RANSOM Consulting, Inc.

Consulting Engineers and Scientists

23 Ocean Avenue Pre-Development & Post Development Stormwater Calculations

Date:	October 12, 2016
From:	John Mahoney, P.E.
Location:	23 Ocean Avenue, Portland, Maine

Existing Conditions:

The site is a 9,519 SF (.22 acres) acre parcel located at 23 Ocean Avenue, which is located at the northeast corner of the intersection of Ocean Avenue and Hersey Street. The parcel is currently occupied by a 1,222 square-foot office building, parking area, and lawn. The parcel drains from northwest to southeast with a change in elevation of approximately four feet.

Stormwater runoff currently drains across the lawn area to the existing paved parking lot to the southeast. The site is graded such that stormwater runoff concentrates in the southeast corner. Runoff exits the site through the existing driveway into the public right-of-way on Hersey Street. Runoff then flows down the Hersey Street gutter for approximately 300 feet then into a catch basin that is connected to a 15" combined sewer.

The existing drainage systems on Ocean Avenue and Hersey Street are currently combined sanitary sewer and stormdrain systems.

Proposed Development:

The owner is proposing to continue the use of the existing building as office space and to construct a mixed-use building with four two-bedroom apartments and eight offices. The proposed development will result in a moderate increase in the impervious area.

The existing site impervious area is:	4,036 SF
The new site impervious area is:	6,188 SF

Estimated increase in impervious area: 2,152 SF

Stormwater Management - Quantity:

The attached stormwater calculations were developed using HydroCAD 10.0 and are based on existing and proposed topography, existing and proposed impervious areas, soil Hydrologic Group and land cover information. The model utilizes 24-hour duration, Type III storms for 2-year, 10-year, 25-year, 50-year and 100-year return periods. The attached figures show the locations of our analysis points. The existing condition is that the entire site drains to Analysis Point 1. The proposed condition is that the roof from the new building will drain to the existing catch basin on Ocean Avenue near the intersection of Hersey (Analysis Point 2), while the remaining portion of the site will drain to Hersey Street (Analysis Point 1)

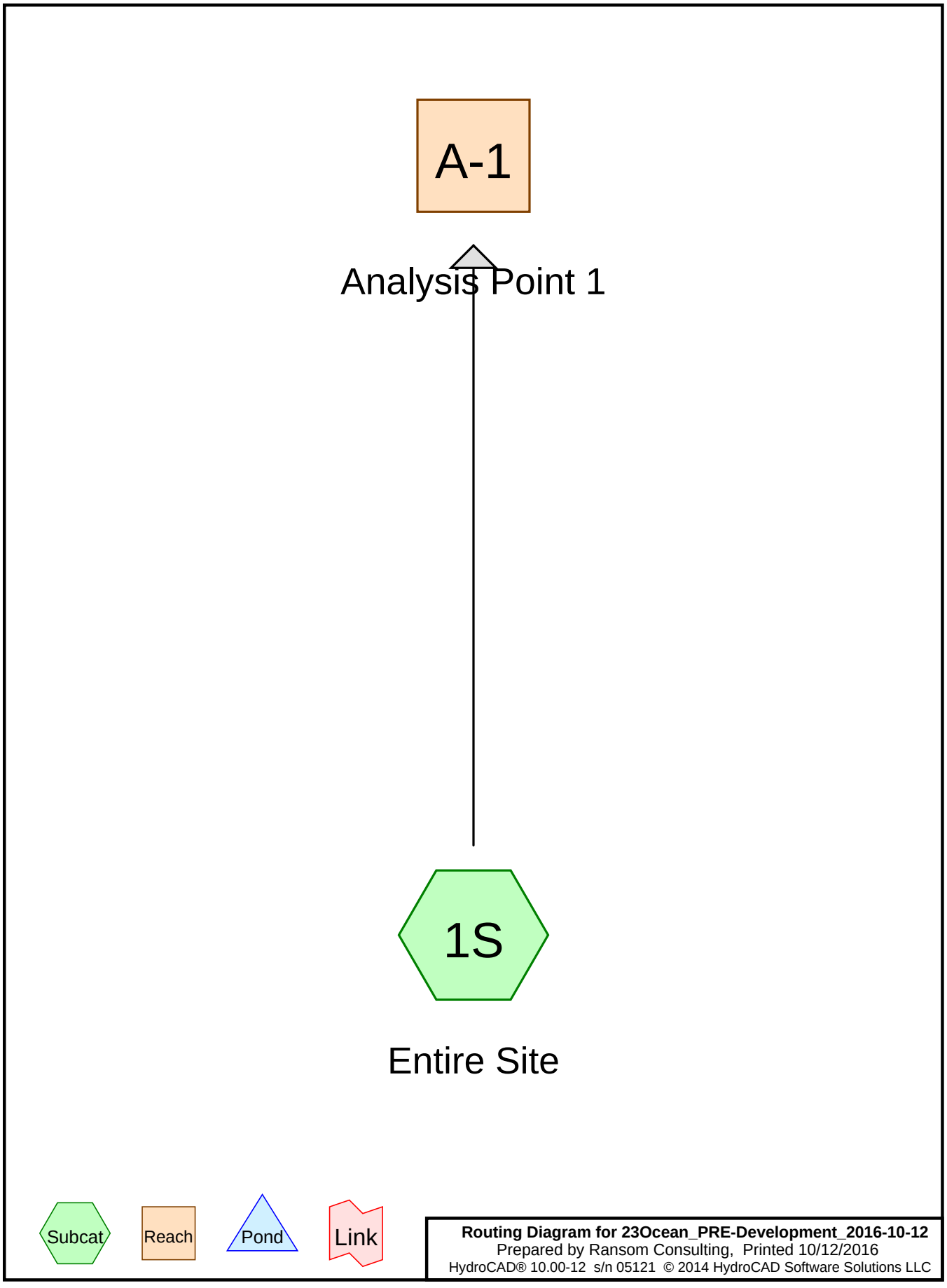
Storm Event	PRE-Development Peak Runoff RATES cubic feet per second (CFS)	
	Analysis Point 1 (Hersey Street Gutter)	Analysis Point 2 (Ocean Avenue Catch Basin)
2-year Storm (3.19 inches)	0.52	-
10-year Storm (4.77 inches)	0.89	-
25-year Storm (6.01 inches)	1.18	-
50-year Storm (7.66 inches)	1.45	-
100-year Storm (8.54 inches)	1.77	-

Storm Event	POST-Development Peak Runoff RATES cubic feet per second (CFS)	
	Analysis Point 1	Analysis Point 2
2-year Storm (3.19 inches)	0.38	0.21
10-year Storm (4.77 inches)	0.64	0.31
25-year Storm (6.01 inches)	0.85	0.39
50-year Storm (7.66 inches)	1.03	0.47
100-year Storm (8.54 inches)	1.26	0.56

As shown indicated above, the peak flow rates discharging to Hersey Street will decrease for all storm events. This is because both the total area and impervious area draining to Hersey Street are proposed to decrease.

