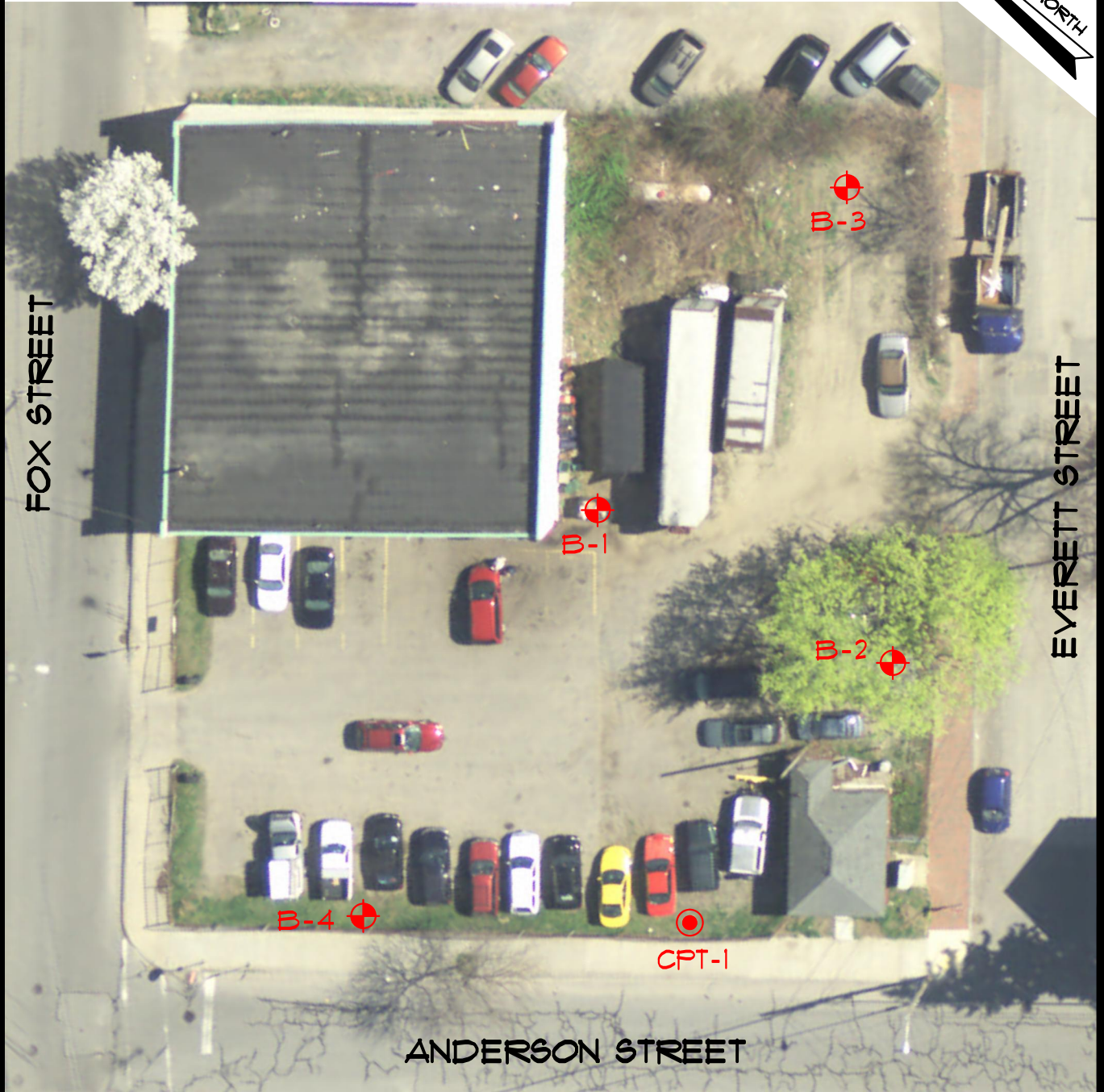


LEGEND

-  **B-1** SUMMIT TEST BORING (NOVEMBER 25, 2014)
-  **CPT-1** CONE PENETRATION TEST (NOVEMBER 25, 2014)

PLAN REFERENCE

AERIAL IMAGE OBTAINED FROM MAINE OFFICE OF G.I.S.



