

St.Germain ■ Collins

STORMWATER MANAGEMENT REPORT

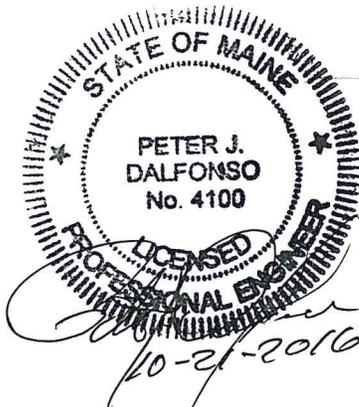
Pratt Abbott Cleaners
839 Roosevelt Trail
Windham, Maine 04062

Prepared for:

Hanna Realty Associates, LLC
P.O. Box 1120
Portland, Maine 04104

Revised October 21, 2016

St.Germain Collins File No.: 3580



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1.0 INTRODUCTION

Hanna Realty Associates, LLC is proposing to construct a new facility for Pratt Abbott Cleaners at the existing site (Map 71, Lots 6 and 7) on Roosevelt Trail in Windham. The project will include a new 4,750-square-foot laundromat and garment care facility and associated parking on the south portion of the lot. The project will also include a vacant lot for future development on the north side of the lot.

The site is developed with an existing 2,500 square foot laundromat, paved parking, and an engineered septic system to serve the laundry facility.

Runoff from the front portion of the site generally flows to the storm drain system in Roosevelt Trail. Runoff from the rear portion of the site flows east to a drainage swale and off site which leaves the parcel to the east. The entire site is within the Tarkill Pond watershed and ultimately discharges into the Presumpscot River. Tarkill pond is not on the State List of Lakes Most at Risk from New Development. The site is not subject to The Maine Stormwater Law (Chapter 500) since the site is not in the direct watershed of a lake most at risk from new development and the proposed impervious surface is less than one acre.

2.0 METHOD OF ANALYSIS

Runoff was evaluated using the HydroCAD® 8.5 Model, a TR-20 based model. The post development runoff conditions and rates were compared to the existing conditions. The model utilized a Type III 24 hour design storm distribution and antecedent moisture condition two. Runoff rates were modeled at 4 Analysis Points in both the existing and proposed conditions for the 2-year, 10-year, and 25-year storms to comply with local and state requirements.

3.0 EXISTING CONDITIONS

In the existing condition, the site is 1.89 acres and includes a 2,500 sqft laundromat, 0.45 acres of parking and circulation, 1.10 acres of lawn, field, and landscaping, and an 8,000 sqft septic system.

The site is comprised of four subcatchments, three of which discharge to the west and one that discharges to the east. Runoff from the site was evaluated at four locations (Analysis Points). Analysis Point 1 is located in the southeast corner of the site. Analysis Points 2A, 2B, and 2C are located along the west side of the site, adjacent Roosevelt Trail and discharge to the existing storm drain system in Roosevelt Trail.

Table 1 is a summary of the runoff rates for the existing condition based on modeling with HydroCAD® 8.5.

Table 1
Existing Conditions Summary

Analysis Point	Peak Flow (CFS)		
	2-Year	10-Year	25-Year
1	0.98	2.38	3.65
2A	0.34	0.51	0.64
2B	0.74	1.11	1.40
2C	0.19	0.37	0.53

See Appendix A for the HydroCAD® analysis of the existing condition.

4.0 PROPOSED POST DEVELOPMENT CONDITIONS

Proposed development includes construction of a new 4,750 square foot building, new parking and circulation areas, and an infiltration stormwater treatment system. The project also includes changing the existing lots into two reconfigured lots; one with the new building and existing septic system (1.35 acres) and the other with the old building and existing associated pavement (0.45 acres). The existing building will remain until the new building is complete and operational.

The post development conditions were calculated with the existing building in place. For the post development condition, the site includes 7,250 sqft of building, 0.75 acres of existing and new parking and circulation, and 0.97 acres of lawn, field, and landscaping.

The site is divided into seven Subcatchments that drain to the same four Analysis Points as in the existing condition. The stormwater management system has been designed to utilize the existing discharge points to minimize any impact to the existing natural drainage patterns beyond the property line.

Table 2 is a summary of the runoff rates for the post development conditions based on modeling with HydroCAD® 8.5.

Table 2
Post Development Summary

Analysis Point	Peak Flow (CFS)		
	2-Year	10-Year	25-Year
1	1.07	1.74	2.48
2A	0.34	0.51	0.64
2B	0.16	0.24	0.30
2C	0.25	0.39	0.51

See Appendix B for the HydroCAD® analysis for the proposed post development conditions.

5.0 ANALYSIS

The following table presents a comparison of the existing and post development runoff rates at the Analysis Points. The runoff rates in the post development conditions are less than in the existing conditions at all Analysis Points except at Analysis Point 1 in the 2-Year storm and at Analysis 2C in the 2- and 10-Year storms where they are slightly higher than existing. These slight increases are insignificant and are completely offset by the overall reduction in runoff rates.

Table 3
Runoff Comparison at Analysis Points

Analysis Point	Design Storm	Peak Flow (CFS)		
		Existing	Post	Difference Existing to Post
1	2-Year	0.98	1.07	+0.09
	10-Year	2.38	1.74	-0.64
	25-Year	3.65	2.48	-1.17
2A	2-Year	0.34	0.34	0.00
	10-Year	0.51	0.51	0.00
	25-Year	0.64	0.64	0.00
2B	2-Year	0.74	0.16	-0.58
	10-Year	1.11	0.24	-0.87
	25-Year	1.40	0.30	-1.10
2C	2-Year	0.19	0.25	+0.06
	10-Year	0.37	0.39	+0.02
	25-Year	0.53	0.51	-0.02

6.0 STORMWATER QUALITY

The proposed post development improvements include the construction of an infiltration basin, the installation of a drywell, and the installation of several sections of dripline filter around the building. The improvements have been designed to conform to MEDEP Maine Stormwater Best Practices Manual Chapter 6 – Infiltration BMPs and Chapter 7.5 – Roof Dripline Filters.

