

**STORMWATER MANAGEMENT REPORT
THE PLAZA – PHASE I
881 ROOSEVELT TRAIL
WINDHAM, MAINE**

Prepared for

**MARTIN LIPPMAN
DBA
APPLE ANNIE'S ENTERPRISES, INC.
95 WHITES BRIDGE ROAD
WINDHAM, MAINE**

October 3, 2016

SME

Sevee & Maher Engineers, Inc.

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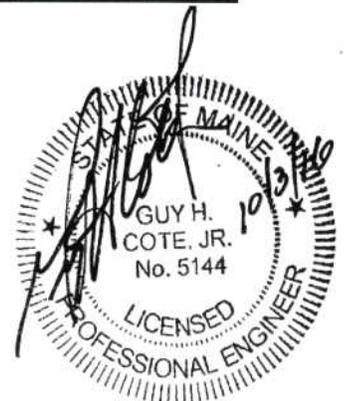


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**STORMWATER MANAGEMENT REPORT
THE PLAZA - PHASE I
881 ROOSEVELT TRAIL
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1.0 INTRODUCTION

This Stormwater Management Report is prepared on behalf of Martin Lippman of 95 Whites Bridge Road, Windham, Maine, the Owner/Applicant for 'The Plaza - Phase 1" referred to herein as the Project at 881 Roosevelt Trail in Windham. The Project will not require a Maine Department of Environmental Protection (MEDEP) Site Location of Development Act (SLODA) permit or Stormwater Law. However, it is possible additional phases of development will meet the thresholds requiring coverage under the Stormwater Law and if large enough the Site Location of Development Act. Therefore, this project is being developed such that this phase will meet the requirements of the MEDEP Chapter 500 Stormwater Management Rules or require minor retrofits.

The site is located in the watershed of Outlet Brook of Chaffin Pond which flows westerly into Sebago Lake Basin as shown on Figure 1, Site Location Map. Although not specifically required for this project the stormwater management measures proposed are intended to meet the MEDEP Chapter 500 requirements for the basic, general, and flooding standards.

2.0 PROJECT NARRATIVE

The Owner proposes to construct a 4,800 sq. ft. single story retail building with 18 parking spaces, and associated site improvements including stormwater management measures. The project will include demolition of existing buildings and upgrades to the existing utilities. The building construction is expected to start in the fall of 2016 and be completed by the Fall of 2017.

The total parcel is approximately 7.65 acres, which is mostly wooded with developed commercial lots along Route 302 (Roosevelt Trail). It is located in a commercial district in North Windham. There is a narrow strip zoned "Resource protection" along Outlet Brook at the south

edge of the parcel that will not be disturbed as part of this project. Currently, at the north edge of the Route 302 frontage is an operating hearing aid business. At the southern edge of the Route 302 frontage is a former garden center. Between these two locations is the site of the proposed retail development project. This portion of the property along Route 302 is just under 1 acre (approximately 170 feet by 190 feet). This part of the property consists of a vacant 16 feet by 21 feet garage, a 95 feet by 27 feet concrete pad, and overgrown grass, weeds, and bushes. There will be no impacts to other areas of the property as a result of this project should be negligible. The wooded portion of the site will remain largely undisturbed as a result of Phase I.

The project will result in a net increase in impervious surface of 0.37 acres, increasing the percent of impervious surface from 11.4 percent to 16.2 percent of the total parcel area. An existing entrance onto U.S. Route 302 will be closed and the existing shared entrance with a retail business will be improved. Included in the impervious surface is a short paved drive north of the building to serve as a future access road to subsequent phases of development of the parcel.

An underdrain soil filter is proposed along the parking lot adjacent to Route 302. Although not specifically required for this project, the underdrain soil filter has been incorporated into the design of this initial phase in anticipation of further development of this parcel that will mandate treatment under the Stormwater Law or the Site Location of Development Act. A description of the proposed stormwater treatment is provided later in Section 5.

3.0 SITE DESCRIPTION

In the pre-development condition, the entire 7.65-Acre parcel is divided up into primarily two subcatchments that drain to two distinct (2) locations. A small portion of the property along the frontage drains to the road. The northern half of the parcel flows northeasterly to a separate wooded parcel also owned by the applicant zoned as "Resource Protection" just east of Chaffin Pond. The southern half of the 7.65-acre parcel flows southerly to Outlet Brook. Outlet Brook is the outlet of Chaffin Pond and also serves at the southern boundary of the property. Outlet Brook then flows westerly to a 48-inch culvert crossing Route 302 at the southwestern corner of

the site. Outlet Brook then flows about 3,000 feet westerly emptying into the Sebago Lake Basin.