TEST BORING LOCATION PLAN EAST BAYSIDE LOFTS

89 ANDERSON STREET - PORTLAND, ME

PREPARED FOR

REDFERN PROPERTIES, LLC

145 LISBON ST. - SUITE 601
LEWISTON, ME 04240
Tel.: (207) 576-3313

173 PLEASANT STREET
ROCKLAND, ME 04841
Tel.: (207) 318-1161

SUMMIT

GEOENGINEERING SERVICES
www.summitgeoeng.com

DATE: 11-26-14	DRAWN BY: KRF	CHECKED BY: UMP
JOB: 14221	SCALE: 1" = 30'	FILE: 14221 BOR



SOIL BORING LOG

Boring #: **B-1**

Project: East Bayside
 Location: 89 Anderson Street
 City, State: Portland, Maine

Project #: 14221
 Sheet: 1 of 1
 Chkd by:

Drilling Co: Summit Geoengineering Services
 Driller: C. Coolidge, P.E.
 Summit Staff: B. Peterlein, P.E.

Boring Elevation:
 Reference:
 Date started: 11/25/2014 Date Completed: 11/25/2014

DRILLING METHOD	SAMPLER	ESTIMATED GROUND WATER DEPTH			
Vehicle: Tracked	Length: 24" SS	Date	Depth	Elevation	Reference
Model: AMS Power Probe	Diameter: 2"OD/1.5"ID	11/25/2014	9 ft		In borehole at completion
Method: 2-1/2" H.S.A.	Hammer: 140 lb				
Hammer Style: Auto	Method: ASTM D1586				

Depth (ft.)	SAMPLER					SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀			
1	S-1		0 to 2	3		Brown SAND, trace Silt, dry, loose, SM		FILL
				2				
				3				
2				3		Olive-gray Sandy SILT, trace ash, dry		
	S-2	2 to 4		2				
				1				
3				2		Gray Clayey SILT, moist, soft, ML		
				2				
				2				
4	S-3	4 to 6		3		Olive-brown Clayey SILT, trace wood chips, moist, firm, ML		
				2				
				3				
5				2		No recovery - gravel in tip of spoon		
	S-4	6 to 8		3				
				1				
6				6				
				2				
				2				
7	S-5	8 to 10		WH		Gray Silty CLAY, trace fine Sand in seams, damp, very soft, CL		GLACIAL MARINE
				WH				
				WH				
8				WH		Same as above		
	S-6			WH				
				WH				
9				WH				
				WH				
				WH				
10				WH		Same as above		
	S-7	15 to 17		WH				
				WH				
11				WH				
				WH				
				WH				
12				WH		Same as above		
	S-8	20 to 22		WH				
				WH				
13				WH				
				WH				
				WH				
14				WH		End of Boring at 22 ft		
				WH				
				WH				
15				WH				
				WH				
				WH				
16				WH				
				WH				
				WH				
17				WH				
				WH				
				WH				
18				WH				
				WH				
				WH				
19				WH				
				WH				
				WH				
20				WH				
				WH				
				WH				
21				WH				
				WH				
				WH				
22				WH				
				WH				
				WH				
23				WH				
				WH				
				WH				
24				WH				
				WH				
				WH				
25				WH				
				WH				
				WH				
26				WH				
				WH				
				WH				
27				WH				
				WH				
				WH				

Granular Soils		Cohesive Soils		% Composition ASTM D2487	NOTES: PP = Pocket Penetrometer, MC = Moisture Content LL = Liquid Limit, PI = Plastic Index	Soil Moisture Condition
Blows/ft.	Density	Blows/ft.	Consistency			
0-4	V. Loose	<2	V. soft	< 5% Trace 5-15% Little 15-30% Some > 30% With	<u>Bedrock Joints</u> Shallow = 0 to 35 degrees Dipping = 35 to 55 degrees Steep = 55 to 90 degrees Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200	Dry: S = 0% Humid: S = 1 to 25% Damp: S = 26 to 50% Moist: S = 51 to 75% Wet: S = 76 to 99% Saturated: S = 100%
5-10	Loose	2-4	Soft			
11-30	Compact	5-8	Firm			
31-50	Dense	9-15	Stiff			
>50	V. Dense	16-30 >30	V. Stiff Hard			



SOIL BORING LOG

Boring #: **B-2**

Project: East Bayside
 Location: 89 Anderson Street
 City, State: Portland, Maine

Project #: 14221
 Sheet: 1 of 1
 Chkd by:

Drilling Co: Summit Geoengineering Services
 Driller: C. Coolidge, P.E.
 Summit Staff: B. Peterlein, P.E.