The City has asked us to redirect drainage from this site to Ocean Avenue so it can be connected to a new separated stormdrain system, proposed to be installed in the near future. Because the entire property currently drains to Hersey Street, the proposed discharge rates to Ocean Avenue (Analysis Point 2) are increases as shown above.

It is our understanding that the proposed stormdrain system will be will be designed to convey area stormwater flows. After the separated drainage system is installed, this project will have zero impact on the Ocean Avenue combined sewer and as mentioned above, flow rates to Hersey will decrease. For these reasons, we are requesting ether a waiver of the flooding standard or a determination that the flooding standing has been met.



Routing Diagram for 23Ocean_PRE-Development_2016-10-12
Prepared by Ransom Consulting, Printed 10/12/2016

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.126	80	>75% Grass cover, Good, HSG D (1S)
0.093	98	Paved parking & roofs (1S)
0.219	**88**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.126	HSG D	1S
0.093	Other	1S
0.219		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.126	0.000	0.126	>75% Grass cover, Good	1S
0.000	0.000	0.000	0.000	0.093	0.093	Paved parking & roofs	1S
0.000	**0.000**	**0.000**	**0.126**	**0.093**	**0.219**	**TOTAL AREA**	

Time span=2.00-20.00 hrs, dt=0.02 hrs, 901 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Entire Site Runoff Area=9,519 sf 42.40% Impervious Runoff Depth>3.25"
Tc=5.0 min CN=88 Runoff=0.89 cfs 0.059 af

Reach A-1: Analysis Point 1 Avg. Flow Depth=0.11' Max Vel=3.18 fps Inflow=0.89 cfs 0.059 af
n=0.013 L=10.0' S=0.0400 '/' Capacity=55.95 cfs Outflow=0.89 cfs 0.059 af

Total Runoff Area = 0.219 ac Runoff Volume = 0.059 af Average Runoff Depth = 3.25"
57.60% Pervious = 0.126 ac 42.40% Impervious = 0.093 ac

Summary for Subcatchment 1S: Entire Site

Runoff = 0.89 cfs @ 12.07 hrs, Volume= 0.059 af, Depth> 3.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-20.00 hrs, dt= 0.02 hrs
Type III 24-hr SE_Cu 10-yr Rainfall=4.77"

Area (sf)	CN	Description
4,036	98	Paved parking & roofs
5,483	80	>75% Grass cover, Good, HSG D
9,519	88	Weighted Average
5,483		57.60% Pervious Area
4,036		42.40% Impervious Area

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

Summary for Reach A-1: Analysis Point 1

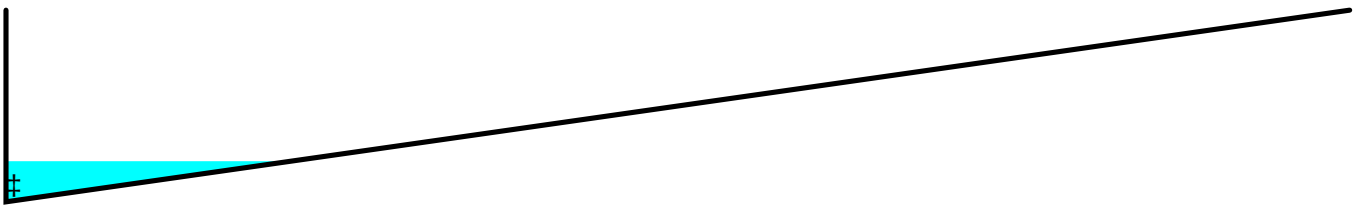
Hersey Street Gutter

Inflow Area = 0.219 ac, 42.40% Impervious, Inflow Depth > 3.25" for SE_Cu 10-yr event
Inflow = 0.89 cfs @ 12.07 hrs, Volume= 0.059 af
Outflow = 0.89 cfs @ 12.07 hrs, Volume= 0.059 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-20.00 hrs, dt= 0.02 hrs
Max. Velocity= 3.18 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.30 fps, Avg. Travel Time= 0.1 min

Peak Storage= 3 cf @ 12.07 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 0.50' Flow Area= 6.3 sf, Capacity= 55.95 cfs

0.00' x 0.50' deep channel, n= 0.013 Asphalt, smooth
Side Slope Z-value= 0.0 50.0 '/' Top Width= 25.00'
Length= 10.0' Slope= 0.0400 '/'
Inlet Invert= 50.40', Outlet Invert= 50.00'



Time span=2.00-20.00 hrs, dt=0.02 hrs, 901 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Entire Site Runoff Area=9,519 sf 42.40% Impervious Runoff Depth>6.73"
Tc=5.0 min CN=88 Runoff=1.77 cfs 0.123 af

Reach A-1: Analysis Point 1 Avg. Flow Depth=0.14' Max Vel=3.77 fps Inflow=1.77 cfs 0.123 af
n=0.013 L=10.0' S=0.0400 '/' Capacity=55.95 cfs Outflow=1.77 cfs 0.123 af

Total Runoff Area = 0.219 ac Runoff Volume = 0.123 af Average Runoff Depth = 6.73"
57.60% Pervious = 0.126 ac 42.40% Impervious = 0.093 ac

Summary for Subcatchment 1S: Entire Site

Runoff = 1.77 cfs @ 12.07 hrs, Volume= 0.123 af, Depth> 6.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-20.00 hrs, dt= 0.02 hrs
Type III 24-hr SE_Cu 100-yr Rainfall=8.54"

Area (sf)	CN	Description
4,036	98	Paved parking & roofs
5,483	80	>75% Grass cover, Good, HSG D
9,519	88	Weighted Average
5,483		57.60% Pervious Area
4,036		42.40% Impervious Area

