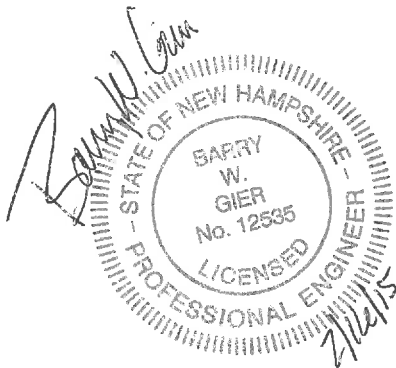


DRAINAGE ANALYSIS

**3 Bay Garage, 3 Dover Road
Tax Map 4 Lot 49
3 Dover Road
Durham, NH 03824**

Prepared for:

**Tropic Star Development LLC
321D Lafayette Road
Hampton, NH 03842**



**Prepared by:
Jones & Beach Engineers, Inc.
85 Portsmouth Avenue
P.O. Box 219
Stratham, NH 03885
(603) 772-4746
August 27, 2014
Revised: February 11, 2015
JBE Project No. 14011**

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1. EXECUTIVE SUMMARY

The purpose of this project is to remove all existing structures, and replace them with a 3 bay garage with associated parking.

A drainage analysis of the development site and its offsite contributing watershed areas was conducted for the purpose of estimating the peak rate of stormwater runoff and to subsequently design adequate drainage structures. Two models were compiled, one for the area in its existing (pre-construction) condition, and a second for its proposed (post-construction) condition. The analysis was conducted using the USDA SCS TR-20 method within the HydroCAD Stormwater Modeling System environment. A summary of the existing and proposed conditions peak rates of runoff is as follows:

COMPONENT	PEAK DISCHARGE COMPARISON											
	1"		2 Year		10 Year		25 Year		50 Year		100 Year	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Analysis Point #1	0.24	0.12	1.23	1.16	1.98	1.92	2.56	2.51	3.10	3.03	3.75	3.66
Analysis Point #2	0	0	0.03	0.03	0.07	0.06	0.11	0.08	0.14	0.11	0.18	0.14
Total	0.24	0.12	1.27	1.19	2.05	1.97	2.67	2.59	3.24	3.13	3.94	3.78

The drainage design intent for this site is to maintain the post-development peak flow to the pre-development peak flow conditions to the extent practicable. This has been accomplished through the use of an underground detention system to maintain the peak discharge.

2.1 INTRODUCTION

The intent of this project is to construct a 2,450 s.f. 3 bay garage on Town of Auburn Tax Map 4 Lot 49.

2.2 METHODOLOGY

The existing and proposed watersheds were modeled utilizing HydroCad stormwater software, version 9.10. The watersheds were analyzed utilizing the SCS TR-20 methodology for hydrograph development and the TR-55 methodology for Time of Concentration (Tc) determination. The Dynamic-Storage-Indicating method for reach and pond routing was utilized. Type III, 24-hour hydrographs were developed for the 1-Inch, 2-year, 10-year, 25-year, 50-year, and 100-year storm events, corresponding to rainfall events of 1", 3.14", 4.75", 6.02", 7.20", and 8.63" respectively.

Existing topography and site features were obtained through on-ground topography completed by Jones & Beach Engineers. Existing soil conditions were derived from soils information obtained from the NRCS Web Soil Survey.

2.3 EXISTING CONDITIONS ANALYSIS

The study area consists of the subject property and upstream contributing area. The study area contains 0.463 acres including offsite contributing areas. The existing site is currently partially developed. The existing site currently contains a single building with parking and utilities.

Two (2) Analysis Points (AP's) were defined for this project.

Analysis Point #1 is defined as the existing south-eastern catch basin. Analysis Point #1 includes drainage from the majority of the building and site.

Analysis Point #2 is defined as the northern and eastern property lines. Analysis Point #2 includes the area of the parcel which drains north and east across the existing property line.

2.4 PROPOSED CONDITIONS ANALYSIS

The proposed site includes a 2,450 sq.ft 3 bay garage. The subject parcel includes unique conditions limiting the storm water features that can be incorporated. The most limiting feature is the size of the site. Underground detention underneath the pavement was used because of this.

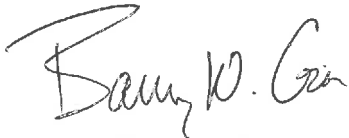
As the table in the Executive Summary demonstrates, the proposed peak rates of runoff have been maintained at the existing peak rates of runoff for the analyzed storms to the extent practicable.

2.5 CONCLUSION

This proposed site development will have minimal effect on abutting infrastructures or properties by way of stormwater runoff or siltation. Peak runoff rate from the proposed site has been maintained to the existing conditions peak rate to the extent practicable.

The area of disturbance is approximately 11,000 square feet.

Respectfully Submitted,
JONES & BEACH ENGINEERS, INC.

A handwritten signature in black ink, appearing to read "Barry W. Gier". The signature is written in a cursive, flowing style.

Barry W. Gier, P.E.
Senior Project Manager

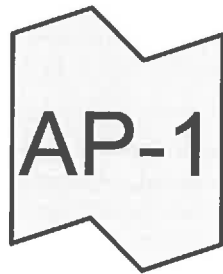
2.6 APPENDIX I

EXISTING CONDITIONS DRAINAGE ANALYSIS

- 2.6.1 1” 24=Hour Summary Analysis
- 2.6.2 2-Year 24-Hour Summary Analysis
- 2.6.3 10-Year 24-Hour Complete Analysis
- 2.6.4 25-Year 24-Hour Summary Analysis
- 2.6.5 50-Year 24-Hour Summary Analysis
- 2.6.6 100-Year 24-Hour Summary Analysis



WS-1



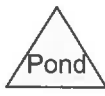
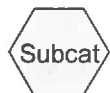
AP-1



WS-2



AP-2



Routing Diagram for 14011-EXISTING

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14011-EXISTING

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.118	74	>75% Grass cover, Good, HSG C (1S, 2S)
0.346	98	Paved parking, HSG C (1S, 2S)
0.463	92	TOTAL AREA

14011-EXISTING

Soil Listing (all nodes)

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

14011-EXISTING

Type III 24-hr 1 INCH Rainfall=1.00"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: WS-1

Runoff Area=19,106 sf 78.66% Impervious Runoff Depth>0.42"
Flow Length=259' Tc=4.4 min CN=93 Runoff=0.24 cfs 0.015 af