Boring Elevation:
 Reference:
 Date started: 11/25/2014 Date Completed: 11/25/2014

DRILLING METHOD	SAMPLER	ESTIMATED GROUND WATER DEPTH			
Vehicle: Tracked	Length: 24" SS	Date	Depth	Elevation	Reference
Model: AMS Power Probe	Diameter: 2"OD/1.5"ID	11/25/2014	8 ft		In borehole at completion
Method: 2-1/2" H.S.A.	Hammer: 140 lb				
Hammer Style: Auto	Method: ASTM D1586				

Depth (ft.)	SAMPLER					SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀			
1	S-1		0 to 2	3		Brown Gravelly SAND, trace Silt, dry, compact, SP		FILL
				5				
2				3		-----		
				2				
3	S-2		2 to 4	2		Gray Ash mixed with bricks and silty sand		
				3				
4				1		-----		
				4				
5	S-3		4 to 6	3		Olive-brown Silty CLAY, moist, firm, CL	PP >4.5 tsf	GLACIAL MARINE
				3				
6				5		Same as above		
				8				
7	S-4		6 to 8	5		-----		
				5				
8				2		-----		
				2				
9	S-5		8 to 10	WH		Gray Silty CLAY, trace fine Sand in seams, wet, very soft, CL		
				1				
10				WH		-----		
				1				
11				WH		-----		
				1				
12				WH		-----		
				1				
13						End of Boring at 12 ft		
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								

Granular Soils		Cohesive Soils		% Composition ASTM D2487	NOTES: PP = Pocket Penetrometer, MC = Moisture Content LL = Liquid Limit, PI = Plastic Index	Soil Moisture Condition
Blows/ft.	Density	Blows/ft.	Consistency			
0-4	V. Loose	<2	V. soft	< 5% Trace 5-15% Little 15-30% Some > 30% With	Bedrock Joints Shallow = 0 to 35 degrees Dipping = 35 to 55 degrees Steep = 55 to 90 degrees Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200	Dry: S = 0% Humid: S = 1 to 25% Damp: S = 26 to 50% Moist: S = 51 to 75% Wet: S = 76 to 99% Saturated: S = 100%
5-10	Loose	2-4	Soft			
11-30	Compact	5-8	Firm			
31-50	Dense	9-15	Stiff			
>50	V. Dense	16-30	V. Stiff			
		>30	Hard			



SOIL BORING LOG

Boring #: **B-3**

Project: East Bayside
 Location: 89 Anderson Street
 City, State: Portland, Maine

Project #: 14221
 Sheet: 1 of 1
 Chkd by:

Drilling Co: Summit Geoengineering Services
 Driller: C. Coolidge, P.E.
 Summit Staff: B. Peterlein, P.E.

Boring Elevation:
 Reference:
 Date started: 11/25/2014 Date Completed: 11/25/2014

DRILLING METHOD	SAMPLER	ESTIMATED GROUND WATER DEPTH			
Vehicle: Tracked	Length: 24" SS	Date	Depth	Elevation	Reference
Model: AMS Power Probe	Diameter: 2"OD/1.5"ID	11/25/2014	9 ft		in borehole at completion
Method: 2-1/2" H.S.A.	Hammer: 140 lb				
Hammer Style: Auto	Method: ASTM D1586				

Depth (ft.)	SAMPLE DESCRIPTION					Geological/ Test Data	Geological Stratum
	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀		
1	S-1		0 to 2	3		Dark brown Sandy SILT, trace organics, humid, firm, ML	FILL
				4			
				3			
2				4			
				4			
3	S-2		2 to 4	4			
				3			
				3			
4				3			
	S-3		4 to 6	WH			
5				1		Olive-gray Silty CLAY, moist, soft, CL	PP = 1.4 to 1.7 tsf GLACIAL MARINE
				2			
				1			
6				1			
	S-4		6 to 8	WH			
7				3			
				1			
8				1			
	S-5		8 to 10	WH			
9				WH			
10				1		Gray Silty fine SAND, trace to little Clay, mottled wet, SM	PP = 0.3 to 0.5 tsf
				WH			
11							
12							
13							
14							
15							
16	S-6		15 to 17	WH			
				WH			
				WH			
17				WH			
18							
19							
20							
21	S-7		20 to 22	WH		Gray Silty CLAY, trace fine Sand in seams, wet, very soft, CL	
				WH			
				WH			
22				WH			
23							
24							
25							
26							
27							