7.0 MAINTENANCE

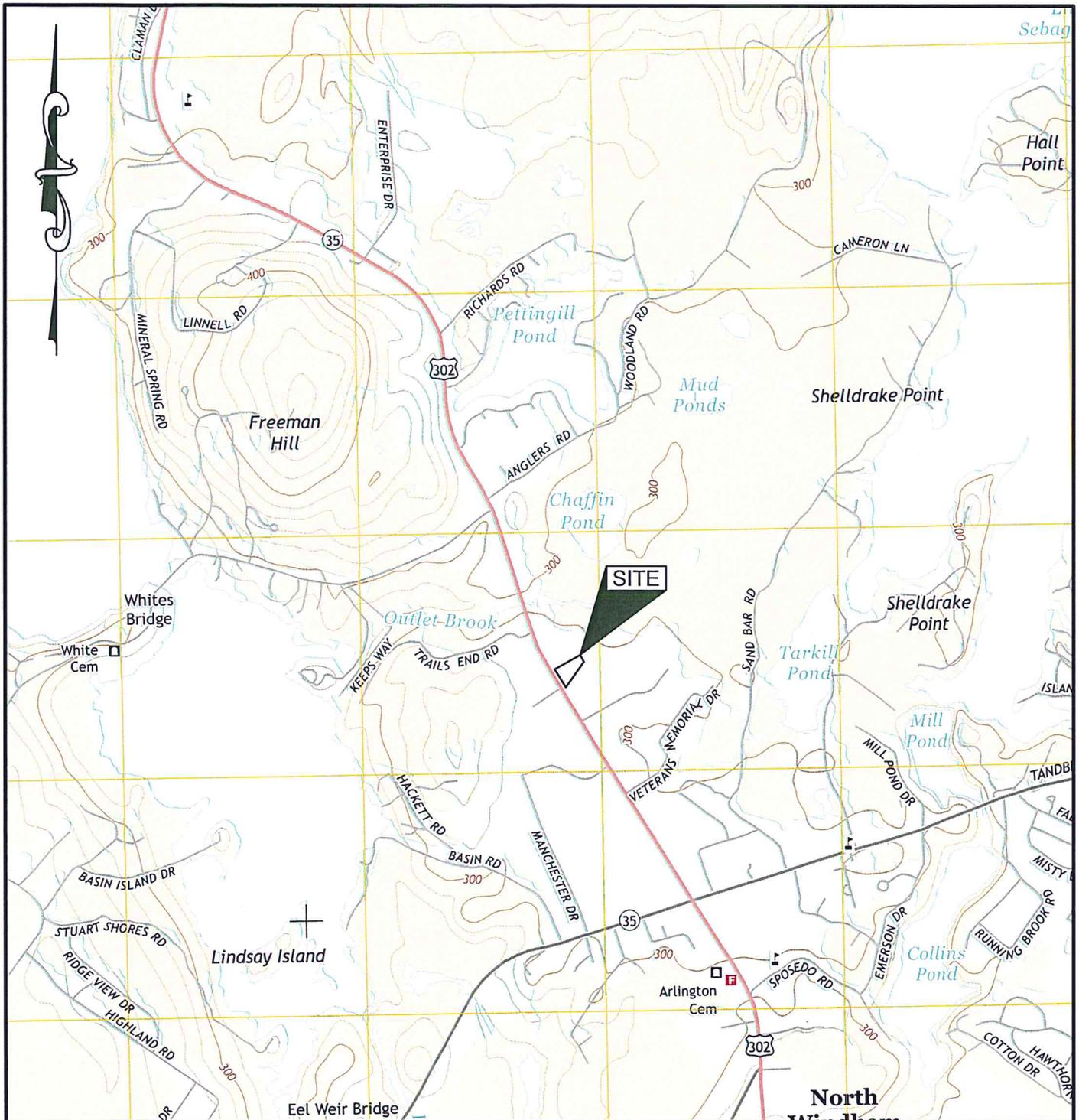
Maintenance of existing and proposed stormwater facilities will be in conformance with the Maintenance Plan for Stormwater Facilities included in Appendix D. Additionally, as required by the Post-Construction Stormwater Ordinance in Chapter 144 from the Code of

the Town of Windham, a qualified third-party inspector shall, on or by May 1 of each year, provide a completed and signed certification to the enforcement authority certifying that the person has inspected the stormwater management facilities. Using the form in Appendix 1 of the Ordinance, the inspector shall certify that the stormwater management facilities are adequately maintained and functioning as intended by approved post-construction stormwater management plan, or that they require maintenance or repair, describing any required maintenance and any deficiencies found during inspection of the stormwater management facilities. If the stormwater management facilities require maintenance or repair of deficiencies in order to function as intended by approved post-construction stormwater management plan, the person shall provide a record of the required maintenance or deficiency and corrective action(s) taken.

8.0 SUMMARY

The development as proposed will meet Town of Windham requirements for stormwater management. Stormwater runoff quantity requirements are met by maintaining or reducing the rate of stormwater runoff from the site. In addition, stormwater runoff quality will be improved by construction of an infiltration basin, the installation of two drywells, and the installation of several sections of dripline filter.

FIGURES



REFERENCE:
 USGS SERIES 7.5 TOPOGRAPHIC MAP, NORTH WINDHAM, ME 2014
 QUADRANGLE.

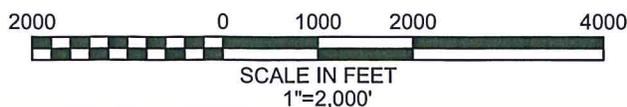
SITE LOCATION MAP

PRATT ABBOTT CLEANERS
 839 ROOSEVELT TRAIL
 WINDHAM, MAINE

HANNA REALTY ASSOCIATES, LLC
 PO BOX 1120
 PORTLAND, ME 04104

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FIGURE 1

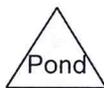


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 H:\Dwg\3580 Windham\3580 Site Loc.dwg

Appendix A
Existing Conditions



Analysis Point 1 Analysis Point 2A Analysis Point 2B Analysis Point 2C



PA Existing [3580]

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.056	49	50-75% Grass cover, Fair, HSG A (SC-2C)
1.308	68	<50% Grass cover, Poor, HSG A (SC-1)
0.521	98	Paved parking & roofs (SC-1,SC-2A,SC-2B,SC-2C)
1.885		TOTAL AREA

PA Existing [3580]

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

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Time span=1.00-100.00 hrs, dt=0.01 hrs, 9901 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment SC-1: Runoff Area=62,306 sf 8.57% Impervious Runoff Depth=0.82"
Flow Length=330' Tc=12.9 min CN=71 Runoff=0.98 cfs 0.098 af

Subcatchment SC-2A: Runoff Area=4,107 sf 100.00% Impervious Runoff Depth=2.87"
Flow Length=60' Slope=0.0150 '/' Tc=0.9 min CN=98 Runoff=0.34 cfs 0.023 af

Subcatchment SC-2B: Runoff Area=9,076 sf 100.00% Impervious Runoff Depth=2.87"
Flow Length=80' Slope=0.0150 '/' Tc=1.2 min CN=98 Runoff=0.74 cfs 0.050 af

Subcatchment SC-2C: Runoff Area=6,614 sf 63.08% Impervious Runoff Depth=1.33"
Flow Length=107' Slope=0.0150 '/' Tc=12.0 min CN=80 Runoff=0.19 cfs 0.017 af

Link AP-1: Analysis Point 1 Inflow=0.98 cfs 0.098 af
Primary=0.98 cfs 0.098 af

Link AP-2A: Analysis Point 2A Inflow=0.34 cfs 0.023 af
Primary=0.34 cfs 0.023 af

Link AP-2B: Analysis Point 2B Inflow=0.74 cfs 0.050 af
Primary=0.74 cfs 0.050 af

Link AP-2C: Analysis Point 2C Inflow=0.19 cfs 0.017 af
Primary=0.19 cfs 0.017 af

Total Runoff Area = 1.885 ac Runoff Volume = 0.187 af Average Runoff Depth = 1.19"
72.36% Pervious = 1.364 ac 27.64% Impervious = 0.521 ac

PA Existing [3580]

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

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Summary for Subcatchment SC-1:

Runoff = 0.98 cfs @ 12.20 hrs, Volume= 0.098 af, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
5,337	98	Paved parking & roofs
56,969	68	<50% Grass cover, Poor, HSG A
62,306	71	Weighted Average
56,969		Pervious Area
5,337		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0150	0.15		Sheet Flow, Segment A-B Grass: Short n= 0.150 P2= 3.00"
0.8	60	0.0330	1.27		Shallow Concentrated Flow, Segment B-C Short Grass Pasture Kv= 7.0 fps
0.7	170	0.0130	4.05	13.50	Parabolic Channel, Segment C-D W=5.00' D=1.00' Area=3.3 sf Perim=5.5' n= 0.030 Earth, grassed & winding
12.9	330	Total			

Summary for Subcatchment SC-2A:

Runoff = 0.34 cfs @ 12.01 hrs, Volume= 0.023 af, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
4,107	98	Paved parking & roofs
4,107		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	60	0.0150	1.07		Sheet Flow, Segment A-B Smooth surfaces n= 0.011 P2= 3.00"

Summary for Subcatchment SC-2B:

Runoff = 0.74 cfs @ 12.02 hrs, Volume= 0.050 af, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

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

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Area (sf)	CN	Description
9,076	98	Paved parking & roofs
9,076		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	80	0.0150	1.14		Sheet Flow, Segment A-B Smooth surfaces n= 0.011 P2= 3.00"

Summary for Subcatchment SC-2C:

Runoff = 0.19 cfs @ 12.17 hrs, Volume= 0.017 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
4,172	98	Paved parking & roofs
2,442	49	50-75% Grass cover, Fair, HSG A
6,614	80	Weighted Average
2,442		Pervious Area
4,172		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	107	0.0150	0.15		Sheet Flow, Segment A-B Grass: Short n= 0.150 P2= 3.00"

Summary for Link AP-1: Analysis Point 1

Inflow Area = 1.430 ac, 8.57% Impervious, Inflow Depth = 0.82" for 2-Year event
 Inflow = 0.98 cfs @ 12.20 hrs, Volume= 0.098 af
 Primary = 0.98 cfs @ 12.20 hrs, Volume= 0.098 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs

Summary for Link AP-2A: Analysis Point 2A

Inflow Area = 0.094 ac, 100.00% Impervious, Inflow Depth = 2.87" for 2-Year event
 Inflow = 0.34 cfs @ 12.01 hrs, Volume= 0.023 af
 Primary = 0.34 cfs @ 12.01 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs

Summary for Link AP-2B: Analysis Point 2B

Inflow Area = 0.208 ac, 100.00% Impervious, Inflow Depth = 2.87" for 2-Year event
Inflow = 0.74 cfs @ 12.02 hrs, Volume= 0.050 af
Primary = 0.74 cfs @ 12.02 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs

Summary for Link AP-2C: Analysis Point 2C

Inflow Area = 0.152 ac, 63.08% Impervious, Inflow Depth = 1.33" for 2-Year event
Inflow = 0.19 cfs @ 12.17 hrs, Volume= 0.017 af
Primary = 0.19 cfs @ 12.17 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs

PA Existing [3580]

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Type III 24-hr 10-Year Rainfall=4.60"

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Time span=1.00-100.00 hrs, dt=0.01 hrs, 9901 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1: Runoff Area=62,306 sf 8.57% Impervious Runoff Depth=1.82"
Flow Length=330' Tc=12.9 min CN=71 Runoff=2.38 cfs 0.217 af

Subcatchment SC-2A: Runoff Area=4,107 sf 100.00% Impervious Runoff Depth>4.36"
Flow Length=60' Slope=0.0150 '/' Tc=0.9 min CN=98 Runoff=0.51 cfs 0.034 af

Subcatchment SC-2B: Runoff Area=9,076 sf 100.00% Impervious Runoff Depth>4.36"
Flow Length=80' Slope=0.0150 '/' Tc=1.2 min CN=98 Runoff=1.11 cfs 0.076 af

Subcatchment SC-2C: Runoff Area=6,614 sf 63.08% Impervious Runoff Depth=2.55"
Flow Length=107' Slope=0.0150 '/' Tc=12.0 min CN=80 Runoff=0.37 cfs 0.032 af

Link AP-1: Analysis Point 1 Inflow=2.38 cfs 0.217 af
Primary=2.38 cfs 0.217 af

Link AP-2A: Analysis Point 2A Inflow=0.51 cfs 0.034 af
Primary=0.51 cfs 0.034 af

Link AP-2B: Analysis Point 2B Inflow=1.11 cfs 0.076 af
Primary=1.11 cfs 0.076 af

Link AP-2C: Analysis Point 2C Inflow=0.37 cfs 0.032 af
Primary=0.37 cfs 0.032 af

Total Runoff Area = 1.885 ac Runoff Volume = 0.359 af Average Runoff Depth = 2.29"
72.36% Pervious = 1.364 ac 27.64% Impervious = 0.521 ac

PA Existing [3580]

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Type III 24-hr 25-Year Rainfall=5.80"

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Time span=1.00-100.00 hrs, dt=0.01 hrs, 9901 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1: Runoff Area=62,306 sf 8.57% Impervious Runoff Depth=2.74"
Flow Length=330' Tc=12.9 min CN=71 Runoff=3.65 cfs 0.326 af

Subcatchment SC-2A: Runoff Area=4,107 sf 100.00% Impervious Runoff Depth>5.56"
Flow Length=60' Slope=0.0150 '/' Tc=0.9 min CN=98 Runoff=0.64 cfs 0.044 af

Subcatchment SC-2B: Runoff Area=9,076 sf 100.00% Impervious Runoff Depth>5.56"
Flow Length=80' Slope=0.0150 '/' Tc=1.2 min CN=98 Runoff=1.40 cfs 0.097 af

Subcatchment SC-2C: Runoff Area=6,614 sf 63.08% Impervious Runoff Depth=3.60"
Flow Length=107' Slope=0.0150 '/' Tc=12.0 min CN=80 Runoff=0.53 cfs 0.046 af

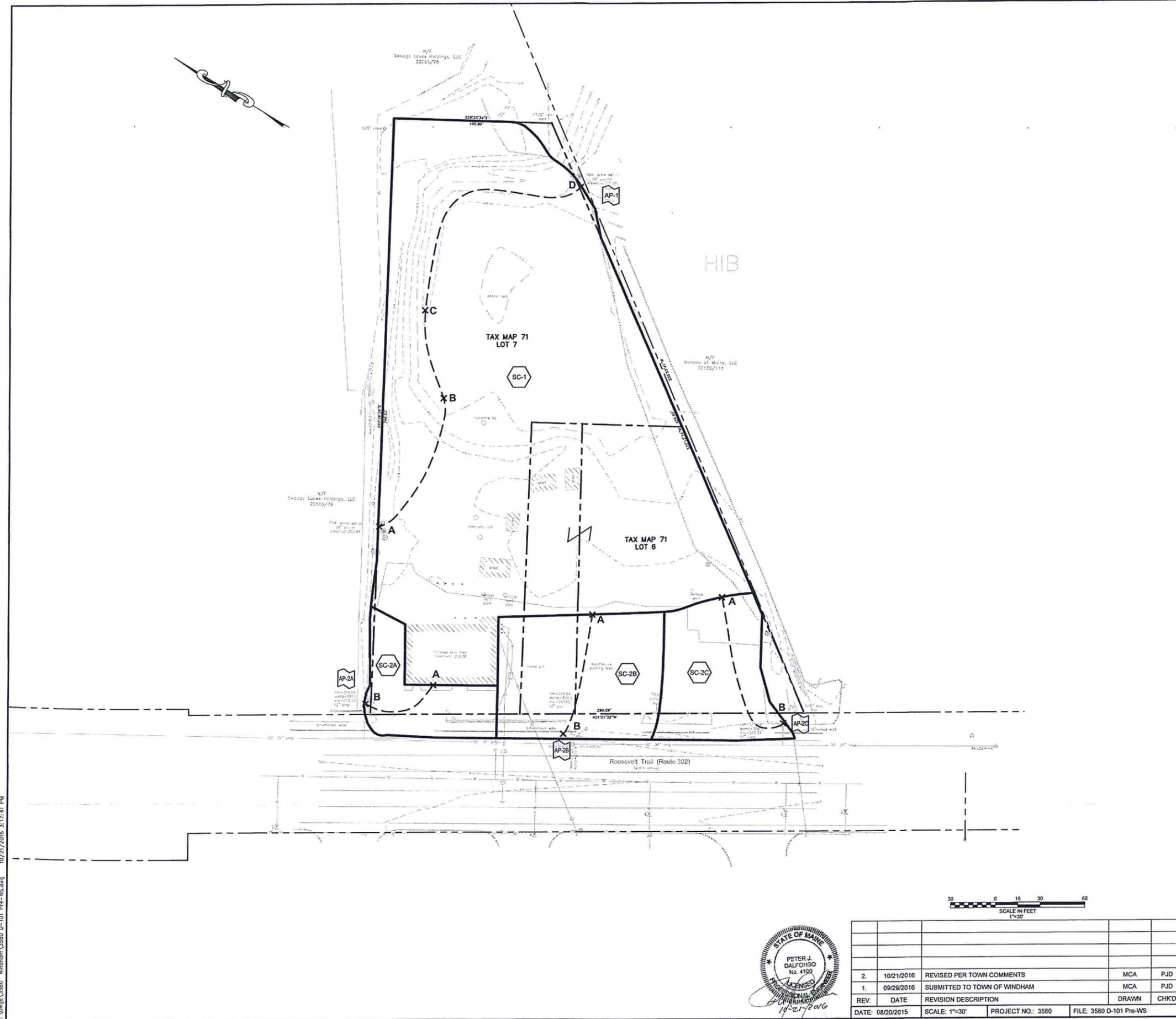
Link AP-1: Analysis Point 1 Inflow=3.65 cfs 0.326 af
Primary=3.65 cfs 0.326 af