Subcatchment 2S: WS-2

Runoff Area=1,081 sf 2.96% Impervious Runoff Depth>0.02"
Flow Length=12' Slope=0.1900 '/' Tc=1.1 min CN=75 Runoff=0.00 cfs 0.000 af

Link AP-1: AP-1

Inflow=0.24 cfs 0.015 af
Primary=0.24 cfs 0.015 af

Link AP-2: AP-2

Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 0.463 ac Runoff Volume = 0.015 af Average Runoff Depth = 0.40"
25.40% Pervious = 0.118 ac 74.60% Impervious = 0.346 ac

14011-EXISTING

Type III 24-hr 2 YR Rainfall=3.14"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: WS-1

Runoff Area=19,106 sf 78.66% Impervious Runoff Depth>2.26"
Flow Length=259' Tc=4.4 min CN=93 Runoff=1.23 cfs 0.082 af

Subcatchment 2S: WS-2

Runoff Area=1,081 sf 2.96% Impervious Runoff Depth>0.96"
Flow Length=12' Slope=0.1900 '/ Tc=1.1 min CN=75 Runoff=0.03 cfs 0.002 af

Link AP-1: AP-1

Inflow=1.23 cfs 0.082 af
Primary=1.23 cfs 0.082 af

Link AP-2: AP-2

Inflow=0.03 cfs 0.002 af
Primary=0.03 cfs 0.002 af

Total Runoff Area = 0.463 ac Runoff Volume = 0.084 af Average Runoff Depth = 2.19"
25.40% Pervious = 0.118 ac 74.60% Impervious = 0.346 ac

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Type III 24-hr 10 YR Rainfall=4.75"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: WS-1

Runoff Area=19,106 sf 78.66% Impervious Runoff Depth>3.74"
Flow Length=259' Tc=4.4 min CN=93 Runoff=1.98 cfs 0.137 af

Subcatchment 2S: WS-2

Runoff Area=1,081 sf 2.96% Impervious Runoff Depth>2.09"
Flow Length=12' Slope=0.1900 '/' Tc=1.1 min CN=75 Runoff=0.07 cfs 0.004 af

Link AP-1: AP-1

Inflow=1.98 cfs 0.137 af
Primary=1.98 cfs 0.137 af

Link AP-2: AP-2

Inflow=0.07 cfs 0.004 af
Primary=0.07 cfs 0.004 af

Total Runoff Area = 0.463 ac Runoff Volume = 0.141 af Average Runoff Depth = 3.65"
25.40% Pervious = 0.118 ac 74.60% Impervious = 0.346 ac

14011-EXISTING

Type III 24-hr 10 YR Rainfall=4.75"

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Summary for Subcatchment 1S: WS-1

Runoff = 1.98 cfs @ 12.06 hrs, Volume= 0.137 af, Depth> 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.75"

Area (sf)	CN	Description
15,028	98	Paved parking, HSG C
4,078	74	>75% Grass cover, Good, HSG C
19,106	93	Weighted Average
4,078		21.34% Pervious Area
15,028		78.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	22	0.0200	0.12		Sheet Flow, Grass: Short n= 0.150 P2= 3.14"
0.6	53	0.0294	1.40		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.14"
0.9	184	0.0310	3.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
4.4	259	Total			

Summary for Subcatchment 2S: WS-2

Runoff = 0.07 cfs @ 12.02 hrs, Volume= 0.004 af, Depth> 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.75"

Area (sf)	CN	Description
1,049	74	>75% Grass cover, Good, HSG C
32	98	Paved parking, HSG C
1,081	75	Weighted Average
1,049		97.04% Pervious Area
32		2.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	12	0.1900	0.19		Sheet Flow, Grass: Dense n= 0.240 P2= 3.14"

Summary for Link AP-1: AP-1

Inflow Area = 0.439 ac, 78.66% Impervious, Inflow Depth > 3.74" for 10 YR event
 Inflow = 1.98 cfs @ 12.06 hrs, Volume= 0.137 af
 Primary = 1.98 cfs @ 12.06 hrs, Volume= 0.137 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link AP-2: AP-2

Inflow Area = 0.025 ac, 2.96% Impervious, Inflow Depth > 2.09" for 10 YR event
Inflow = 0.07 cfs @ 12.02 hrs, Volume= 0.004 af
Primary = 0.07 cfs @ 12.02 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

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Type III 24-hr 25 YR Rainfall=6.02"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: WS-1

Runoff Area=19,106 sf 78.66% Impervious Runoff Depth>4.91"
Flow Length=259' Tc=4.4 min CN=93 Runoff=2.56 cfs 0.179 af

Subcatchment 2S: WS-2

Runoff Area=1,081 sf 2.96% Impervious Runoff Depth>3.08"
Flow Length=12' Slope=0.1900 '/' Tc=1.1 min CN=75 Runoff=0.11 cfs 0.006 af

Link AP-1: AP-1

Inflow=2.56 cfs 0.179 af
Primary=2.56 cfs 0.179 af

Link AP-2: AP-2

Inflow=0.11 cfs 0.006 af
Primary=0.11 cfs 0.006 af

Total Runoff Area = 0.463 ac Runoff Volume = 0.186 af Average Runoff Depth = 4.81"
25.40% Pervious = 0.118 ac 74.60% Impervious = 0.346 ac

14011-EXISTING

Type III 24-hr 50 YR Rainfall=7.20"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: WS-1

Runoff Area=19,106 sf 78.66% Impervious Runoff Depth>6.00"
Flow Length=259' Tc=4.4 min CN=93 Runoff=3.10 cfs 0.219 af

Subcatchment 2S: WS-2

Runoff Area=1,081 sf 2.96% Impervious Runoff Depth>4.05"
Flow Length=12' Slope=0.1900 '/ Tc=1.1 min CN=75 Runoff=0.14 cfs 0.008 af

Link AP-1: AP-1

Inflow=3.10 cfs 0.219 af
Primary=3.10 cfs 0.219 af

Link AP-2: AP-2

Inflow=0.14 cfs 0.008 af
Primary=0.14 cfs 0.008 af

Total Runoff Area = 0.463 ac Runoff Volume = 0.228 af Average Runoff Depth = 5.89"
25.40% Pervious = 0.118 ac 74.60% Impervious = 0.346 ac

14011-EXISTING

Type III 24-hr 100 YR Rainfall=8.63"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: WS-1

Runoff Area=19,106 sf 78.66% Impervious Runoff Depth>7.32"
Flow Length=259' Tc=4.4 min CN=93 Runoff=3.75 cfs 0.267 af