Granular Soils		Cohesive Soils		% Composition ASTM D2487	NOTES: PP = Pocket Penetrometer, MC = Moisture Content LL = Liquid Limit, PI = Plastic Index <u>Bedrock Joints</u> Shallow = 0 to 35 degrees Dipping = 35 to 55 degrees Steep = 55 to 90 degrees Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200	Soil Moisture Condition Dry: S = 0% Humid: S = 1 to 25% Damp: S = 26 to 50% Moist: S = 51 to 75% Wet: S = 76 to 99% Saturated: S = 100%
Blows/ft.	Density	Blows/ft.	Consistency			
0-4	V. Loose	<2	V. soft	< 5% Trace 5-15% Little 15-30% Some > 30% With		
5-10	Loose	2-4	Soft			
11-30	Compact	5-8	Firm			
31-50	Dense	9-15	Stiff			
>50	V. Dense	16-30	V. Stiff			
		>30	Hard			



SOIL BORING LOG

Boring #: **B-4**

Project: East Bayside
 Location: 89 Anderson Street
 City, State: Portland, Maine

Project #: 14221
 Sheet: 1 of 1
 Chkd by:

Drilling Co: Summit Geoengineering Services
 Driller: C. Coolidge, P.E.
 Summit Staff: B. Peterlein, P.E.

Boring Elevation:
 Reference:
 Date started: 11/25/2014 Date Completed: 11/25/2014

DRILLING METHOD	SAMPLER	ESTIMATED GROUND WATER DEPTH			
Vehicle: Tracked	Length: 24" SS	Date	Depth	Elevation	Reference
Model: AMS Power Probe	Diameter: 2"OD/1.5"ID	11/25/2014	6.5 ft		On borehole at completion
Method: 2-1/2" H.S.A.	Hammer: 140 lb				
Hammer Style: Auto	Method: ASTM D1586				

Depth (ft.)	SAMPLER					SAMPLE DESCRIPTION	Geological/ Test Data	Geological Stratum
	No.	Pen/Rec (in)	Depth (ft)	blows/6"	N ₆₀			
1	S-1		0 to 2	1		Dark brown Sandy SILT, trace rootlets and organics, humid, very soft, ML		FILL
				1				
2				3		Olive-brown Silty SAND, trace Clay, moist, loose, SM		
	S-2		2 to 4	1				
3				1				
				2		Brown medium to fine SAND, trace Silt, moist, loose, SP		
4				3				
	S-3		4 to 6	3				
5				5		Brown medium to fine SAND, little Gravel, trace Silt, wet, compact, SP		
				11				
6				7				
	S-4		6 to 8	3		Same as above		
7				2				
				2				
8				2				
	S-5		8 to 10	2		Same as above		
9				4				
				2				
10				1		Olive-gray Silty CLAY, wet, very soft, CL		GLACIAL MARINE
	S-6		10 to 12	WH				
11				WH				
				WH				
12				WH				
				WH				
13								
14								
15								
	S-7		15 to 17	WH		Same as above		
16				WH				
				WH				
17				WH				
18								
19								
20								
	S-7		20 to 22	WH		Same as above		
21				WH				
				WH				
22				WH				
23						End of Boring at 22 ft		
24								
25								
26								
27								

Granular Soils		Cohesive Soils		% Composition ASTM D2487	NOTES: PP = Pocket Penetrometer, MC = Moisture Content LL = Liquid Limit, PI = Plastic Index <u>Bedrock Joints</u> Shallow = 0 to 35 degrees Dipping = 35 to 55 degrees Steep = 55 to 90 degrees Boulders = diameter > 12 inches, Cobbles = diameter < 12 inches and > 3 inches Gravel = < 3 inch and > No 4, Sand = < No 4 and >No 200, Silt/Clay = < No 200	Soil Moisture Condition Dry: S = 0% Humid: S = 1 to 25% Damp: S = 26 to 50% Moist: S = 51 to 75% Wet: S = 76 to 99% Saturated: S = 100%
Blows/ft.	Density	Blows/ft.	Consistency			
0-4	V. Loose	<2	V. soft			
5-10	Loose	2-4	Soft	< 5% Trace		
11-30	Compact	5-8	Firm	5-15% Little		
31-50	Dense	9-15	Stiff	15-30% Some		
>50	V. Dense	16-30	V. Stiff	> 30% With		
		>30	Hard			