Link AP-2A: Analysis Point 2A Inflow=0.64 cfs 0.044 af
Primary=0.64 cfs 0.044 af

Link AP-2B: Analysis Point 2B Inflow=1.40 cfs 0.097 af
Primary=1.40 cfs 0.097 af

Link AP-2C: Analysis Point 2C Inflow=0.53 cfs 0.046 af
Primary=0.53 cfs 0.046 af

Total Runoff Area = 1.885 ac Runoff Volume = 0.512 af Average Runoff Depth = 3.26"
72.36% Pervious = 1.364 ac 27.64% Impervious = 0.521 ac



LEGEND:

	EXISTING		PROPOSED
	PROPERTY LINE		ADJACENT PROPERTY LINE
	MONUMENTS		CONTOURS (1')
	CONTOURS (5')		EDGE OF GRAVEL
	EDGE OF PAVEMENT		CURB
	PAVEMENT STRIPING		BUILDINGS
	TREES		SIGNS
	BOLLARDS		UTILITY POLE & OVERHEAD LINE
	LIGHTS		GAS LINE
	WATER SHUTOFF, VALVE, HYDRANT & WATER LINE		CATCH BASIN & STORM DRAIN
	SC-1		SUBCATCHMENT
	AP-1		ANALYSIS POINT
	A	B	TIME OF CONCENTRATION FLOW PATH
			WATERSHED BOUNDARY

SC-1 AREA: 62,306 S.F.
 Tc:
 A-B SF L=100' S=0.0150
 B-C SHC L=60' S=0.0330
 C-D C L=170' S=0.0130

SC-2A AREA: 4,107 S.F.
 Tc:
 A-B SF L=60' S=0.0150

SC-2B AREA: 9,076 S.F.
 Tc:
 A-B SF L=80' S=0.0150

SC-2C AREA: 6,614 S.F.
 Tc:
 A-B SF L=107' S=0.0150

SOILS TYPE LEGEND:

HIB HINCKLEY LOAMY SAND (HYDROLOGIC SOIL GROUP: A) - 100% OF SITE

SOIL TYPES FOR THE SITE WERE OBTAINED FROM MEDIUM INTENSITY SOILS MAPPING BY THE NATURAL RESOURCE CONSERVATION SERVICE.

- NOTES:**
1. PLAN REFERENCE: "EXISTING CONDITIONS SURVEY, 839 ROOSEVELT TRAIL, WINDHAM, ME" BY TITCOMB ASSOCIATES, MAY 28, 2015.
 2. ELEVATIONS BASED ON NAVD88 DERIVED FROM GPS OBSERVATIONS.
 3. BEARINGS ARE REFERENCED TO GRID NORTH, MAINE STATE PLANE COORDINATE SYSTEM, NAD83, WEST ZONE, DERIVED FROM GPS OBSERVATIONS.

EXISTING CONDITIONS WATERSHED PLAN
 PRATT ABBOTT CLEANERS
 839 ROOSEVELT TRAIL
 WINDHAM, MAINE

HANNA REALTY ASSOCIATES, LLC
 PO BOX 1120
 PORTLAND, ME 04104



REV.	DATE	REVISION DESCRIPTION	DRAWN	CHKD
2.	10/21/2016	REVISED PER TOWN COMMENTS	MCA	PJD
1.	09/29/2016	SUBMITTED TO TOWN OF WINDHAM	MCA	PJD

DATE: 08/20/2015 SCALE: 1"=30' PROJECT NO.: 3580 FILE: 3580 D-101 Pre-WS

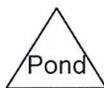
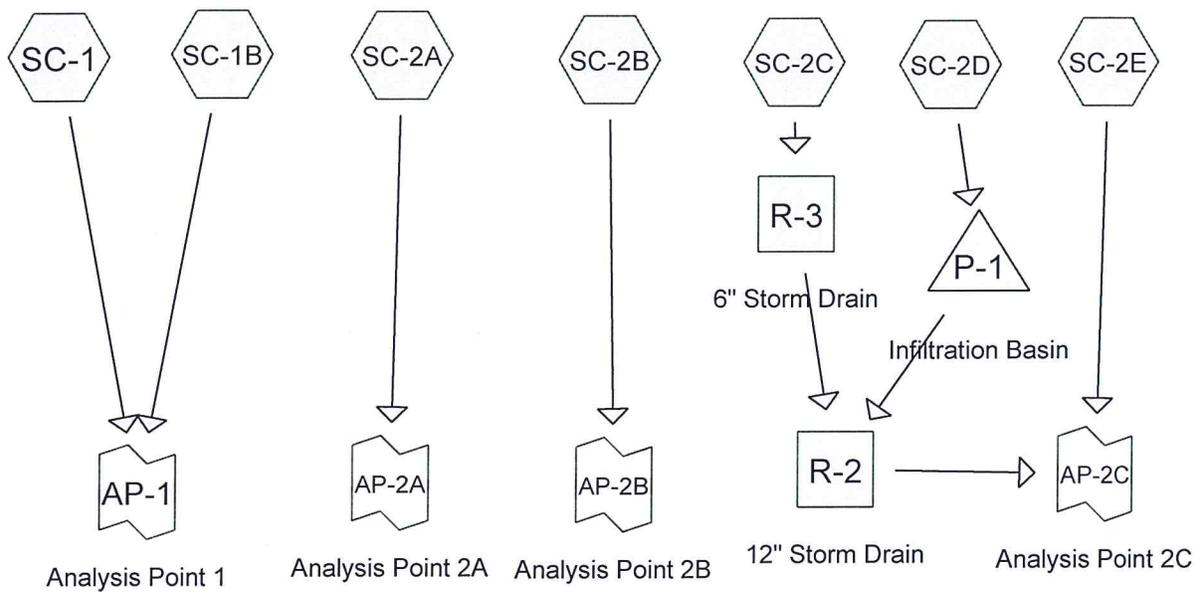
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D-101

846 MAIN ST., WESTBROOK, ME 04092 TEL:207-591-7000 WWW.STGERMAINCOLLINS.COM

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Appendix B
Proposed Post Development Conditions



PA Proposed [3580] (2)

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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.094	39	>75% Grass cover, Good, HSG A (SC-2C,SC-2D)
0.862	49	50-75% Grass cover, Fair, HSG A (SC-1,SC-2E)
0.009	68	<50% Grass cover, Poor, HSG A (SC-1B)
0.919	98	Paved parking & roofs (SC-1,SC-1B,SC-2A,SC-2B,SC-2C,SC-2D,SC-2E)
1.885		TOTAL AREA

PA Proposed [3580] (2)

Prepared by St.Germain Collins

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

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Page 3

Time span=1.00-100.00 hrs, dt=0.01 hrs, 9901 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1: Runoff Area=42,099 sf 11.39% Impervious Runoff Depth=0.22"
Flow Length=335' Tc=13.2 min CN=55 Runoff=0.08 cfs 0.018 af

Subcatchment SC-1B: Runoff Area=14,042 sf 97.20% Impervious Runoff Depth=2.76"
Flow Length=250' Tc=2.7 min CN=97 Runoff=1.07 cfs 0.074 af

Subcatchment SC-2A: Runoff Area=4,105 sf 100.00% Impervious Runoff Depth=2.87"
Flow Length=60' Slope=0.0150 '/' Tc=0.9 min CN=98 Runoff=0.34 cfs 0.023 af