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

Summary for Reach A-1: Analysis Point 1

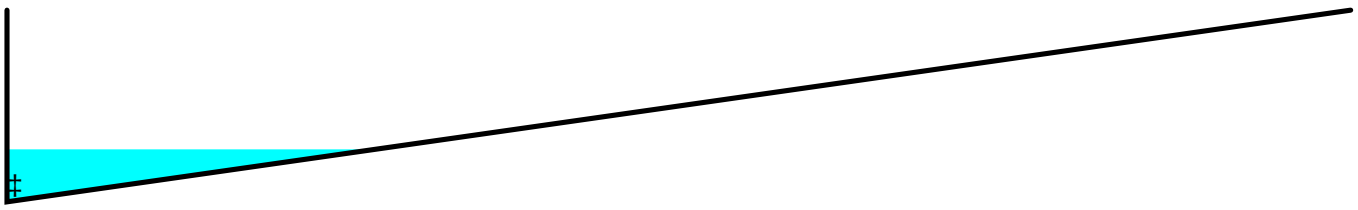
Hersey Street Gutter

Inflow Area = 0.219 ac, 42.40% Impervious, Inflow Depth > 6.73" for SE_Cu 100-yr event
Inflow = 1.77 cfs @ 12.07 hrs, Volume= 0.123 af
Outflow = 1.77 cfs @ 12.07 hrs, Volume= 0.123 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-20.00 hrs, dt= 0.02 hrs
Max. Velocity= 3.77 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.51 fps, Avg. Travel Time= 0.1 min

Peak Storage= 5 cf @ 12.07 hrs
Average Depth at Peak Storage= 0.14’
Bank-Full Depth= 0.50’ Flow Area= 6.3 sf, Capacity= 55.95 cfs

0.00’ x 0.50’ deep channel, n= 0.013 Asphalt, smooth
Side Slope Z-value= 0.0 50.0 ’/’ Top Width= 25.00’
Length= 10.0’ Slope= 0.0400 ’/’
Inlet Invert= 50.40’, Outlet Invert= 50.00’



Time span=2.00-20.00 hrs, dt=0.02 hrs, 901 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Entire Site Runoff Area=9,519 sf 42.40% Impervious Runoff Depth>1.86"
Tc=5.0 min CN=88 Runoff=0.52 cfs 0.034 af

Reach A-1: Analysis Point 1 Avg. Flow Depth=0.09' Max Vel=2.79 fps Inflow=0.52 cfs 0.034 af
n=0.013 L=10.0' S=0.0400 '/' Capacity=55.95 cfs Outflow=0.52 cfs 0.034 af

Total Runoff Area = 0.219 ac Runoff Volume = 0.034 af Average Runoff Depth = 1.86"
57.60% Pervious = 0.126 ac 42.40% Impervious = 0.093 ac

Summary for Subcatchment 1S: Entire Site

Runoff = 0.52 cfs @ 12.07 hrs, Volume= 0.034 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-20.00 hrs, dt= 0.02 hrs
Type III 24-hr SE_Cu 2-yr Rainfall=3.19"

Area (sf)	CN	Description
4,036	98	Paved parking & roofs
5,483	80	>75% Grass cover, Good, HSG D
9,519	88	Weighted Average
5,483		57.60% Pervious Area
4,036		42.40% Impervious Area

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

Summary for Reach A-1: Analysis Point 1

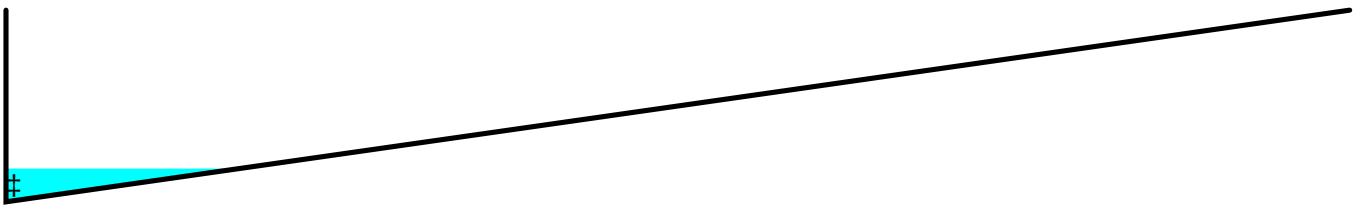
Hersey Street Gutter

Inflow Area = 0.219 ac, 42.40% Impervious, Inflow Depth > 1.86" for SE_Cu 2-yr event
Inflow = 0.52 cfs @ 12.07 hrs, Volume= 0.034 af
Outflow = 0.52 cfs @ 12.08 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-20.00 hrs, dt= 0.02 hrs
Max. Velocity= 2.79 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.18 fps, Avg. Travel Time= 0.1 min

Peak Storage= 2 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.09'
Bank-Full Depth= 0.50' Flow Area= 6.3 sf, Capacity= 55.95 cfs

0.00' x 0.50' deep channel, n= 0.013 Asphalt, smooth
Side Slope Z-value= 0.0 50.0 '/' Top Width= 25.00'
Length= 10.0' Slope= 0.0400 '/'
Inlet Invert= 50.40', Outlet Invert= 50.00'



Time span=2.00-20.00 hrs, dt=0.02 hrs, 901 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Entire Site Runoff Area=9,519 sf 42.40% Impervious Runoff Depth>4.38"
Tc=5.0 min CN=88 Runoff=1.18 cfs 0.080 af

Reach A-1: Analysis Point 1 Avg. Flow Depth=0.12' Max Vel=3.41 fps Inflow=1.18 cfs 0.080 af
n=0.013 L=10.0' S=0.0400 '/' Capacity=55.95 cfs Outflow=1.18 cfs 0.080 af

Total Runoff Area = 0.219 ac Runoff Volume = 0.080 af Average Runoff Depth = 4.38"
57.60% Pervious = 0.126 ac 42.40% Impervious = 0.093 ac

Summary for Subcatchment 1S: Entire Site

Runoff = 1.18 cfs @ 12.07 hrs, Volume= 0.080 af, Depth> 4.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-20.00 hrs, dt= 0.02 hrs
Type III 24-hr SE_Cu 25-yr Rainfall=6.01"

Area (sf)	CN	Description
4,036	98	Paved parking & roofs
5,483	80	>75% Grass cover, Good, HSG D
9,519	88	Weighted Average
5,483		57.60% Pervious Area
4,036		42.40% Impervious Area