Subcatchment 2S: WS-2

Runoff Area=1,081 sf 2.96% Impervious Runoff Depth>5.28"
Flow Length=12' Slope=0.1900 '/' Tc=1.1 min CN=75 Runoff=0.18 cfs 0.011 af

Link AP-1: AP-1

Inflow=3.75 cfs 0.267 af
Primary=3.75 cfs 0.267 af

Link AP-2: AP-2

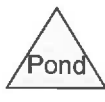
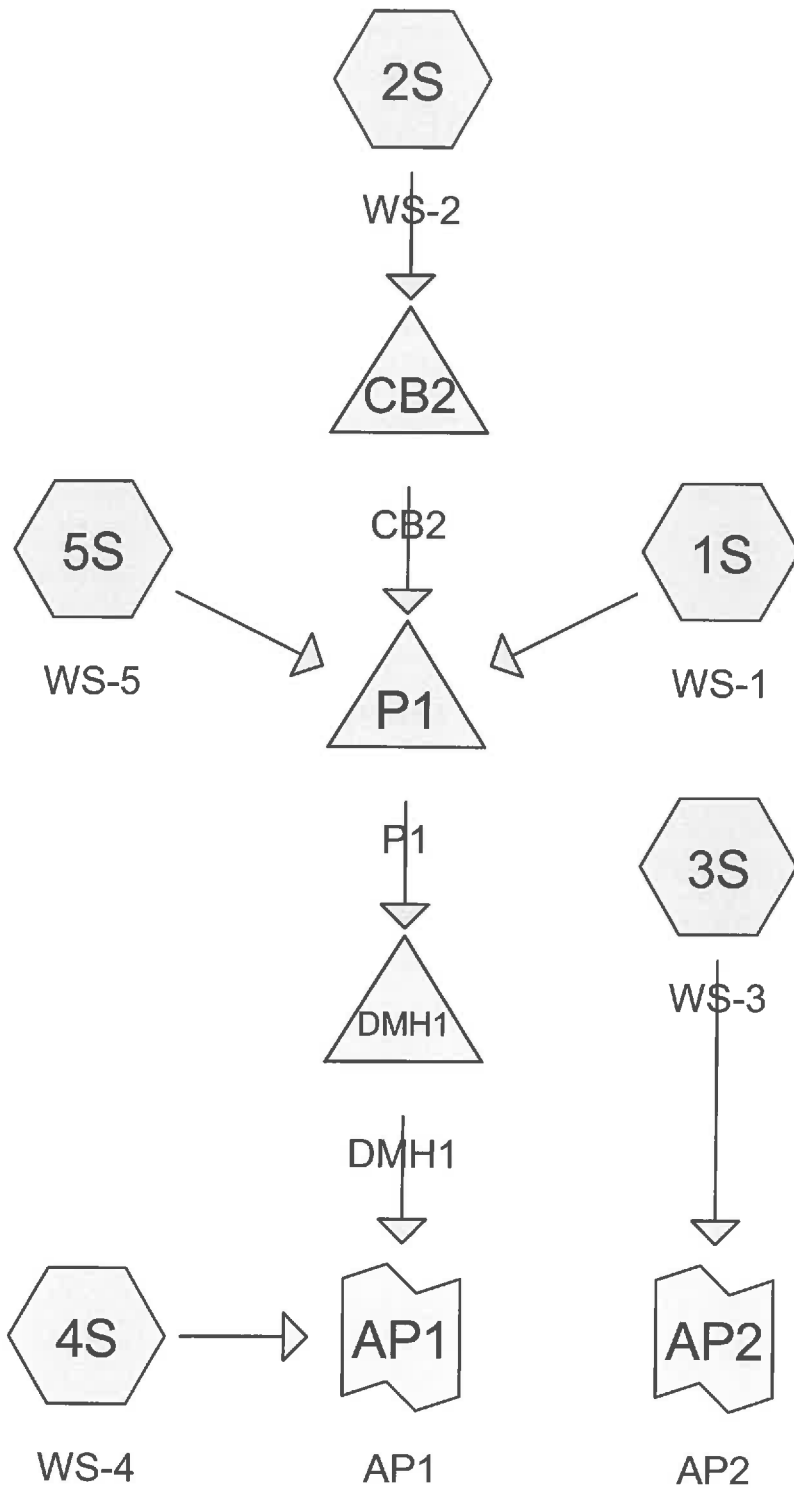
Inflow=0.18 cfs 0.011 af
Primary=0.18 cfs 0.011 af

Total Runoff Area = 0.463 ac Runoff Volume = 0.278 af Average Runoff Depth = 7.21"
25.40% Pervious = 0.118 ac 74.60% Impervious = 0.346 ac

2.7 APPENDIX II

PROPOSED CONDITIONS DRAINAGE ANALYSIS

- 2.7.1 1” 24-Hour Summary Analysis
- 2.7.2 2-Year 24-Hour Summary Analysis
- 2.7.3 10-Year 24-Hour Complete Analysis
- 2.7.4 25-Year 24-Hour Summary Analysis
- 2.7.5 50-Year 24-Hour Summary Analysis
- 2.7.6 100-Year 24-Hour Summary Analysis



Routing Diagram for 14011-PROPOSED
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14011-PROPOSED

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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.103	74	>75% Grass cover, Good, HSG C (1S, 2S, 3S, 4S)
0.305	98	Paved parking, HSG C (1S, 2S, 3S, 4S)
0.056	98	Roofs, HSG C (5S)
0.463	93	TOTAL AREA

14011-PROPOSED

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.463	HSG C	1S, 2S, 3S, 4S, 5S
0.000	HSG D	
0.000	Other	
0.463		TOTAL AREA

14011-PROPOSED

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Type III 24-hr 1 INCH Rainfall=1.00"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: WS-1 Runoff Area=1,944 sf 86.78% Impervious Runoff Depth>0.53"
 Flow Length=61' Slope=0.0230 '/ Tc=0.8 min CN=95 Runoff=0.03 cfs 0.002 af

Subcatchment 2S: WS-2 Runoff Area=5,063 sf 84.40% Impervious Runoff Depth>0.47"
 Flow Length=142' Tc=2.5 min CN=94 Runoff=0.08 cfs 0.005 af

Subcatchment 3S: WS-3 Runoff Area=852 sf 3.64% Impervious Runoff Depth>0.02"
 Flow Length=12' Slope=0.1700 '/ Tc=1.1 min CN=75 Runoff=0.00 cfs 0.000 af

Subcatchment 4S: WS-4 Runoff Area=9,878 sf 73.70% Impervious Runoff Depth>0.37"
 Flow Length=212' Tc=2.8 min CN=92 Runoff=0.12 cfs 0.007 af