Subcatchment SC-2B: Runoff Area=1,961 sf 100.00% Impervious Runoff Depth=2.87"
Flow Length=100' Slope=0.0150 '/' Tc=1.4 min CN=98 Runoff=0.16 cfs 0.011 af

Subcatchment SC-2C: Runoff Area=6,331 sf 89.37% Impervious Runoff Depth=2.26"
Flow Length=153' Tc=42.0 min CN=92 Runoff=0.18 cfs 0.027 af

Subcatchment SC-2D: Runoff Area=10,370 sf 67.10% Impervious Runoff Depth=1.26"
Flow Length=89' Slope=0.0150 '/' Tc=1.3 min CN=79 Runoff=0.41 cfs 0.025 af

Subcatchment SC-2E: Runoff Area=3,183 sf 91.86% Impervious Runoff Depth=2.45"
Flow Length=91' Slope=0.0150 '/' Tc=10.5 min CN=94 Runoff=0.17 cfs 0.015 af

Reach R-2: 12" Storm Drain Avg. Depth=0.13' Max Vel=3.03 fps Inflow=0.18 cfs 0.027 af
D=12.0" n=0.013 L=62.0' S=0.0200 '/' Capacity=5.04 cfs Outflow=0.18 cfs 0.027 af

Reach R-3: 6" Storm Drain Avg. Depth=0.16' Max Vel=3.47 fps Inflow=0.18 cfs 0.027 af
D=6.0" n=0.013 L=60.0' S=0.0233 '/' Capacity=0.86 cfs Outflow=0.18 cfs 0.027 af

Pond P-1: Infiltration Basin Peak Elev=315.79' Storage=308 cf Inflow=0.41 cfs 0.025 af
Discarded=0.07 cfs 0.025 af Primary=0.00 cfs 0.000 af Outflow=0.07 cfs 0.025 af

Link AP-1: Analysis Point 1 Inflow=1.07 cfs 0.092 af
Primary=1.07 cfs 0.092 af

Link AP-2A: Analysis Point 2A Inflow=0.34 cfs 0.023 af
Primary=0.34 cfs 0.023 af

Link AP-2B: Analysis Point 2B Inflow=0.16 cfs 0.011 af
Primary=0.16 cfs 0.011 af

Link AP-2C: Analysis Point 2C Inflow=0.25 cfs 0.042 af
Primary=0.25 cfs 0.042 af

Total Runoff Area = 1.885 ac Runoff Volume = 0.193 af Average Runoff Depth = 1.23"
51.21% Pervious = 0.965 ac 48.79% Impervious = 0.919 ac

PA Proposed [3580] (2)

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

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Summary for Subcatchment SC-1:

Runoff = 0.08 cfs @ 12.46 hrs, Volume= 0.018 af, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
4,796	98	Paved parking & roofs
37,303	49	50-75% Grass cover, Fair, HSG A
42,099	55	Weighted Average
37,303		Pervious Area
4,796		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	100	0.0150	0.15		Sheet Flow, Segment A-B Grass: Short n= 0.150 P2= 3.00"
1.0	50	0.0150	0.86		Shallow Concentrated Flow, Segment B-C Short Grass Pasture Kv= 7.0 fps
0.8	185	0.0130	4.05	13.50	Parabolic Channel, Segment C-D W=5.00' D=1.00' Area=3.3 sf Perim=5.5' n= 0.030 Earth, grassed & winding
13.2	335	Total			

Summary for Subcatchment SC-1B:

Runoff = 1.07 cfs @ 12.04 hrs, Volume= 0.074 af, Depth= 2.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
13,649	98	Paved parking & roofs
393	68	<50% Grass cover, Poor, HSG A
14,042	97	Weighted Average
393		Pervious Area
13,649		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	30	0.3300	3.21		Sheet Flow, Segment A-B Smooth surfaces n= 0.011 P2= 3.00"
0.6	110	0.0200	2.87		Shallow Concentrated Flow, Segment B-C Paved Kv= 20.3 fps
1.9	110	0.0200	0.99		Shallow Concentrated Flow, Segment C-D Short Grass Pasture Kv= 7.0 fps
2.7	250	Total			

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

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Summary for Subcatchment SC-2A:

Runoff = 0.34 cfs @ 12.01 hrs, Volume= 0.023 af, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
4,105	98	Paved parking & roofs
4,105		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	60	0.0150	1.07		Sheet Flow, Segment A-B Smooth surfaces n= 0.011 P2= 3.00"

Summary for Subcatchment SC-2B:

Runoff = 0.16 cfs @ 12.02 hrs, Volume= 0.011 af, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
1,961	98	Paved parking & roofs
1,961		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	100	0.0150	1.19		Sheet Flow, Segment A-B Smooth surfaces n= 0.011 P2= 3.00"

Summary for Subcatchment SC-2C:

Runoff = 0.18 cfs @ 12.55 hrs, Volume= 0.027 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
5,658	98	Paved parking & roofs
673	39	>75% Grass cover, Good, HSG A
6,331	92	Weighted Average
673		Pervious Area
5,658		Impervious Area

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

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	31	0.3300	3.23		Sheet Flow, Segment A-B Smooth surfaces n= 0.011 P2= 3.00"
41.8	122	0.0050	0.05	0.00	Trap/Vee/Rect Channel Flow, Segment B-C Bot.W=4.00' D=0.01' n= 0.100 Earth, dense brush, high stage
42.0	153	Total			

Summary for Subcatchment SC-2D:

Runoff = 0.41 cfs @ 12.02 hrs, Volume= 0.025 af, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
6,958	98	Paved parking & roofs
3,412	39	>75% Grass cover, Good, HSG A
10,370	79	Weighted Average
3,412		Pervious Area
6,958		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	89	0.0150	1.16		Sheet Flow, Segment A-b Smooth surfaces n= 0.011 P2= 3.00"

Summary for Subcatchment SC-2E:

Runoff = 0.17 cfs @ 12.14 hrs, Volume= 0.015 af, Depth= 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
2,924	98	Paved parking & roofs
259	49	50-75% Grass cover, Fair, HSG A
3,183	94	Weighted Average
259		Pervious Area
2,924		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	91	0.0150	0.14		Sheet Flow, Segment A-B Grass: Short n= 0.150 P2= 3.00"

Summary for Reach R-2: 12" Storm Drain

Inflow Area = 0.383 ac, 75.54% Impervious, Inflow Depth = 0.86" for 2-Year event
Inflow = 0.18 cfs @ 12.56 hrs, Volume= 0.027 af
Outflow = 0.18 cfs @ 12.58 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.03 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.23 fps, Avg. Travel Time= 0.8 min

Peak Storage= 4 cf @ 12.57 hrs, Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 5.04 cfs

12.0" Diameter Pipe, n= 0.013 Corrugated PE, smooth interior
Length= 62.0' Slope= 0.0200 '/'
Inlet Invert= 311.70', Outlet Invert= 310.46'



Summary for Reach R-3: 6" Storm Drain

Inflow Area = 0.145 ac, 89.37% Impervious, Inflow Depth = 2.26" for 2-Year event
Inflow = 0.18 cfs @ 12.55 hrs, Volume= 0.027 af
Outflow = 0.18 cfs @ 12.56 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.47 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.40 fps, Avg. Travel Time= 0.7 min

Peak Storage= 3 cf @ 12.56 hrs, Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 0.50', Capacity at Bank-Full= 0.86 cfs

6.0" Diameter Pipe, n= 0.013 Corrugated PE, smooth interior
Length= 60.0' Slope= 0.0233 '/'
Inlet Invert= 314.50', Outlet Invert= 313.10'



PA Proposed [3580] (2)

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

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Summary for Pond P-1: Infiltration Basin