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

Summary for Reach A-1: Analysis Point 1

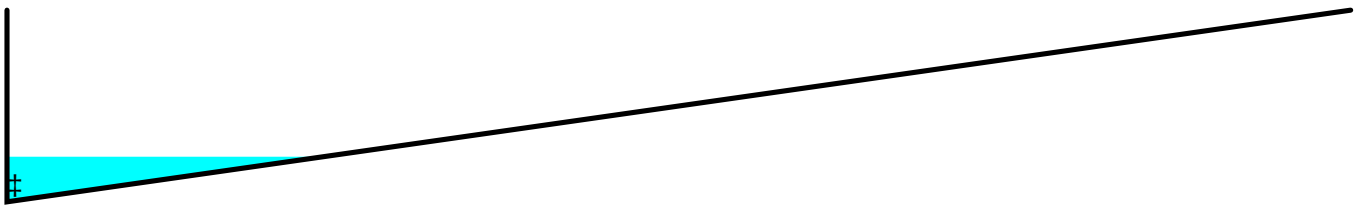
Hersey Street Gutter

Inflow Area = 0.219 ac, 42.40% Impervious, Inflow Depth > 4.38" for SE_Cu 25-yr event
Inflow = 1.18 cfs @ 12.07 hrs, Volume= 0.080 af
Outflow = 1.18 cfs @ 12.07 hrs, Volume= 0.080 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-20.00 hrs, dt= 0.02 hrs
Max. Velocity= 3.41 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.38 fps, Avg. Travel Time= 0.1 min

Peak Storage= 3 cf @ 12.07 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 0.50' Flow Area= 6.3 sf, Capacity= 55.95 cfs

0.00' x 0.50' deep channel, n= 0.013 Asphalt, smooth
Side Slope Z-value= 0.0 50.0 '/' Top Width= 25.00'
Length= 10.0' Slope= 0.0400 '/'
Inlet Invert= 50.40', Outlet Invert= 50.00'



Time span=2.00-20.00 hrs, dt=0.02 hrs, 901 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Entire Site Runoff Area=9,519 sf 42.40% Impervious Runoff Depth>5.44"
Tc=5.0 min CN=88 Runoff=1.45 cfs 0.099 af

Reach A-1: Analysis Point 1 Avg. Flow Depth=0.13' Max Vel=3.59 fps Inflow=1.45 cfs 0.099 af
n=0.013 L=10.0' S=0.0400 '/' Capacity=55.95 cfs Outflow=1.45 cfs 0.099 af

Total Runoff Area = 0.219 ac Runoff Volume = 0.099 af Average Runoff Depth = 5.44"
57.60% Pervious = 0.126 ac 42.40% Impervious = 0.093 ac

Summary for Subcatchment 1S: Entire Site

Runoff = 1.45 cfs @ 12.07 hrs, Volume= 0.099 af, Depth> 5.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-20.00 hrs, dt= 0.02 hrs
Type III 24-hr SE_Cu 50-yr Rainfall=7.16"

Area (sf)	CN	Description
4,036	98	Paved parking & roofs
5,483	80	>75% Grass cover, Good, HSG D
9,519	88	Weighted Average
5,483		57.60% Pervious Area
4,036		42.40% Impervious Area

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

Summary for Reach A-1: Analysis Point 1

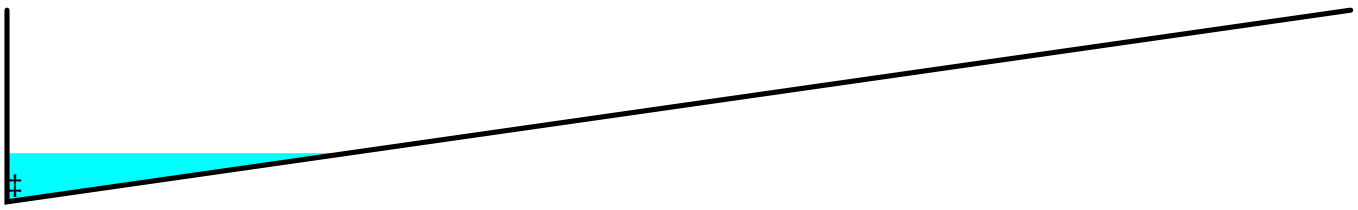
Hersey Street Gutter

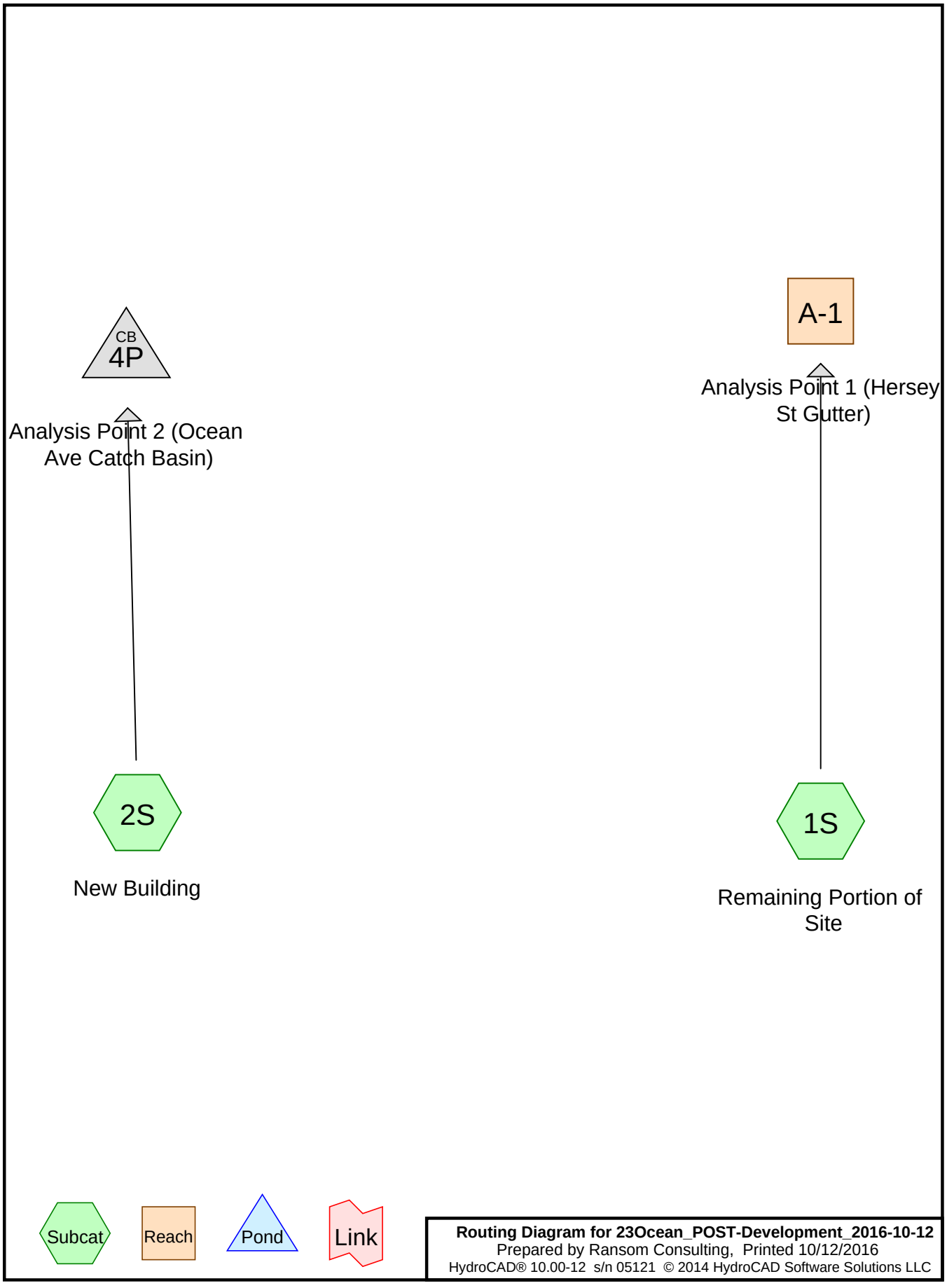
Inflow Area = 0.219 ac, 42.40% Impervious, Inflow Depth > 5.44" for SE_Cu 50-yr event
Inflow = 1.45 cfs @ 12.07 hrs, Volume= 0.099 af
Outflow = 1.45 cfs @ 12.07 hrs, Volume= 0.099 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-20.00 hrs, dt= 0.02 hrs
Max. Velocity= 3.59 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.44 fps, Avg. Travel Time= 0.1 min