Subcatchment 5S: WS-5 Runoff Area=2,449 sf 100.00% Impervious Runoff Depth>0.75"
 Flow Length=15' Slope=0.1500 '/ Tc=0.1 min CN=98 Runoff=0.06 cfs 0.004 af

Pond CB2: CB2 Peak Elev=34.13' Storage=0.000 af Inflow=0.08 cfs 0.005 af
 12.0" Round Culvert n=0.012 L=63.0' S=0.0103 '/ Outflow=0.07 cfs 0.005 af

Pond DMH1: DMH1 Peak Elev=33.30' Storage=0.000 af Inflow=0.04 cfs 0.006 af
 12.0" Round Culvert n=0.012 L=9.0' S=0.0500 '/ Outflow=0.04 cfs 0.006 af

Pond P1: P1 Peak Elev=33.47' Storage=219 cf Inflow=0.16 cfs 0.010 af
 Outflow=0.04 cfs 0.006 af

Link AP1: AP1 Inflow=0.12 cfs 0.013 af
 Primary=0.12 cfs 0.013 af

Link AP2: AP2 Inflow=0.00 cfs 0.000 af
 Primary=0.00 cfs 0.000 af

Total Runoff Area = 0.463 ac Runoff Volume = 0.017 af Average Runoff Depth = 0.44"
22.12% Pervious = 0.103 ac 77.88% Impervious = 0.361 ac

14011-PROPOSED

Type III 24-hr 2 YR Rainfall=3.14"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: WS-1	Runoff Area=1,944 sf 86.78% Impervious Runoff Depth>2.45" Flow Length=61' Slope=0.0230 '/' Tc=0.8 min CN=95 Runoff=0.14 cfs 0.009 af
Subcatchment 2S: WS-2	Runoff Area=5,063 sf 84.40% Impervious Runoff Depth>2.35" Flow Length=142' Tc=2.5 min CN=94 Runoff=0.35 cfs 0.023 af
Subcatchment 3S: WS-3	Runoff Area=852 sf 3.64% Impervious Runoff Depth>0.96" Flow Length=12' Slope=0.1700 '/' Tc=1.1 min CN=75 Runoff=0.03 cfs 0.002 af
Subcatchment 4S: WS-4	Runoff Area=9,878 sf 73.70% Impervious Runoff Depth>2.17" Flow Length=212' Tc=2.8 min CN=92 Runoff=0.65 cfs 0.041 af
Subcatchment 5S: WS-5	Runoff Area=2,449 sf 100.00% Impervious Runoff Depth>2.72" Flow Length=15' Slope=0.1500 '/' Tc=0.1 min CN=98 Runoff=0.20 cfs 0.013 af
Pond CB2: CB2	Peak Elev=34.29' Storage=0.000 af Inflow=0.35 cfs 0.023 af 12.0" Round Culvert n=0.012 L=63.0' S=0.0103 '/' Outflow=0.35 cfs 0.023 af
Pond DMH1: DMH1	Peak Elev=33.36' Storage=0.000 af Inflow=0.52 cfs 0.040 af 12.0" Round Culvert n=0.012 L=9.0' S=0.0500 '/' Outflow=0.52 cfs 0.040 af
Pond P1: P1	Peak Elev=33.86' Storage=386 cf Inflow=0.66 cfs 0.045 af Outflow=0.52 cfs 0.040 af
Link AP1: AP1	Inflow=1.16 cfs 0.081 af Primary=1.16 cfs 0.081 af
Link AP2: AP2	Inflow=0.03 cfs 0.002 af Primary=0.03 cfs 0.002 af
Total Runoff Area = 0.463 ac Runoff Volume = 0.087 af Average Runoff Depth = 2.26"	
22.12% Pervious = 0.103 ac 77.88% Impervious = 0.361 ac	

14011-PROPOSED

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Type III 24-hr 10 YR Rainfall=4.75"

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Page 1

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: WS-1 Runoff Area=1,944 sf 86.78% Impervious Runoff Depth>3.93"
Flow Length=61' Slope=0.0230 '/' Tc=0.8 min CN=95 Runoff=0.23 cfs 0.015 af

Subcatchment 2S: WS-2 Runoff Area=5,063 sf 84.40% Impervious Runoff Depth>3.84"
Flow Length=142' Tc=2.5 min CN=94 Runoff=0.56 cfs 0.037 af

Subcatchment 3S: WS-3 Runoff Area=852 sf 3.64% Impervious Runoff Depth>2.09"
Flow Length=12' Slope=0.1700 '/' Tc=1.1 min CN=75 Runoff=0.06 cfs 0.003 af

Subcatchment 4S: WS-4 Runoff Area=9,878 sf 73.70% Impervious Runoff Depth>3.64"
Flow Length=212' Tc=2.8 min CN=92 Runoff=1.06 cfs 0.069 af

Subcatchment 5S: WS-5 Runoff Area=2,449 sf 100.00% Impervious Runoff Depth>4.19"
Flow Length=15' Slope=0.1500 '/' Tc=0.1 min CN=98 Runoff=0.30 cfs 0.020 af

Pond CB2: CB2 Peak Elev=34.38' Storage=0.000 af Inflow=0.56 cfs 0.037 af
12.0" Round Culvert n=0.012 L=63.0' S=0.0103 '/' Outflow=0.56 cfs 0.037 af

Pond DMH1: DMH1 Peak Elev=33.48' Storage=0.000 af Inflow=0.88 cfs 0.067 af
12.0" Round Culvert n=0.012 L=9.0' S=0.0500 '/' Outflow=0.88 cfs 0.067 af

Pond P1: P1 Peak Elev=34.06' Storage=463 cf Inflow=1.04 cfs 0.071 af
Outflow=0.88 cfs 0.067 af

Link AP1: AP1 Inflow=1.92 cfs 0.136 af
Primary=1.92 cfs 0.136 af

Link AP2: AP2 Inflow=0.06 cfs 0.003 af
Primary=0.06 cfs 0.003 af

Total Runoff Area = 0.463 ac Runoff Volume = 0.144 af Average Runoff Depth = 3.72"
22.12% Pervious = 0.103 ac 77.88% Impervious = 0.361 ac

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Type III 24-hr 10 YR Rainfall=4.75"

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Summary for Subcatchment 1S: WS-1

Runoff = 0.23 cfs @ 12.01 hrs, Volume= 0.015 af, Depth> 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.75"