Inflow Area = 0.238 ac, 67.10% Impervious, Inflow Depth = 1.26" for 2-Year event
 Inflow = 0.41 cfs @ 12.02 hrs, Volume= 0.025 af
 Outflow = 0.07 cfs @ 12.49 hrs, Volume= 0.025 af, Atten= 84%, Lag= 28.2 min
 Discarded = 0.07 cfs @ 12.49 hrs, Volume= 0.025 af
 Primary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs
 Peak Elev= 315.79' @ 12.49 hrs Surf.Area= 1,176 sf Storage= 308 cf

Plug-Flow detention time= 34.2 min calculated for 0.025 af (100% of inflow)
 Center-of-Mass det. time= 34.2 min (877.5 - 843.3)

Volume	Invert	Avail.Storage	Storage Description
#1	315.50'	2,286 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
315.50	968	0	0
316.00	1,329	574	574
317.00	2,094	1,712	2,286

Device	Routing	Invert	Outlet Devices
#1	Primary	314.00'	18.0" x 80.0' long Culvert CPP, projecting, no headwall, Ke= 0.900 Outlet Invert= 311.00' S= 0.0375 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior
#2	Device 1	316.50'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600
#3	Discarded	315.50'	2.410 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.07 cfs @ 12.49 hrs HW=315.79' (Free Discharge)
 ↑3=Exfiltration (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=315.50' (Free Discharge)
 ↑1=Culvert (Passes 0.00 cfs of 5.82 cfs potential flow)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

Summary for Link AP-1: Analysis Point 1

Inflow Area = 1.289 ac, 32.85% Impervious, Inflow Depth = 0.86" for 2-Year event
 Inflow = 1.07 cfs @ 12.04 hrs, Volume= 0.092 af
 Primary = 1.07 cfs @ 12.04 hrs, Volume= 0.092 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs

Summary for Link AP-2A: Analysis Point 2A

Inflow Area = 0.094 ac, 100.00% Impervious, Inflow Depth = 2.87" for 2-Year event
Inflow = 0.34 cfs @ 12.01 hrs, Volume= 0.023 af
Primary = 0.34 cfs @ 12.01 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs

Summary for Link AP-2B: Analysis Point 2B

Inflow Area = 0.045 ac, 100.00% Impervious, Inflow Depth = 2.87" for 2-Year event
Inflow = 0.16 cfs @ 12.02 hrs, Volume= 0.011 af
Primary = 0.16 cfs @ 12.02 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs

Summary for Link AP-2C: Analysis Point 2C

Inflow Area = 0.456 ac, 78.15% Impervious, Inflow Depth = 1.11" for 2-Year event
Inflow = 0.25 cfs @ 12.16 hrs, Volume= 0.042 af
Primary = 0.25 cfs @ 12.16 hrs, Volume= 0.042 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-100.00 hrs, dt= 0.01 hrs

PA Proposed [3580] (2)

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Type III 24-hr 10-Year Rainfall=4.60"

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Time span=1.00-100.00 hrs, dt=0.01 hrs, 9901 points

Runoff by SCS TR-20 method, UH=SCS

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

Subcatchment SC-1: Runoff Area=42,099 sf 11.39% Impervious Runoff Depth=0.79"
Flow Length=335' Tc=13.2 min CN=55 Runoff=0.52 cfs 0.063 af

Subcatchment SC-1B: Runoff Area=14,042 sf 97.20% Impervious Runoff Depth=4.25"
Flow Length=250' Tc=2.7 min CN=97 Runoff=1.62 cfs 0.114 af

Subcatchment SC-2A: Runoff Area=4,105 sf 100.00% Impervious Runoff Depth>4.36"
Flow Length=60' Slope=0.0150 '/' Tc=0.9 min CN=98 Runoff=0.51 cfs 0.034 af

Subcatchment SC-2B: Runoff Area=1,961 sf 100.00% Impervious Runoff Depth>4.36"
Flow Length=100' Slope=0.0150 '/' Tc=1.4 min CN=98 Runoff=0.24 cfs 0.016 af

Subcatchment SC-2C: Runoff Area=6,331 sf 89.37% Impervious Runoff Depth=3.70"
Flow Length=153' Tc=42.0 min CN=92 Runoff=0.29 cfs 0.045 af

Subcatchment SC-2D: Runoff Area=10,370 sf 67.10% Impervious Runoff Depth=2.46"
Flow Length=89' Slope=0.0150 '/' Tc=1.3 min CN=79 Runoff=0.81 cfs 0.049 af

Subcatchment SC-2E: Runoff Area=3,183 sf 91.86% Impervious Runoff Depth=3.91"
Flow Length=91' Slope=0.0150 '/' Tc=10.5 min CN=94 Runoff=0.27 cfs 0.024 af

Reach R-2: 12" Storm Drain Avg. Depth=0.16' Max Vel=3.50 fps Inflow=0.29 cfs 0.045 af
D=12.0" n=0.013 L=62.0' S=0.0200 '/' Capacity=5.04 cfs Outflow=0.29 cfs 0.045 af

Reach R-3: 6" Storm Drain Avg. Depth=0.20' Max Vel=3.95 fps Inflow=0.29 cfs 0.045 af
D=6.0" n=0.013 L=60.0' S=0.0233 '/' Capacity=0.86 cfs Outflow=0.29 cfs 0.045 af

Pond P-1: Infiltration Basin Peak Elev=316.15' Storage=781 cf Inflow=0.81 cfs 0.049 af
Discarded=0.08 cfs 0.049 af Primary=0.00 cfs 0.000 af Outflow=0.08 cfs 0.049 af

Link AP-1: Analysis Point 1 Inflow=1.74 cfs 0.178 af
Primary=1.74 cfs 0.178 af

Link AP-2A: Analysis Point 2A Inflow=0.51 cfs 0.034 af
Primary=0.51 cfs 0.034 af

Link AP-2B: Analysis Point 2B Inflow=0.24 cfs 0.016 af
Primary=0.24 cfs 0.016 af

Link AP-2C: Analysis Point 2C Inflow=0.39 cfs 0.069 af
Primary=0.39 cfs 0.069 af

Total Runoff Area = 1.885 ac Runoff Volume = 0.346 af Average Runoff Depth = 2.20"
51.21% Pervious = 0.965 ac 48.79% Impervious = 0.919 ac

PA Proposed [3580] (2)

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Type III 24-hr 25-Year Rainfall=5.80"

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Time span=1.00-100.00 hrs, dt=0.01 hrs, 9901 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment SC-1: Runoff Area=42,099 sf 11.39% Impervious Runoff Depth=1.40"
Flow Length=335' Tc=13.2 min CN=55 Runoff=1.09 cfs 0.113 af

Subcatchment SC-1B: Runoff Area=14,042 sf 97.20% Impervious Runoff Depth=5.44"
Flow Length=250' Tc=2.7 min CN=97 Runoff=2.05 cfs 0.146 af

Subcatchment SC-2A: Runoff Area=4,105 sf 100.00% Impervious Runoff Depth>5.56"
Flow Length=60' Slope=0.0150 '/' Tc=0.9 min CN=98 Runoff=0.64 cfs 0.044 af

Subcatchment SC-2B: Runoff Area=1,961 sf 100.00% Impervious Runoff Depth>5.56"
Flow Length=100' Slope=0.0150 '/' Tc=1.4 min CN=98 Runoff=0.30 cfs 0.021 af

Subcatchment SC-2C: Runoff Area=6,331 sf 89.37% Impervious Runoff Depth=4.87"
Flow Length=153' Tc=42.0 min CN=92 Runoff=0.38 cfs 0.059 af

Subcatchment SC-2D: Runoff Area=10,370 sf 67.10% Impervious Runoff Depth=3.50"
Flow Length=89' Slope=0.0150 '/' Tc=1.3 min CN=79 Runoff=1.16 cfs 0.069 af

Subcatchment SC-2E: Runoff Area=3,183 sf 91.86% Impervious Runoff Depth=5.10"
Flow Length=91' Slope=0.0150 '/' Tc=10.5 min CN=94 Runoff=0.35 cfs 0.031 af