Peak Storage= 4 cf @ 12.07 hrs
Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 0.50' Flow Area= 6.3 sf, Capacity= 55.95 cfs

0.00' x 0.50' deep channel, n= 0.013 Asphalt, smooth
Side Slope Z-value= 0.0 50.0 '/' Top Width= 25.00'
Length= 10.0' Slope= 0.0400 '/'
Inlet Invert= 50.40', Outlet Invert= 50.00'





Routing Diagram for 23Ocean_POST-Development_2016-10-12
Prepared by Ransom Consulting, Printed 10/12/2016

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.076	80	>75% Grass cover, Good, HSG D (1S)
0.142	98	Paved parking & roofs (1S, 2S)
0.219	**92**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.076	HSG D	1S
0.142	Other	1S, 2S
0.219		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.076	0.000	0.076	>75% Grass cover, Good	1S
0.000	0.000	0.000	0.000	0.142	0.142	Paved parking & roofs	1S, 2S
0.000	**0.000**	**0.000**	**0.076**	**0.142**	**0.219**	**TOTAL AREA**	

Time span=0.00-20.00 hrs, dt=0.02 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Remaining Portion of Runoff Area=6,695 sf 50.25% Impervious Runoff Depth>3.35"
Tc=5.0 min CN=89 Runoff=0.64 cfs 0.043 af

Subcatchment2S: New Building Runoff Area=2,824 sf 100.00% Impervious Runoff Depth>4.32"
Tc=5.0 min CN=98 Runoff=0.31 cfs 0.023 af

Reach A-1: Analysis Point 1 (Hersey St Avg. Flow Depth=0.09' Max Vel=2.93 fps Inflow=0.64 cfs 0.043 af
n=0.013 L=10.0' S=0.0400 '/' Capacity=55.95 cfs Outflow=0.64 cfs 0.043 af

Pond 4P: Analysis Point 2 (Ocean Ave Catch Basin) Peak Elev=49.29' Inflow=0.31 cfs 0.023 af
12.0" Round Culvert n=0.012 L=20.0' S=0.0100 '/' Outflow=0.31 cfs 0.023 af

Total Runoff Area = 0.219 ac Runoff Volume = 0.066 af Average Runoff Depth = 3.64"
34.99% Pervious = 0.076 ac 65.01% Impervious = 0.142 ac

Summary for Subcatchment 1S: Remaining Portion of Site

Runoff = 0.64 cfs @ 12.07 hrs, Volume= 0.043 af, Depth> 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Type III 24-hr SE_Cu 10-yr Rainfall=4.77"

Area (sf)	CN	Description
3,364	98	Paved parking & roofs
3,331	80	>75% Grass cover, Good, HSG D
6,695	89	Weighted Average
3,331		49.75% Pervious Area
3,364		50.25% Impervious Area

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

Summary for Subcatchment 2S: New Building

Runoff = 0.31 cfs @ 12.07 hrs, Volume= 0.023 af, Depth> 4.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Type III 24-hr SE_Cu 10-yr Rainfall=4.77"

Area (sf)	CN	Description
2,824	98	Paved parking & roofs
2,824		100.00% Impervious Area

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

Summary for Reach A-1: Analysis Point 1 (Hersey St Gutter)

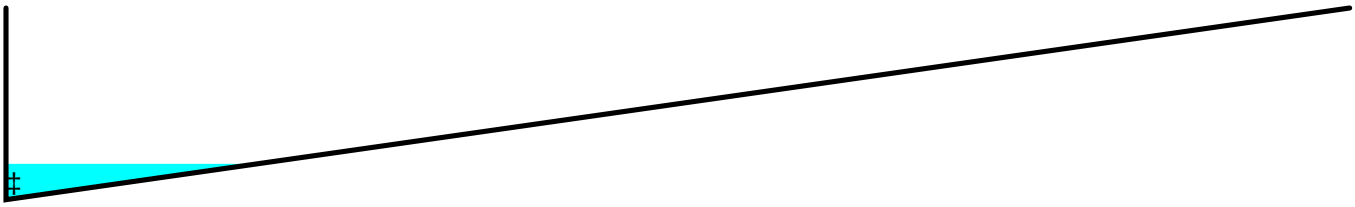
Hersey Street Gutter

Inflow Area = 0.154 ac, 50.25% Impervious, Inflow Depth > 3.35" for SE_Cu 10-yr event
Inflow = 0.64 cfs @ 12.07 hrs, Volume= 0.043 af
Outflow = 0.64 cfs @ 12.07 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Max. Velocity= 2.93 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.19 fps, Avg. Travel Time= 0.1 min

Peak Storage= 2 cf @ 12.07 hrs
Average Depth at Peak Storage= 0.09'
Bank-Full Depth= 0.50' Flow Area= 6.3 sf, Capacity= 55.95 cfs

0.00' x 0.50' deep channel, n= 0.013 Asphalt, smooth
Side Slope Z-value= 0.0 50.0 '/' Top Width= 25.00'
Length= 10.0' Slope= 0.0400 '/'
Inlet Invert= 50.40', Outlet Invert= 50.00'



Summary for Pond 4P: Analysis Point 2 (Ocean Ave Catch Basin)