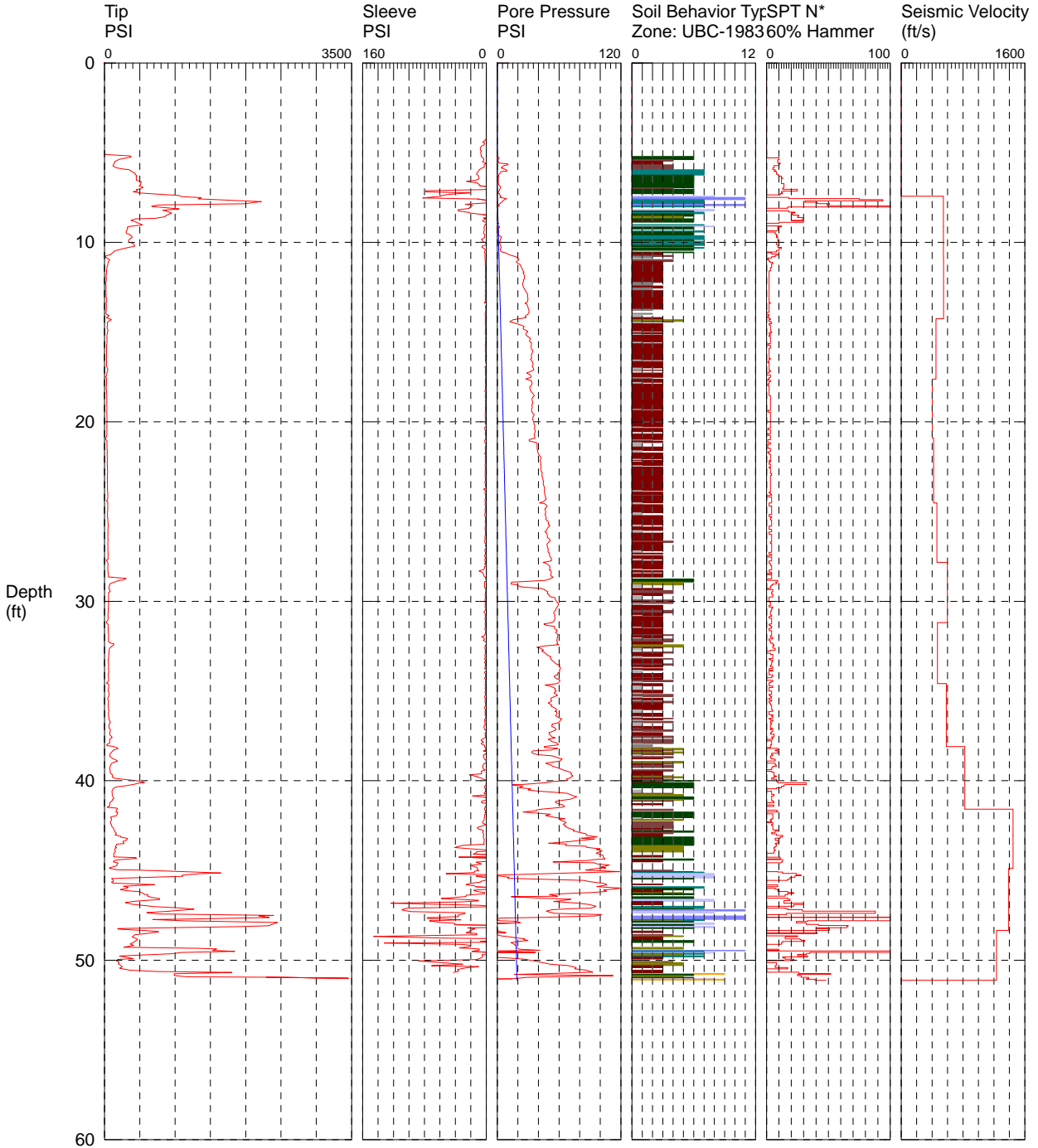
14221



COMPANY: Summit
 FILENAME:
 TEST ID: cpt1
 PROJECT: 14221
 SITE: Fox Street

LOCATION: Portland
 OPERATOR: Craig
 CREW: Bill
 CLIENT: Red Fern
 CLIENT REP: Jay Culley