Reach R-2: 12" Storm Drain Avg. Depth=0.19' Max Vel=3.78 fps Inflow=0.38 cfs 0.059 af
D=12.0" n=0.013 L=62.0' S=0.0200 '/' Capacity=5.04 cfs Outflow=0.38 cfs 0.059 af

Reach R-3: 6" Storm Drain Avg. Depth=0.23' Max Vel=4.23 fps Inflow=0.38 cfs 0.059 af
D=6.0" n=0.013 L=60.0' S=0.0233 '/' Capacity=0.86 cfs Outflow=0.38 cfs 0.059 af

Pond P-1: Infiltration Basin Peak Elev=316.44' Storage=1,228 cf Inflow=1.16 cfs 0.069 af
Discarded=0.09 cfs 0.069 af Primary=0.00 cfs 0.000 af Outflow=0.09 cfs 0.069 af

Link AP-1: Analysis Point 1 Inflow=2.48 cfs 0.259 af
Primary=2.48 cfs 0.259 af

Link AP-2A: Analysis Point 2A Inflow=0.64 cfs 0.044 af
Primary=0.64 cfs 0.044 af

Link AP-2B: Analysis Point 2B Inflow=0.30 cfs 0.021 af
Primary=0.30 cfs 0.021 af

Link AP-2C: Analysis Point 2C Inflow=0.51 cfs 0.090 af
Primary=0.51 cfs 0.090 af

Total Runoff Area = 1.885 ac Runoff Volume = 0.483 af Average Runoff Depth = 3.08"
51.21% Pervious = 0.965 ac 48.79% Impervious = 0.919 ac

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LEGEND:

	EXISTING		PROPOSED
	PROPERTY LINE		ADJACENT PROPERTY LINE
	MONUMENTS		CONTOURS (1')
	CONTOURS (5')		EDGE OF GRAVEL
	EDGE OF PAVEMENT		CURB
	PAVEMENT STRIPING		BUILDINGS
	TREES		SIGNS
	BOLLARDS		UTILITY POLE & OVERHEAD LINE
	LIGHTS		GAS LINE
	WATER SHUTOFF, VALVE, & WATER LINE		CATCH BASIN & STORM DRAIN
	SC-1		SUBCATCHMENT
	AP-1		ANALYSIS POINT
	R-1		REACH
	A		B
	TIME OF CONCENTRATION FLOW PATH		
	WATERSHED BOUNDARY		

SC-1 AREA: 42,099 S.F.
 Tc:
 A-B SF L=100' S=0.0150
 B-C SHC L=50' S=0.0150
 C-D C L=185' S=0.0130

SC-1B AREA: 14,042 S.F.
 Tc:
 A-B SF L=30' S=0.3300
 B-C SCF L=110 S=0.0200
 C-D SCF L=110 S=0.0200

SC-2A AREA: 4,105 S.F.
 Tc:
 A-B SF L=60' S=0.0150

SC-2B AREA: 1,961 S.F.
 Tc:
 A-B SF L=100' S=0.0150

SC-2C AREA: 6,331 S.F.
 Tc:
 A-B SF L=31' S=0.3300
 B-C CH L=122' S=0.005

SC-2D AREA: 10,370 S.F.
 Tc:
 A-B SF L=89' S=0.0150

SC-2E AREA: 2,924 S.F.
 Tc:
 A-B SF L=91 S=0.0150

SOILS TYPE LEGEND:

HIB HINCKLEY LOAMY SAND (HYDROLOGIC SOIL GROUP: A) - 100% OF SITE

SOIL TYPES FOR THE SITE WERE OBTAINED FROM MEDIUM INTENSITY SOILS MAPPING BY THE NATURAL RESOURCE CONSERVATION SERVICE.

NOTES:

1. PLAN REFERENCE: "EXISTING CONDITIONS SURVEY, 839 ROOSEVELT TRAIL, WINDHAM, ME" BY TITCOMB ASSOCIATES, MAY 25, 2015.
2. ELEVATIONS BASED ON NAVD88 DERIVED FROM GPS OBSERVATIONS.
3. BEARINGS ARE REFERENCED TO GRID NORTH, MAINE STATE PLANE COORDINATE SYSTEM, NAD83, WEST ZONE, DERIVED FROM GPS OBSERVATIONS.

**PROPOSED CONDITIONS
WATERSHED PLAN**

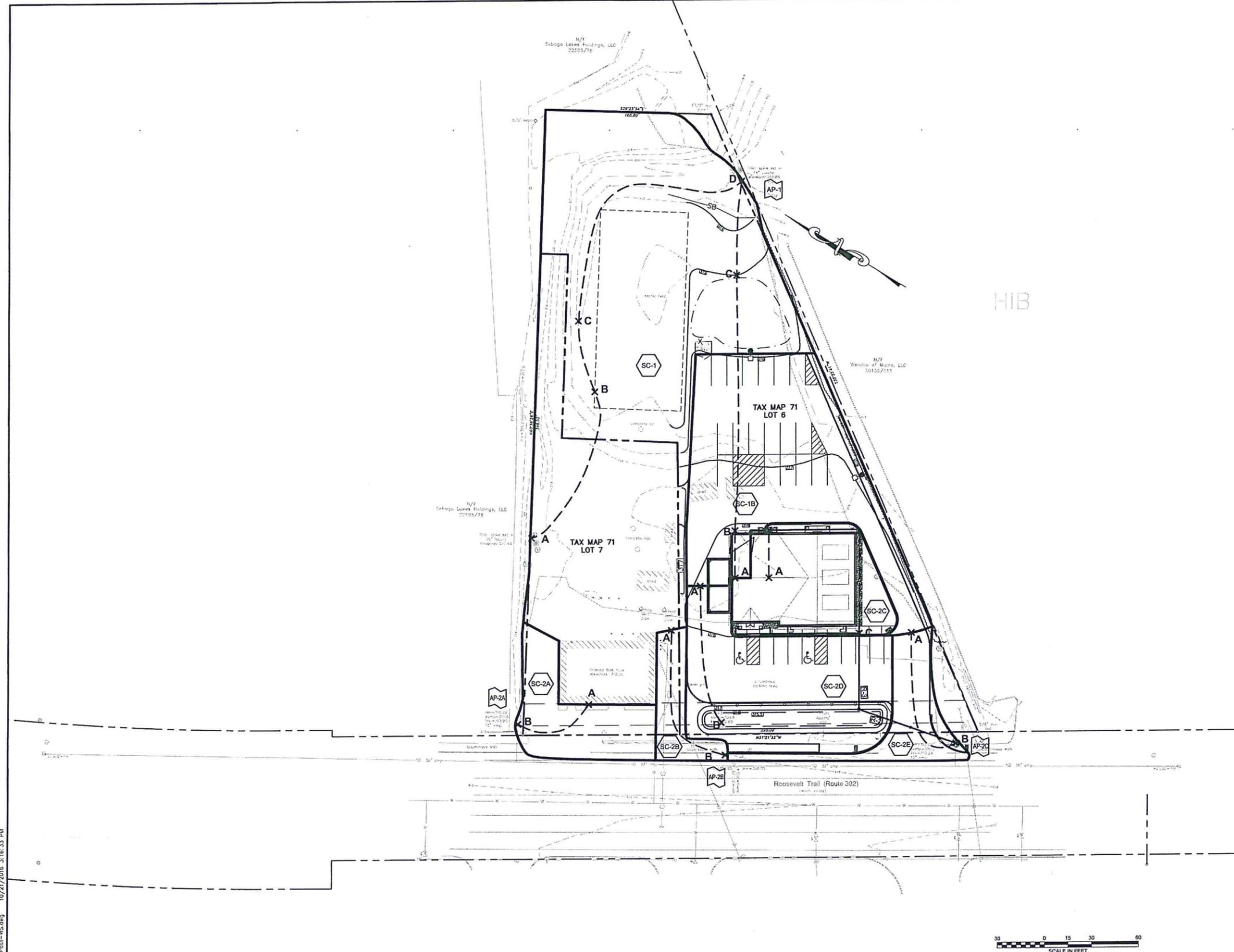
PRATT ABBOTT CLEANERS
839 ROOSEVELT TRAIL
WINDHAM, MAINE

HANNA REALTY ASSOCIATES, LLC
PO BOX 1120
PORTLAND, ME 04104

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D-102

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REV.	DATE	REVISION DESCRIPTION	DRAWN	CHKD
2.	10/21/2016	REVISED PER TOWN COMMENTS	MCA	PJD
1.	09/29/2016	SUBMITTED TO TOWN OF WINDHAM	MCA	PJD
DATE:	08/20/2015	SCALE: 1"=30'	PROJECT NO.: 3580	FILE: 3580 D-102 Post-WS