Inflow Area = 0.065 ac,100.00% Impervious, Inflow Depth > 4.32" for SE_Cu 10-yr event
Inflow = 0.31 cfs @ 12.07 hrs, Volume= 0.023 af
Outflow = 0.31 cfs @ 12.07 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min
Primary = 0.31 cfs @ 12.07 hrs, Volume= 0.023 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Peak Elev= 49.29' @ 12.07 hrs
Flood Elev= 54.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	49.00'	**12.0" Round 12" Catch Basin Lead** L= 20.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 49.00' / 48.80' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.31 cfs @ 12.07 hrs HW=49.29' (Free Discharge)
↑—**1=12" Catch Basin Lead** (Barrel Controls 0.31 cfs @ 2.50 fps)

Time span=0.00-20.00 hrs, dt=0.02 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Remaining Portion of Runoff Area=6,695 sf 50.25% Impervious Runoff Depth>6.85"
Tc=5.0 min CN=89 Runoff=1.26 cfs 0.088 af

Subcatchment2S: New Building Runoff Area=2,824 sf 100.00% Impervious Runoff Depth>7.93"
Tc=5.0 min CN=98 Runoff=0.56 cfs 0.043 af

Reach A-1: Analysis Point 1 (Hersey St Avg. Flow Depth=0.12' Max Vel=3.46 fps Inflow=1.26 cfs 0.088 af
n=0.013 L=10.0' S=0.0400 '/' Capacity=55.95 cfs Outflow=1.26 cfs 0.088 af

Pond 4P: Analysis Point 2 (Ocean Ave Catch Basin) Peak Elev=49.40' Inflow=0.56 cfs 0.043 af
12.0" Round Culvert n=0.012 L=20.0' S=0.0100 '/' Outflow=0.56 cfs 0.043 af

Total Runoff Area = 0.219 ac Runoff Volume = 0.131 af Average Runoff Depth = 7.17"
34.99% Pervious = 0.076 ac 65.01% Impervious = 0.142 ac

Summary for Subcatchment 1S: Remaining Portion of Site

Runoff = 1.26 cfs @ 12.07 hrs, Volume= 0.088 af, Depth> 6.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Type III 24-hr SE_Cu 100-yr Rainfall=8.54"

Area (sf)	CN	Description
3,364	98	Paved parking & roofs
3,331	80	>75% Grass cover, Good, HSG D
6,695	89	Weighted Average
3,331		49.75% Pervious Area
3,364		50.25% Impervious Area

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

Summary for Subcatchment 2S: New Building

Runoff = 0.56 cfs @ 12.07 hrs, Volume= 0.043 af, Depth> 7.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Type III 24-hr SE_Cu 100-yr Rainfall=8.54"

Area (sf)	CN	Description
2,824	98	Paved parking & roofs
2,824		100.00% Impervious Area

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

Summary for Reach A-1: Analysis Point 1 (Hersey St Gutter)

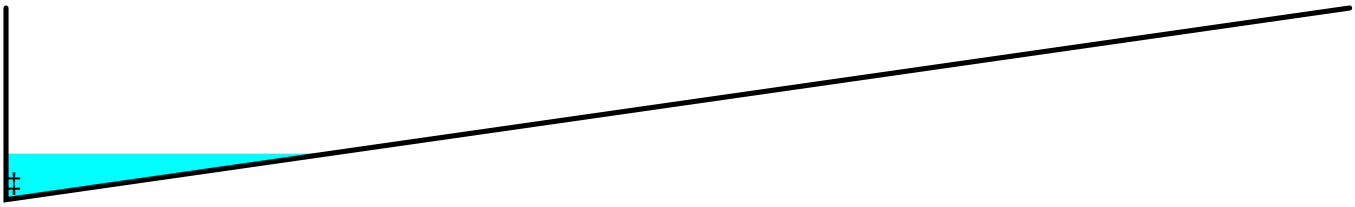
Hersey Street Gutter

Inflow Area = 0.154 ac, 50.25% Impervious, Inflow Depth > 6.85" for SE_Cu 100-yr event
Inflow = 1.26 cfs @ 12.07 hrs, Volume= 0.088 af
Outflow = 1.26 cfs @ 12.07 hrs, Volume= 0.088 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Max. Velocity= 3.46 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 1.39 fps, Avg. Travel Time= 0.1 min

Peak Storage= 4 cf @ 12.07 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 0.50' Flow Area= 6.3 sf, Capacity= 55.95 cfs

0.00' x 0.50' deep channel, n= 0.013 Asphalt, smooth
Side Slope Z-value= 0.0 50.0 '/' Top Width= 25.00'
Length= 10.0' Slope= 0.0400 '/'
Inlet Invert= 50.40', Outlet Invert= 50.00'



Summary for Pond 4P: Analysis Point 2 (Ocean Ave Catch Basin)

Inflow Area = 0.065 ac,100.00% Impervious, Inflow Depth > 7.93" for SE_Cu 100-yr event
Inflow = 0.56 cfs @ 12.07 hrs, Volume= 0.043 af
Outflow = 0.56 cfs @ 12.07 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min
Primary = 0.56 cfs @ 12.07 hrs, Volume= 0.043 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Peak Elev= 49.40' @ 12.07 hrs
Flood Elev= 54.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	49.00'	**12.0" Round 12" Catch Basin Lead** L= 20.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 49.00' / 48.80' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.56 cfs @ 12.07 hrs HW=49.40' (Free Discharge)
1=12" Catch Basin Lead (Barrel Controls 0.56 cfs @ 2.84 fps)

Time span=0.00-20.00 hrs, dt=0.02 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Remaining Portion of Runoff Area=6,695 sf 50.25% Impervious Runoff Depth>1.95"
Tc=5.0 min CN=89 Runoff=0.38 cfs 0.025 af

Subcatchment2S: New Building Runoff Area=2,824 sf 100.00% Impervious Runoff Depth>2.82"
Tc=5.0 min CN=98 Runoff=0.21 cfs 0.015 af

Reach A-1: Analysis Point 1 (Hersey St Avg. Flow Depth=0.08' Max Vel=2.58 fps Inflow=0.38 cfs 0.025 af
n=0.013 L=10.0' S=0.0400 '/' Capacity=55.95 cfs Outflow=0.38 cfs 0.025 af

Pond 4P: Analysis Point 2 (Ocean Ave Catch Basin) Peak Elev=49.23' Inflow=0.21 cfs 0.015 af
12.0" Round Culvert n=0.012 L=20.0' S=0.0100 '/' Outflow=0.21 cfs 0.015 af

Total Runoff Area = 0.219 ac Runoff Volume = 0.040 af Average Runoff Depth = 2.20"
34.99% Pervious = 0.076 ac 65.01% Impervious = 0.142 ac