Area (sf)	CN	Description
1,687	98	Paved parking, HSG C
257	74	>75% Grass cover, Good, HSG C
1,944	95	Weighted Average
257		13.22% Pervious Area
1,687		86.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	61	0.0230	1.31		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.14"

Summary for Subcatchment 2S: WS-2

Runoff = 0.56 cfs @ 12.04 hrs, Volume= 0.037 af, Depth> 3.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.75"

Area (sf)	CN	Description
790	74	>75% Grass cover, Good, HSG C
4,273	98	Paved parking, HSG C
5,063	94	Weighted Average
790		15.60% Pervious Area
4,273		84.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	14	0.0300	0.13		Sheet Flow, Grass: Short n= 0.150 P2= 3.14"
0.4	36	0.0500	1.60		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.14"
0.4	92	0.0300	3.52		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.5	142	Total			

Summary for Subcatchment 3S: WS-3

Runoff = 0.06 cfs @ 12.02 hrs, Volume= 0.003 af, Depth> 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.75"

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Type III 24-hr 10 YR Rainfall=4.75"

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Area (sf)	CN	Description
31	98	Paved parking, HSG C
821	74	>75% Grass cover, Good, HSG C
852	75	Weighted Average
821		96.36% Pervious Area
31		3.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	12	0.1700	0.18		Sheet Flow, Grass: Dense n= 0.240 P2= 3.14"

Summary for Subcatchment 4S: WS-4

Runoff = 1.06 cfs @ 12.05 hrs, Volume= 0.069 af, Depth> 3.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.75"

Area (sf)	CN	Description
2,598	74	>75% Grass cover, Good, HSG C
7,280	98	Paved parking, HSG C
9,878	92	Weighted Average
2,598		26.30% Pervious Area
7,280		73.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	14	0.0480	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.14"
0.4	36	0.0500	1.60		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.14"
1.0	162	0.0190	2.80		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.8	212	Total			

Summary for Subcatchment 5S: WS-5

Runoff = 0.30 cfs @ 12.00 hrs, Volume= 0.020 af, Depth> 4.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.75"

Area (sf)	CN	Description
2,449	98	Roofs, HSG C
2,449		100.00% Impervious Area

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Type III 24-hr 10 YR Rainfall=4.75"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	15	0.1500	2.09		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.14"

Summary for Pond CB2: CB2

Inflow Area = 0.116 ac, 84.40% Impervious, Inflow Depth > 3.84" for 10 YR event
 Inflow = 0.56 cfs @ 12.04 hrs, Volume= 0.037 af
 Outflow = 0.56 cfs @ 12.04 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.1 min
 Primary = 0.56 cfs @ 12.04 hrs, Volume= 0.037 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 34.38' @ 12.04 hrs Surf.Area= 0.000 ac Storage= 0.000 af
 Flood Elev= 38.40' Surf.Area= 0.000 ac Storage= 0.001 af

Plug-Flow detention time= 0.5 min calculated for 0.037 af (100% of inflow)
 Center-of-Mass det. time= 0.3 min (746.8 - 746.5)

Volume	Invert	Avail.Storage	Storage Description
#1	34.00'	0.001 af	4.00'D x 4.40'H Vertical Cone/Cylinder

Device	Routing	Invert	Outlet Devices
#1	Primary	34.00'	12.0" Round Culvert L= 63.0' Ke= 0.500 Inlet / Outlet Invert= 34.00' / 33.35' S= 0.0103 '/ Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.55 cfs @ 12.04 hrs HW=34.37' (Free Discharge)
 ↑-1=Culvert (Inlet Controls 0.55 cfs @ 2.07 fps)

Summary for Pond DMH1: DMH1

Inflow Area = 0.217 ac, 88.93% Impervious, Inflow Depth > 3.70" for 10 YR event
 Inflow = 0.88 cfs @ 12.07 hrs, Volume= 0.067 af
 Outflow = 0.88 cfs @ 12.07 hrs, Volume= 0.067 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.88 cfs @ 12.07 hrs, Volume= 0.067 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 33.48' @ 12.07 hrs Surf.Area= 0.000 ac Storage= 0.000 af
 Flood Elev= 37.30' Surf.Area= 0.000 ac Storage= 0.001 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 0.0 min (768.9 - 768.9)

Volume	Invert	Avail.Storage	Storage Description
#1	33.30'	0.001 af	4.00'D x 4.00'H Vertical Cone/Cylinder

Device	Routing	Invert	Outlet Devices
#1	Primary	33.00'	12.0" Round Culvert L= 9.0' Ke= 0.500 Inlet / Outlet Invert= 33.00' / 32.55' S= 0.0500 '/ Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

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Type III 24-hr 10 YR Rainfall=4.75"

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Primary OutFlow Max=0.85 cfs @ 12.07 hrs HW=33.47' (Free Discharge)↑**1=Culvert** (Inlet Controls 0.85 cfs @ 2.34 fps)**Summary for Pond P1: P1**

Inflow Area = 0.217 ac, 88.93% Impervious, Inflow Depth > 3.95" for 10 YR event
 Inflow = 1.04 cfs @ 12.02 hrs, Volume= 0.071 af
 Outflow = 0.88 cfs @ 12.07 hrs, Volume= 0.067 af, Atten= 15%, Lag= 2.8 min
 Primary = 0.88 cfs @ 12.07 hrs, Volume= 0.067 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 34.06' @ 12.07 hrs Surf.Area= 591 sf Storage= 463 cf
 Flood Elev= 35.08' Surf.Area= 591 sf Storage= 740 cf

Plug-Flow detention time= 50.7 min calculated for 0.067 af (93% of inflow)

Center-of-Mass det. time= 27.4 min (768.9 - 741.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	32.75'	425 cf	24.83'W x 23.80'L x 2.33'H Field A 1,379 cf Overall - 316 cf Embedded = 1,063 cf x 40.0% Voids
#2A	33.25'	316 cf	StormTech SC-310 x 21 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 2.07 sf x 7 rows
		741 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Device 4	33.35'	6.0" Vert. Orifice/Grate C= 0.600
#2	Device 4	33.75'	6.0" Vert. Orifice/Grate C= 0.600
#3	Device 4	34.55'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.0' Crest Height
#4	Primary	33.00'	12.0" Round Culvert L= 14.0' Ke= 0.500 Inlet / Outlet Invert= 33.00' / 32.85' S= 0.0107 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Primary OutFlow Max=0.85 cfs @ 12.07 hrs HW=34.05' (Free Discharge)↑**4=Culvert** (Passes 0.85 cfs of 2.54 cfs potential flow)↑**1=Orifice/Grate** (Orifice Controls 0.63 cfs @ 3.21 fps)↑**2=Orifice/Grate** (Orifice Controls 0.22 cfs @ 1.85 fps)↑**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)**Summary for Link AP1: AP1**