Appendix C
Stormwater Treatment Calculations

Appendix C
Stormwater Treatment Calculations
Pratt Abbott Cleaners
839 Roosevelt Trail
Windham, ME 04062

Subcatchment	Impervious Area (Sqft)	Treated Impervious Area (Sqft)	% Treated	Treatment
2C	5,658	5,658	100%	Dripline filter
2D	6,958	6,958	100%	Infiltration Basin
2B	1,961	0	0%	
2E	2,924	0	0%	
1E	13,649	0	0%	
Total Impervious	31,150	12,616	41%	

Subcatchment	Landscape Area (Sqft)	Treated Landscape Area (Sqft)	% Treated	Treatment
2C	673	673	100%	Dripline filter
2D	3,412	3,412	100%	Infiltration Basin
2B	259	0	0%	
1B	393	0	0%	
Total Landscape	4,737	4,085	86%	

Total Developed Treatment	35,887	16,701	47%
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Proposed Treatment	Impervious Area (Sqft)	Volume Required (Cuft)	Landscaped Area (Sqft)	Volume Required (Cuft)	Water Quality Storage Depth (ft)	Total Area Required (Sqft)	Proposed Area (Sqft)	% Over Design
Infiltration Basin	6,958	1" x Area 579.83	3,412	0.4" x Area 113.73	1.5	462.38	968	109%

Appendix D

Maintenance Plan for Stormwater Facilities

**Pratt Abbott Cleaners
839 Roosevelt Trail
Windham, Maine
Maintenance Plan for Stormwater Facilities
September 2016**

Site Inspection and Maintenance During Construction

Weekly inspections, as well as routine inspections following rainfalls, shall be conducted by the Owner on all temporary and permanent erosion control devices until final acceptance of the project (90% grass catch). Necessary repairs shall be made to correct undermining or deterioration. Final acceptance shall include a site inspection to verify the stability of all disturbed areas and slopes. Until final inspection, all erosion and sedimentation control measures shall immediately be cleaned, and repaired as required. Disposal of all temporary erosion control devices shall be the responsibility of the Owner.

Post Construction Site Inspection and Maintenance

The Owner shall be responsible for inspecting, maintaining and ensuring proper function of all stormwater treatment and conveyance facilities after the facility is constructed.

Sweeping: Paved areas shall be mechanically swept annually or more often, as necessary. The first sweeping shall take place after winter sanding operations terminate (prior to May 1). A second sweeping may occur prior to winter sanding operations in order to ensure adequate capacity of collection systems.

Catch Basins/Drywells: Catch basins and drywells shall be inspected each spring and fall to determine if cleaning is required. The spring inspection (and cleaning) shall occur after spring sweeping and the fall cleaning shall occur after all leaves have fallen. The cleaning shall include removal and proper disposal of accumulated sediments and floatable debris. Contracting with a cleaning contractor with a vacuum truck is the preferred method of catch basin cleaning. Absorbent logs in drywells shall be replaced every six months at a minimum.

Ditches/Swales: Open swales and ditches shall be inspected on a quarterly basis or after a major rainfall event to assure that debris or sediments do not reduce the effectiveness of the system. Any sign of erosion or blockage shall be immediately repaired to assure a vigorous growth to vegetation for the stability of the structure and proper functioning.

Vegetated Ditches: Vegetative grasses shall be mowed at least monthly during the growing season to a height of not less than 8 inches. Larger brush or trees must not be allowed to become established in the channel. Unless finely mulched, clippings shall be removed to minimize the amount of organic material accumulating in the swales. Any areas where the vegetation fails will be subject to erosion and shall be repaired and revegetated as necessary.

Rip Rap Swales: Where stone is displaced from constructed riprap areas, it shall be replaced and chinked to assure stability. With time, additional riprap may need to be added. Vegetation growing through riprap shall be removed on a yearly schedule.

Culverts: If sediment in culverts or piped drainage systems exceeds 20% of the diameter of the pipe, it shall be removed. This may be accomplished by mechanical means or hydraulic flushing. Care shall be taken to prevent the release of the sediments into the downstream receiving areas. All pipes shall be inspected on an annual basis.

Rip Rap Inlets/Outlets: The culvert inlets/outlets shall be inspected (flow bypass or undermining) and debris removed, as necessary. Repair any channelization if occurring and remove sediment build-up to assure potential storage volume and sheet flow characteristics of the discharge lip. The inspections shall be performed on a semi-annual basis at a minimum.

Infiltration Basin: The infiltration basin shall be inspected as follows:

1. At regular intervals, embankment areas shall be examined for cracks that are produced either by settlement or the beginning of shear slides.
2. The discharge from the internal drains shall be inspected for solid matter. Any noticeable increase of drain flow with a constant reservoir level or abnormal movement of solids is apt to be an indication of erosion.
3. Grass on the slopes and the interior shall be kept cut short, less than 6".
4. Trees and shrubs must be kept from growing in the basin.
5. Inspect monthly to insure that the basin drains within 24 hours following a rain event.

All defects found in inspections must be repaired immediately to prevent progressive deterioration.

Maintenance Documentation: The Stormwater Facilities Inspection Checklist (attached) shall be completed after each inspection.

Stormwater Facilities Inspection Checklist

Facility: **Pratt Abbott Cleaners**
 Location: **839 Roosevelt Trail**
 Town: **Windham, Maine**

Date: _____

Time: _____

Inspector: _____

Inspection/Maintenance Item	Frequency	Satisfactory/ Unsatisfactory	Maintenance Performed
1. Parking Lots & Drives			
Sweep main drive and parking areas	Annual (Spring)		

Inspection/Maintenance Item	Frequency	Satisfactory/ Unsatisfactory	Maintenance Performed
2. Catch Basins, Drywells, Drain Pipes			
Clear debris	Semi-annual		
Check depth of sediment in sumps	Semi-annual		
Remove accumulated sediment	Annual		
Replace absorbent logs	Semi-annual		

Inspection/Maintenance Item	Frequency	Satisfactory/ Unsatisfactory	Maintenance Performed
3. Rip Rap Inlets/Outlets			
Inspect for bypassing	Semi-annual		
Remove accumulated sediment and debris	Semi-annual		

Inspection/Maintenance Item	Frequency	Satisfactory/ Unsatisfactory	Maintenance Performed
4. Culverts and Ditches			
Clear water course of debris	Semi-annual		
Check & repair visible erosion control stone	Semi-annual		
Check outlet stream for erosion or flooding	Semi-annual		
Repair / replace erosion control measures, as needed.	Semi-annual		

Stormwater Facilities Inspection Checklist

Inspection/Maintenance Item	Frequency	Satisfactory/ Unsatisfactory	Maintenance Performed
5. Infiltration basin			
Check pond embankments for erosion	Semi-annual		
Remove accumulated sediment and debris	Annual		
Check to insure draining in 24 hours	Semi-annual		
Mow weekly or as needed	As needed		

Additional Comments: _____

AUTHORIZED FACILITY PERSONNEL SIGNATURE: _____

DATE: _____