Summary for Subcatchment 1S: Remaining Portion of Site

Runoff = 0.38 cfs @ 12.07 hrs, Volume= 0.025 af, Depth> 1.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Type III 24-hr SE_Cu 2-yr Rainfall=3.19"

Area (sf)	CN	Description
3,364	98	Paved parking & roofs
3,331	80	>75% Grass cover, Good, HSG D
6,695	89	Weighted Average
3,331		49.75% Pervious Area
3,364		50.25% Impervious Area

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

Summary for Subcatchment 2S: New Building

Runoff = 0.21 cfs @ 12.07 hrs, Volume= 0.015 af, Depth> 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Type III 24-hr SE_Cu 2-yr Rainfall=3.19"

Area (sf)	CN	Description
2,824	98	Paved parking & roofs
2,824		100.00% Impervious Area

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

Summary for Reach A-1: Analysis Point 1 (Hersey St Gutter)

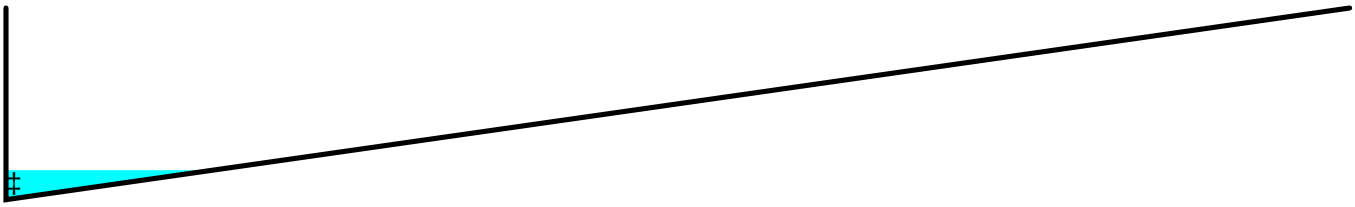
Hersey Street Gutter

Inflow Area = 0.154 ac, 50.25% Impervious, Inflow Depth > 1.95" for SE_Cu 2-yr event
Inflow = 0.38 cfs @ 12.07 hrs, Volume= 0.025 af
Outflow = 0.38 cfs @ 12.08 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Max. Velocity= 2.58 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.09 fps, Avg. Travel Time= 0.2 min

Peak Storage= 1 cf @ 12.07 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 0.50' Flow Area= 6.3 sf, Capacity= 55.95 cfs

0.00' x 0.50' deep channel, n= 0.013 Asphalt, smooth
Side Slope Z-value= 0.0 50.0 '/' Top Width= 25.00'
Length= 10.0' Slope= 0.0400 '/'
Inlet Invert= 50.40', Outlet Invert= 50.00'



Summary for Pond 4P: Analysis Point 2 (Ocean Ave Catch Basin)

Inflow Area = 0.065 ac,100.00% Impervious, Inflow Depth > 2.82" for SE_Cu 2-yr event
Inflow = 0.21 cfs @ 12.07 hrs, Volume= 0.015 af
Outflow = 0.21 cfs @ 12.07 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min
Primary = 0.21 cfs @ 12.07 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Peak Elev= 49.23' @ 12.07 hrs
Flood Elev= 54.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	49.00'	**12.0" Round 12" Catch Basin Lead** L= 20.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 49.00' / 48.80' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.20 cfs @ 12.07 hrs HW=49.23' (Free Discharge)
↑—**1=12" Catch Basin Lead** (Barrel Controls 0.20 cfs @ 2.27 fps)

Time span=0.00-20.00 hrs, dt=0.02 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Remaining Portion of Runoff Area=6,695 sf 50.25% Impervious Runoff Depth>4.49"
Tc=5.0 min CN=89 Runoff=0.85 cfs 0.058 af

Subcatchment2S: New Building Runoff Area=2,824 sf 100.00% Impervious Runoff Depth>5.51"
Tc=5.0 min CN=98 Runoff=0.39 cfs 0.030 af

Reach A-1: Analysis Point 1 (Hersey St Avg. Flow Depth=0.10' Max Vel=3.14 fps Inflow=0.85 cfs 0.058 af
n=0.013 L=10.0' S=0.0400 '/' Capacity=55.95 cfs Outflow=0.85 cfs 0.058 af

Pond 4P: Analysis Point 2 (Ocean Ave Catch Basin) Peak Elev=49.33' Inflow=0.39 cfs 0.030 af
12.0" Round Culvert n=0.012 L=20.0' S=0.0100 '/' Outflow=0.39 cfs 0.030 af

Total Runoff Area = 0.219 ac Runoff Volume = 0.087 af Average Runoff Depth = 4.79"
34.99% Pervious = 0.076 ac 65.01% Impervious = 0.142 ac

Summary for Subcatchment 1S: Remaining Portion of Site

Runoff = 0.85 cfs @ 12.07 hrs, Volume= 0.058 af, Depth> 4.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Type III 24-hr SE_Cu 25-yr Rainfall=6.01"

Area (sf)	CN	Description
3,364	98	Paved parking & roofs
3,331	80	>75% Grass cover, Good, HSG D
6,695	89	Weighted Average
3,331		49.75% Pervious Area
3,364		50.25% Impervious Area

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

Summary for Subcatchment 2S: New Building

Runoff = 0.39 cfs @ 12.07 hrs, Volume= 0.030 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Type III 24-hr SE_Cu 25-yr Rainfall=6.01"

Area (sf)	CN	Description
2,824	98	Paved parking & roofs
2,824		100.00% Impervious Area

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

Summary for Reach A-1: Analysis Point 1 (Hersey St Gutter)

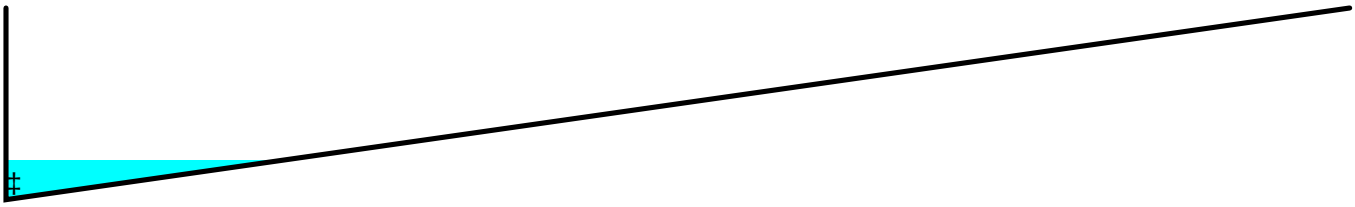
Hersey Street Gutter

Inflow Area = 0.154 ac, 50.25% Impervious, Inflow Depth > 4.49" for SE_Cu 25-yr event
Inflow = 0.85 cfs @ 12.07 hrs, Volume= 0.058 af
Outflow = 0.85 cfs @ 12.07 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Max. Velocity= 3.14 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.27 fps, Avg. Travel Time= 0.1 min