Inflow Area = 0.444 ac, 81.15% Impervious, Inflow Depth > 3.67" for 10 YR event
 Inflow = 1.92 cfs @ 12.05 hrs, Volume= 0.136 af
 Primary = 1.92 cfs @ 12.05 hrs, Volume= 0.136 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

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Type III 24-hr 10 YR Rainfall=4.75"

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Summary for Link AP2: AP2

Inflow Area = 0.020 ac, 3.64% Impervious, Inflow Depth > 2.09" for 10 YR event
Inflow = 0.06 cfs @ 12.02 hrs, Volume= 0.003 af
Primary = 0.06 cfs @ 12.02 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

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Type III 24-hr 25 YR Rainfall=6.02"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: WS-1 Runoff Area=1,944 sf 86.78% Impervious Runoff Depth>5.10"
 Flow Length=61' Slope=0.0230 '/ Tc=0.8 min CN=95 Runoff=0.29 cfs 0.019 af

Subcatchment 2S: WS-2 Runoff Area=5,063 sf 84.40% Impervious Runoff Depth>5.01"
 Flow Length=142' Tc=2.5 min CN=94 Runoff=0.72 cfs 0.049 af

Subcatchment 3S: WS-3 Runoff Area=852 sf 3.64% Impervious Runoff Depth>3.08"
 Flow Length=12' Slope=0.1700 '/ Tc=1.1 min CN=75 Runoff=0.08 cfs 0.005 af

Subcatchment 4S: WS-4 Runoff Area=9,878 sf 73.70% Impervious Runoff Depth>4.81"
 Flow Length=212' Tc=2.8 min CN=92 Runoff=1.38 cfs 0.091 af

Subcatchment 5S: WS-5 Runoff Area=2,449 sf 100.00% Impervious Runoff Depth>5.35"
 Flow Length=15' Slope=0.1500 '/ Tc=0.1 min CN=98 Runoff=0.38 cfs 0.025 af

Pond CB2: CB2 Peak Elev=34.43' Storage=0.000 af Inflow=0.72 cfs 0.049 af
 12.0" Round Culvert n=0.012 L=63.0' S=0.0103 '/ Outflow=0.72 cfs 0.048 af

Pond DMH1: DMH1 Peak Elev=33.56' Storage=0.000 af Inflow=1.16 cfs 0.088 af
 12.0" Round Culvert n=0.012 L=9.0' S=0.0500 '/ Outflow=1.16 cfs 0.088 af

Pond P1: P1 Peak Elev=34.20' Storage=514 cf Inflow=1.33 cfs 0.093 af
 Outflow=1.16 cfs 0.088 af

Link AP1: AP1 Inflow=2.51 cfs 0.179 af
 Primary=2.51 cfs 0.179 af

Link AP2: AP2 Inflow=0.08 cfs 0.005 af
 Primary=0.08 cfs 0.005 af

Total Runoff Area = 0.463 ac Runoff Volume = 0.188 af Average Runoff Depth = 4.88"
22.12% Pervious = 0.103 ac 77.88% Impervious = 0.361 ac

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Type III 24-hr 50 YR Rainfall=7.20"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: WS-1	Runoff Area=1,944 sf 86.78% Impervious Runoff Depth>6.19" Flow Length=61' Slope=0.0230 '/ Tc=0.8 min CN=95 Runoff=0.35 cfs 0.023 af
Subcatchment 2S: WS-2	Runoff Area=5,063 sf 84.40% Impervious Runoff Depth>6.10" Flow Length=142' Tc=2.5 min CN=94 Runoff=0.87 cfs 0.059 af
Subcatchment 3S: WS-3	Runoff Area=852 sf 3.64% Impervious Runoff Depth>4.05" Flow Length=12' Slope=0.1700 '/ Tc=1.1 min CN=75 Runoff=0.11 cfs 0.007 af
Subcatchment 4S: WS-4	Runoff Area=9,878 sf 73.70% Impervious Runoff Depth>5.90" Flow Length=212' Tc=2.8 min CN=92 Runoff=1.67 cfs 0.111 af
Subcatchment 5S: WS-5	Runoff Area=2,449 sf 100.00% Impervious Runoff Depth>6.42" Flow Length=15' Slope=0.1500 '/ Tc=0.1 min CN=98 Runoff=0.45 cfs 0.030 af
Pond CB2: CB2	Peak Elev=34.48' Storage=0.000 af Inflow=0.87 cfs 0.059 af 12.0" Round Culvert n=0.012 L=63.0' S=0.0103 '/ Outflow=0.88 cfs 0.059 af
Pond DMH1: DMH1	Peak Elev=33.62' Storage=0.000 af Inflow=1.38 cfs 0.108 af 12.0" Round Culvert n=0.012 L=9.0' S=0.0500 '/ Outflow=1.38 cfs 0.108 af
Pond P1: P1	Peak Elev=34.35' Storage=561 cf Inflow=1.60 cfs 0.112 af Outflow=1.38 cfs 0.108 af
Link AP1: AP1	Inflow=3.03 cfs 0.219 af Primary=3.03 cfs 0.219 af
Link AP2: AP2	Inflow=0.11 cfs 0.007 af Primary=0.11 cfs 0.007 af
Total Runoff Area = 0.463 ac Runoff Volume = 0.230 af Average Runoff Depth = 5.96"	
22.12% Pervious = 0.103 ac 77.88% Impervious = 0.361 ac	

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Type III 24-hr 100 YR Rainfall=8.63"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: WS-1 Runoff Area=1,944 sf 86.78% Impervious Runoff Depth>7.50"
 Flow Length=61' Slope=0.0230 '/ Tc=0.8 min CN=95 Runoff=0.42 cfs 0.028 af

Subcatchment 2S: WS-2 Runoff Area=5,063 sf 84.40% Impervious Runoff Depth>7.41"
 Flow Length=142' Tc=2.5 min CN=94 Runoff=1.05 cfs 0.072 af

Subcatchment 3S: WS-3 Runoff Area=852 sf 3.64% Impervious Runoff Depth>5.28"
 Flow Length=12' Slope=0.1700 '/ Tc=1.1 min CN=75 Runoff=0.14 cfs 0.009 af