TEST DATE: Tue 25/Nov/2014
 START TIME: 13:09:08
 GPS: 0, 0, 0, 0, 0
 WEATHER: CLEAR

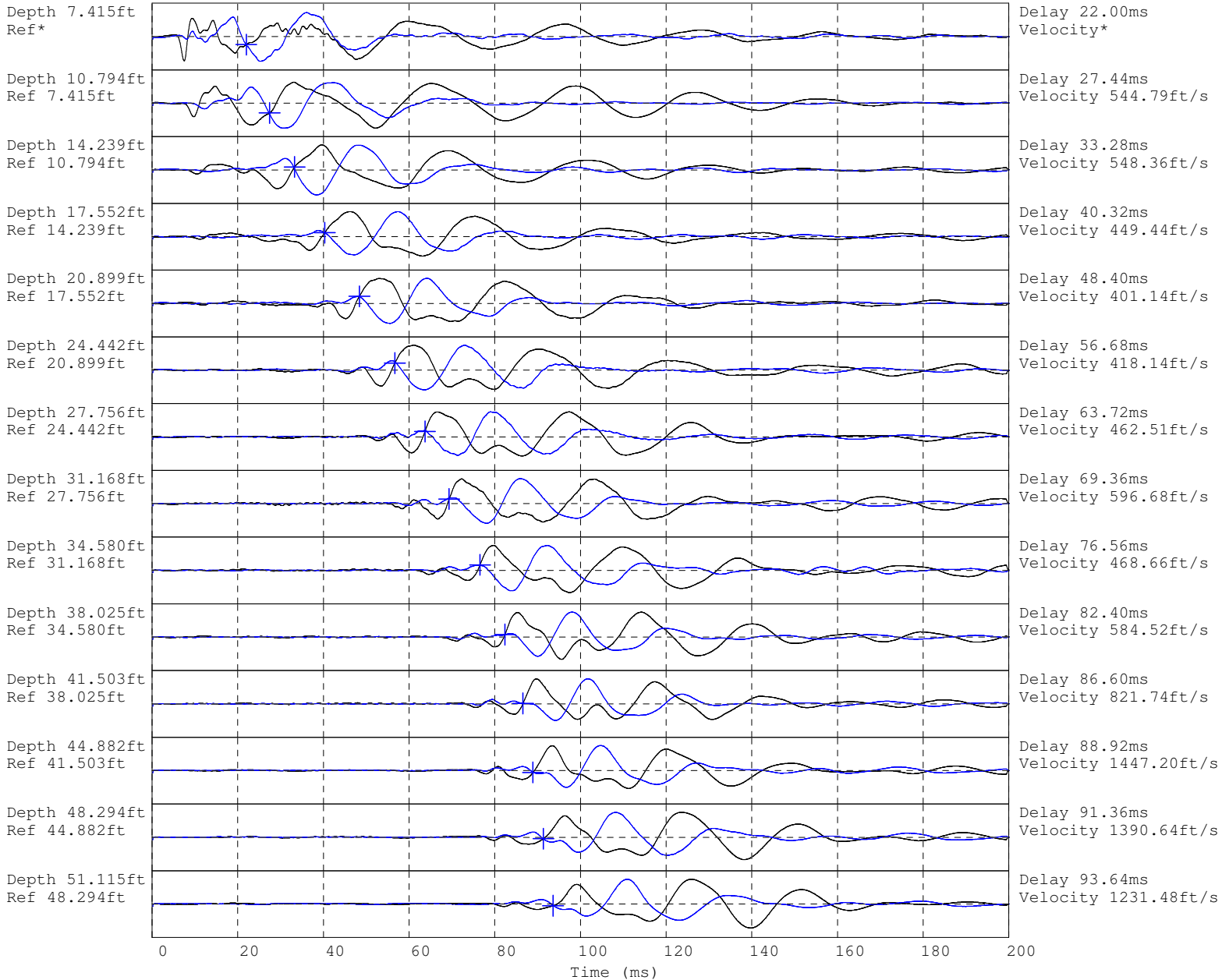


COMMENTS:

- | | | | |
|--------------------------|-----------------------------|----------------------------|--------------------------------|
| 1 sensitive fine grained | 4 silty clay to clay | 7 silty sand to sandy silt | 10 gravelly sand to sand |
| 2 organic material | 5 clayey silt to silty clay | 8 sand to silty sand | 11 very stiff fine grained (*) |
| 3 clay | 6 sandy silt to clayey silt | 9 sand | 12 sand to clayey sand (*) |

*SBT/SPT CORRELATION: UBC-1983

14221cpt1(001).SEI =



Hammer to Rod String Distance 1.5 (m)

* = Not Determined