Peak Storage= 3 cf @ 12.07 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 0.50' Flow Area= 6.3 sf, Capacity= 55.95 cfs

0.00' x 0.50' deep channel, n= 0.013 Asphalt, smooth
Side Slope Z-value= 0.0 50.0 '/' Top Width= 25.00'
Length= 10.0' Slope= 0.0400 '/'
Inlet Invert= 50.40', Outlet Invert= 50.00'



Summary for Pond 4P: Analysis Point 2 (Ocean Ave Catch Basin)

Inflow Area = 0.065 ac,100.00% Impervious, Inflow Depth > 5.51" for SE_Cu 25-yr event
Inflow = 0.39 cfs @ 12.07 hrs, Volume= 0.030 af
Outflow = 0.39 cfs @ 12.07 hrs, Volume= 0.030 af, Atten= 0%, Lag= 0.0 min
Primary = 0.39 cfs @ 12.07 hrs, Volume= 0.030 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Peak Elev= 49.33' @ 12.07 hrs
Flood Elev= 54.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	49.00'	**12.0" Round 12" Catch Basin Lead** L= 20.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 49.00' / 48.80' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.39 cfs @ 12.07 hrs HW=49.33' (Free Discharge)
↑—**1=12" Catch Basin Lead** (Barrel Controls 0.39 cfs @ 2.63 fps)

Time span=0.00-20.00 hrs, dt=0.02 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Remaining Portion of Runoff Area=6,695 sf 50.25% Impervious Runoff Depth>5.56"
Tc=5.0 min CN=89 Runoff=1.04 cfs 0.071 af

Subcatchment2S: New Building Runoff Area=2,824 sf 100.00% Impervious Runoff Depth>6.61"
Tc=5.0 min CN=98 Runoff=0.47 cfs 0.036 af

Reach A-1: Analysis Point 1 (Hersey St Avg. Flow Depth=0.11' Max Vel=3.30 fps Inflow=1.04 cfs 0.071 af
n=0.013 L=10.0' S=0.0400 '/' Capacity=55.95 cfs Outflow=1.03 cfs 0.071 af

Pond 4P: Analysis Point 2 (Ocean Ave Catch Basin) Peak Elev=49.36' Inflow=0.47 cfs 0.036 af
12.0" Round Culvert n=0.012 L=20.0' S=0.0100 '/' Outflow=0.47 cfs 0.036 af

Total Runoff Area = 0.219 ac Runoff Volume = 0.107 af Average Runoff Depth = 5.87"
34.99% Pervious = 0.076 ac 65.01% Impervious = 0.142 ac

Summary for Subcatchment 1S: Remaining Portion of Site

Runoff = 1.04 cfs @ 12.07 hrs, Volume= 0.071 af, Depth> 5.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Type III 24-hr SE_Cu 50-yr Rainfall=7.16"

Area (sf)	CN	Description
3,364	98	Paved parking & roofs
3,331	80	>75% Grass cover, Good, HSG D
6,695	89	Weighted Average
3,331		49.75% Pervious Area
3,364		50.25% Impervious Area

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

Summary for Subcatchment 2S: New Building

Runoff = 0.47 cfs @ 12.07 hrs, Volume= 0.036 af, Depth> 6.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Type III 24-hr SE_Cu 50-yr Rainfall=7.16"

Area (sf)	CN	Description
2,824	98	Paved parking & roofs
2,824		100.00% Impervious Area

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

Summary for Reach A-1: Analysis Point 1 (Hersey St Gutter)

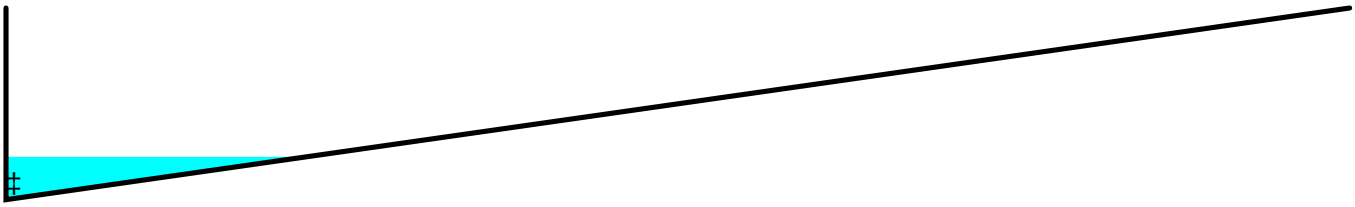
Hersey Street Gutter

Inflow Area = 0.154 ac, 50.25% Impervious, Inflow Depth > 5.56" for SE_Cu 50-yr event
Inflow = 1.04 cfs @ 12.07 hrs, Volume= 0.071 af
Outflow = 1.03 cfs @ 12.07 hrs, Volume= 0.071 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Max. Velocity= 3.30 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.32 fps, Avg. Travel Time= 0.1 min

Peak Storage= 3 cf @ 12.07 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 0.50' Flow Area= 6.3 sf, Capacity= 55.95 cfs

0.00' x 0.50' deep channel, n= 0.013 Asphalt, smooth
Side Slope Z-value= 0.0 50.0 '/' Top Width= 25.00'
Length= 10.0' Slope= 0.0400 '/'
Inlet Invert= 50.40', Outlet Invert= 50.00'



Summary for Pond 4P: Analysis Point 2 (Ocean Ave Catch Basin)

Inflow Area = 0.065 ac,100.00% Impervious, Inflow Depth > 6.61" for SE_Cu 50-yr event
Inflow = 0.47 cfs @ 12.07 hrs, Volume= 0.036 af
Outflow = 0.47 cfs @ 12.07 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min
Primary = 0.47 cfs @ 12.07 hrs, Volume= 0.036 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.02 hrs
Peak Elev= 49.36' @ 12.07 hrs
Flood Elev= 54.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	49.00'	**12.0" Round 12" Catch Basin Lead** L= 20.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 49.00' / 48.80' S= 0.0100 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.47 cfs @ 12.07 hrs HW=49.36' (Free Discharge)
↑—**1=12" Catch Basin Lead** (Barrel Controls 0.47 cfs @ 2.73 fps)