Subcatchment 4S: WS-4 Runoff Area=9,878 sf 73.70% Impervious Runoff Depth>7.22"
 Flow Length=212' Tc=2.8 min CN=92 Runoff=2.03 cfs 0.136 af

Subcatchment 5S: WS-5 Runoff Area=2,449 sf 100.00% Impervious Runoff Depth>7.72"
 Flow Length=15' Slope=0.1500 '/ Tc=0.1 min CN=98 Runoff=0.55 cfs 0.036 af

Pond CB2: CB2 Peak Elev=34.53' Storage=0.000 af Inflow=1.05 cfs 0.072 af
 12.0" Round Culvert n=0.012 L=63.0' S=0.0103 '/ Outflow=1.06 cfs 0.072 af

Pond DMH1: DMH1 Peak Elev=33.70' Storage=0.000 af Inflow=1.66 cfs 0.131 af
 12.0" Round Culvert n=0.012 L=9.0' S=0.0500 '/ Outflow=1.66 cfs 0.131 af

Pond P1: P1 Peak Elev=34.57' Storage=620 cf Inflow=1.93 cfs 0.136 af
 Outflow=1.66 cfs 0.131 af

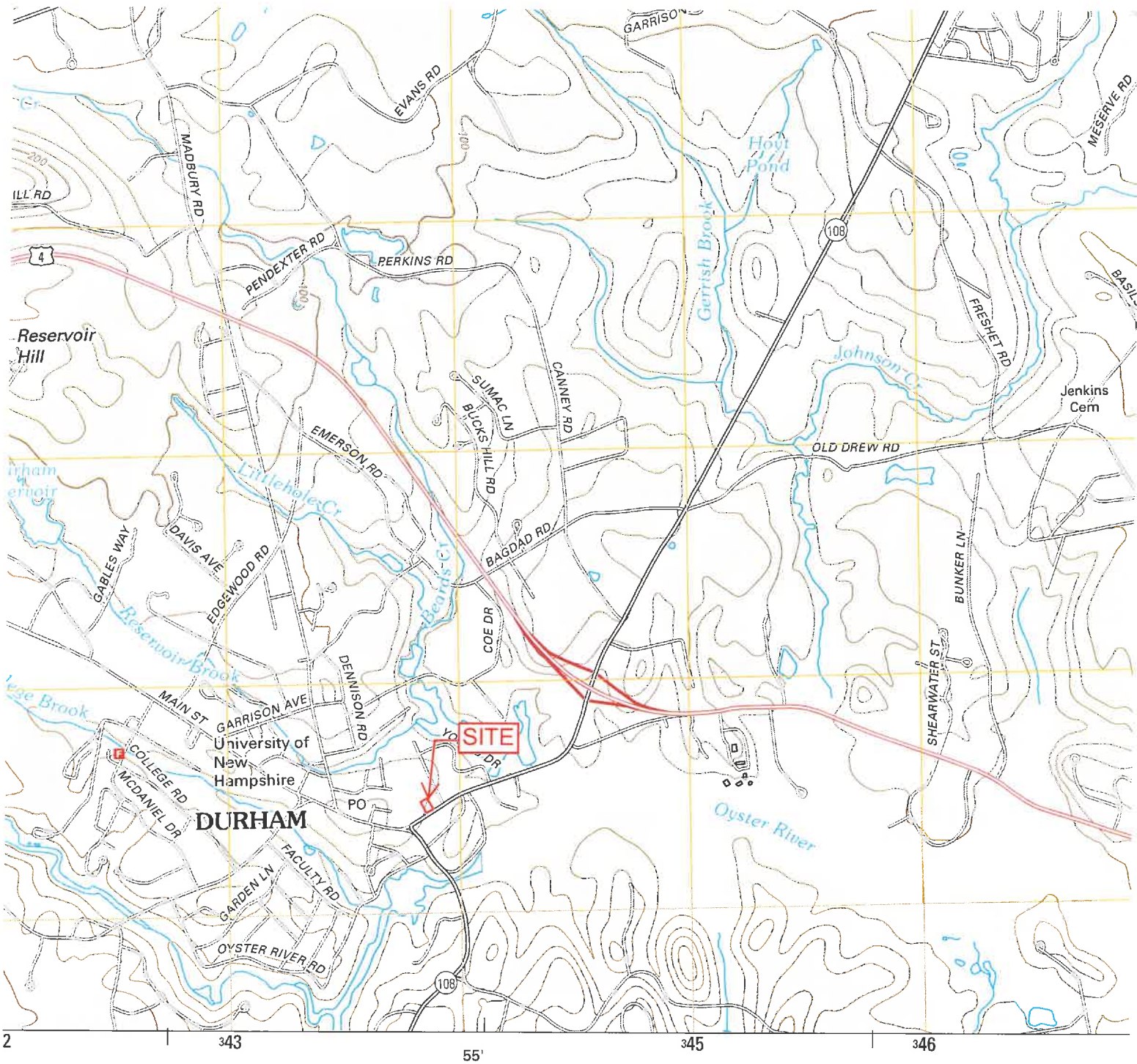
Link AP1: AP1 Inflow=3.66 cfs 0.268 af
 Primary=3.66 cfs 0.268 af

Link AP2: AP2 Inflow=0.14 cfs 0.009 af
 Primary=0.14 cfs 0.009 af

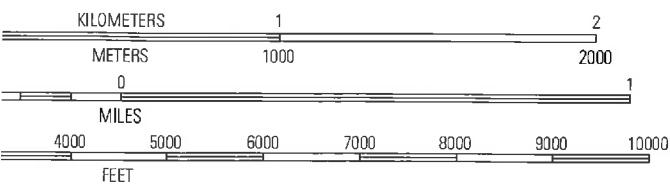
Total Runoff Area = 0.463 ac Runoff Volume = 0.281 af Average Runoff Depth = 7.27"
22.12% Pervious = 0.103 ac 77.88% Impervious = 0.361 ac

APPENDIX III

USGS Map



SCALE 1:24 000



QUADRANGLE LOCATION

Baxter Lake	Rochester	Somersworth
Barrington	Dover West	Dover East
Epping	Newmarket	Portsmouth

ROAD CLASSIFICATION

- Interstate Route (thick red line)
- US Route (double red line)
- Ramp (red line with cross-ticks)
- State I (thin red line)
- Local I (dashed red line)
- 4WD (dotted red line)
- Interstate Route (blue shield icon)
- US Route (white shield icon)

CONTOUR INTERVAL 20 FEET
VERTICAL DATUM OF 1988

Map was produced to conform with the
National Program US Topo Product Standard, 2011.
Associated with this product is draft version 0.6.2

DOVER WEST, N
2012

APPENDIX IV

Web Soil Survey

Soil Map—Strafford County, New Hampshire



Map Scale: 1:539 if printed on A portrait (8.5" x 11") sheet.




0 5 10 20 30 Meters

0 25 50 100 150 Feet

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



MAP LEGEND

 Area of Interest (AOI)	 Spoil Area
 Soils	 Stony Spot
 Soil Map Unit Polygons	 Very Stony Spot
 Soil Map Unit Lines	 Wet Spot
 Soil Map Unit Points	 Other
 Special Point Features	 Special Line Features
 Blowout	 Water Features
 Borrow Pit	 Streams and Canals
 Clay Spot	 Transportation
 Closed Depression	 Rails
 Gravel Pit	 Interstate Highways
 Gravelly Spot	 US Routes
 Landfill	 Major Roads
 Lava Flow	 Local Roads
 Marsh or swamp	 Background
 Mine or Quarry	 Aerial Photography
 Miscellaneous Water	
 Perennial Water	
 Rock Outcrop	
 Saline Spot	
 Sandy Spot	
 Severely Eroded Spot	
 Sinkhole	
 Slide or Slip	
 Sodic Spot	

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Strafford County, New Hampshire
 Survey Area Data: Version 13, Dec 31, 2013

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

Date(s) aerial images were photographed: Jun 20, 2010—May 1, 2011

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

Map Unit Legend

Strafford County, New Hampshire (NH017)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BzB	Buxton silt loam, 3 to 8 percent slopes	1.4	100.0%
Totals for Area of Interest		1.4	100.0%

APPENDIX V

Aerial Photograph of Site



Google earth

feet
meters



APPENDIX VI

Operations and Maintenance Manual

STORMWATER MANAGEMENT OPERATION AND MAINTENANCE MANUAL

**Proposed Commercial Development
4 Bay Car Service
Tax Map 4 Lot 49
3 Dover Road
Durham, NH**

Prepared for:

**Tropic Star Development, LLC
321D Lafayette Road
Hampton, NH 03842**

**Prepared by:
Jones & Beach Engineers, Inc.
85 Portsmouth Avenue
P.O. Box 219
Stratham, NH 03885
(603) 772-4746
Revision: February 11, 2015
August 27, 2014
JBE Project No. 14011**

Inspection and Maintenance of Facilities and Property

A. Maintenance of Common Facilities or Property

1. The Property Owner (Owner) is responsible for maintenance of all stormwater infrastructure associated with this site. This includes all temporary and permanent stormwater and erosion control facilities both during and after construction.

B. General Inspection and Maintenance Requirements

1. The Owner shall perform all inspections and maintenance with greater than annual frequency as required by this report.
2. Permanent stormwater and sediment and erosion control facilities to be maintained on the site include, but are not limited to, the following:
 - a. Catch basins and drain manholes
 - b. Culverts
 - c. Underground Detention basin
 - d. Vegetation and landscaping

2. Maintenance of permanent measures shall follow the following schedule:
- a. **Culverts: Inspection** of culvert inlets and outlets at least **once per month** during the rainy season (March to November). Any debris is to be removed and disposed of properly.
 - b. **Erosion: Annual inspection** of the site for erosion, destabilization, settling, and sloughing. Any needed repairs are to be conducted immediately.
 - c. **Vegetation and Landscaping: Annual inspection** of site's vegetation and landscaping. Any areas that are bare shall be reseeded and mulched with hay or, if the case is extreme, loamed and seeded or sodded to ensure adequate vegetative cover. Landscape specimens shall be replaced in kind, if they are found to be dead or dying.
 - d. **Catch basins and Drain Manholes: Annual inspection** of catch basins and drain manholes to determine if they need to be cleaned. Catch basins are to be cleaned if the depth of deposits is greater than one-third the depth from the basin bottom to the invert of the lowest pipe or opening into or out of the basin. If a catch basin significantly exceeds the one-third depth standard during the inspection, then it should be cleaned more frequently. If woody debris or trash accumulates in a catch basin, then it should be cleaned on a weekly basis. Manholes should be cleaned of any material upon inspection. Catch basins and manholes can be cleaned either manually or by specially designed equipment including, but not limited to, bucket loaders and vacuum pumps. Before any materials can be disposed, it is necessary to perform a detailed chemical analysis to determine if the materials meet the EPA criteria for hazardous waste. This will help determine how the materials should be stored, treated, and disposed.
 - e. **Underground Detention Basin:** Detention Basin should be inspected twice annually and after every rainfall event of 2.5" or greater within a 24-hour period at a minimum. The detention basin areas designed to collect and detain stormwater will need only minimal maintenance. Traffic over the basin areas should be kept to a minimum prior to construction to prevent compaction of the soil reducing infiltration.

Basins shall be inspected for effectiveness at a minimum of twice annually. Sediment build up within the isolator rows shall be removed when sediment exceeds 3" in depth.

See attached sample forms as a guideline.

Any inquiries in regards to the design, function, and/or maintenance of any one of the above mentioned facilities or tasks shall be directed to the project engineer:

Jones & Beach Engineers, Inc.
85 Portsmouth Avenue
P.O. Box 219
Stratham, NH 03885

T#: (603) 772-4746
F#: (603) 772-0227

**STORM WATER POLLUTION PREVENTION PLAN
INSPECTION PERIOD AND CRITERIA**

Tax Map 4 Lot 49
3 Dover Road
Durham, NH

Stormwater Component	Inspection Period	Inspection Criteria/Methods
Culverts	Once per month	Inspect inlet/outlet. Remove debris.
Erosion	Annually	Repair site erosion.
Vegetation	Annually	Repair bare unvegetated areas.
Catch Basins and Drain Manholes	Annually (or more as required)	Remove trash and debris. Inspect for sediment. Remove if sediment greater than 1/3 sump depth.
Detention Basins	Bi-annually	Inspect for standing water, sediment/debris collection, see item e.

**STORM WATER OPERATIONS AND MAINTENANCE PLAN
INSPECTION REPORT**

Tax Map 4 Lot 49
3 Dover Road
Durham, NH

Yearly Inspection Form

Inspected Component	Date of Inspection	Inspector	Issue Detected / Action Taken
Culverts			
Erosion			
Vegetation			
Catch Basins and Drain Manholes			
Detention Basins			

APPENDIX VII

Drainage Plans:
Pre-Development Drainage Plan
Post-Development Drainage Plan