The area to be disturbed in Phase 1 is predominately in the northern subcatchment near the drainage divide with the southern subcatchment. The stormwater runoff patterns after redevelopment of the Phase 1 portion of the property will remain largely unchanged. The flow from the area to be developed in Phase 1 will continue to flow to the rear of the property towards the wooded areas.

The United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) Medium Intensity Soils Survey shows the onsite soils to be primarily Hinckley Soils. These soils are in the Type A Hydrologic Soil Group. The Hinckley series consists of very deep, excessively drained soils formed in glaciofluvial materials.

The stormwater calculations for this Stormwater Management Report are based on the NRCS soils mapping and their respective Hydrologic Soil Group designation. Hydrologic Soil Group 'A' was input in the Hydrocad stormwater model developed for this report. The HydroCAD output for the pre-development and post-development models are provided in Appendix B and Appendix C.

4.0 BASIC STANDARDS

Erosion and Sediment Control measures are located on Drawing C-100 of the Plan Set. Erosion Control Notes and Details are located on Drawing C-300 of the Plan Set.

5.0 GENERAL STANDARDS

The proposed Phase 1 development will result in a net increase of building area of 1,800 sq. ft. (since 3,000 sq. ft. of existing buildings will be removed) and a net increase in pavement of 14,100 sq. ft. As discussed in Section 3.0 of this Report, Phase 1 of the proposed development will direct surface runoff primarily to a wooded areas owned by the Applicant. Some of these wooded areas will likely be designated a stormwater buffer in future phases.

The new parking area in front of the proposed building will flow westerly towards U.S. Route 302 and will be treated with an Underdrained Soil Filters (UDSF) along the site frontage. The roof and other impervious areas that drain away from the road (easterly) will be treated in a future phase of the project, if required. In total, the Underdrain Soil Filter will treat runoff from approximately 4,500 sq. ft. of paved area. This level of treatment is equivalent to nearly 32 percent of the net new pavement associated with Phase 1. Stormwater management design calculations have been included in Appendix E. Details, designs, and specifications for the stormwater treatment measures are shown on the enclosed drawings.

6.0 FLOODING STANDARDS

The stormwater model was developed to size the water quality treatment BMPs and to determine peak flow rates to the analysis points. Stormwater peak flow rates were modeled for the 2-, 10- and 25-year/24-hour storm events with Type III Soil Conservation Service rainfall distribution, using the HydroCAD computer modeling system by Applied Microcomputer Systems of Chocorua, New Hampshire. The peak flow rates at each Analysis Point are summarized in Table 1. The calculations for the pre-development and post-development models are provided in Appendix B and Appendix C, respectively. As shown in the table, peak flow rates for the post-development conditions have been controlled to less than pre-development conditions.

**TABLE 1
DRAINAGE SUMMARY**

Analysis Points (AP)	Pre-Development Flow Rate (cfs)	Post-Development Flow Rate (cfs)	Change in Peak Flows (cfs)
AP 1 – North	2 Year = 0.06 10 Year = 0.82 25 Year = 2.03	2 Year = 0.12 10 Year = 0.43 25 Year = 1.14	+ 0.06 - 0.39 - 0.89
AP 2 – South	2 Year = 1.35 10 Year = 4.58 25 Year = 7.77	2 Year = 1.18 10 Year = 4.31 25 Year = 7.44	- 0.17 - 0.27 - 0.33
AP 3 – Frontage	2 Year = 0.25 10 Year = 0.38 25 Year = 0.48	2 Year = 0.07 10 Year = 0.14 25 Year = 0.21	- 0.18 - 0.24 - 0.27

The post-development flow rates are below pre-development flowrates for all storms and subcatchments except the 2-year storm from Analysis Point 1. This increase is modeled as 0.06 cubic feet per second which is an insignificant increase. For Analysis Point 2, flow rates were reduced due to detention in the underdrain soil filter. Flows at Analysis Point 3 were reduced due to the smaller size area flowing to the road.

Site drainage from the proposed redevelopment will generally follow the pre-development conditions and will be attenuated within wooded areas of the parcel owned by the Applicant.

7.0 MAINTENANCE PLAN, INSPECTIONS, AND REQUIREMENTS

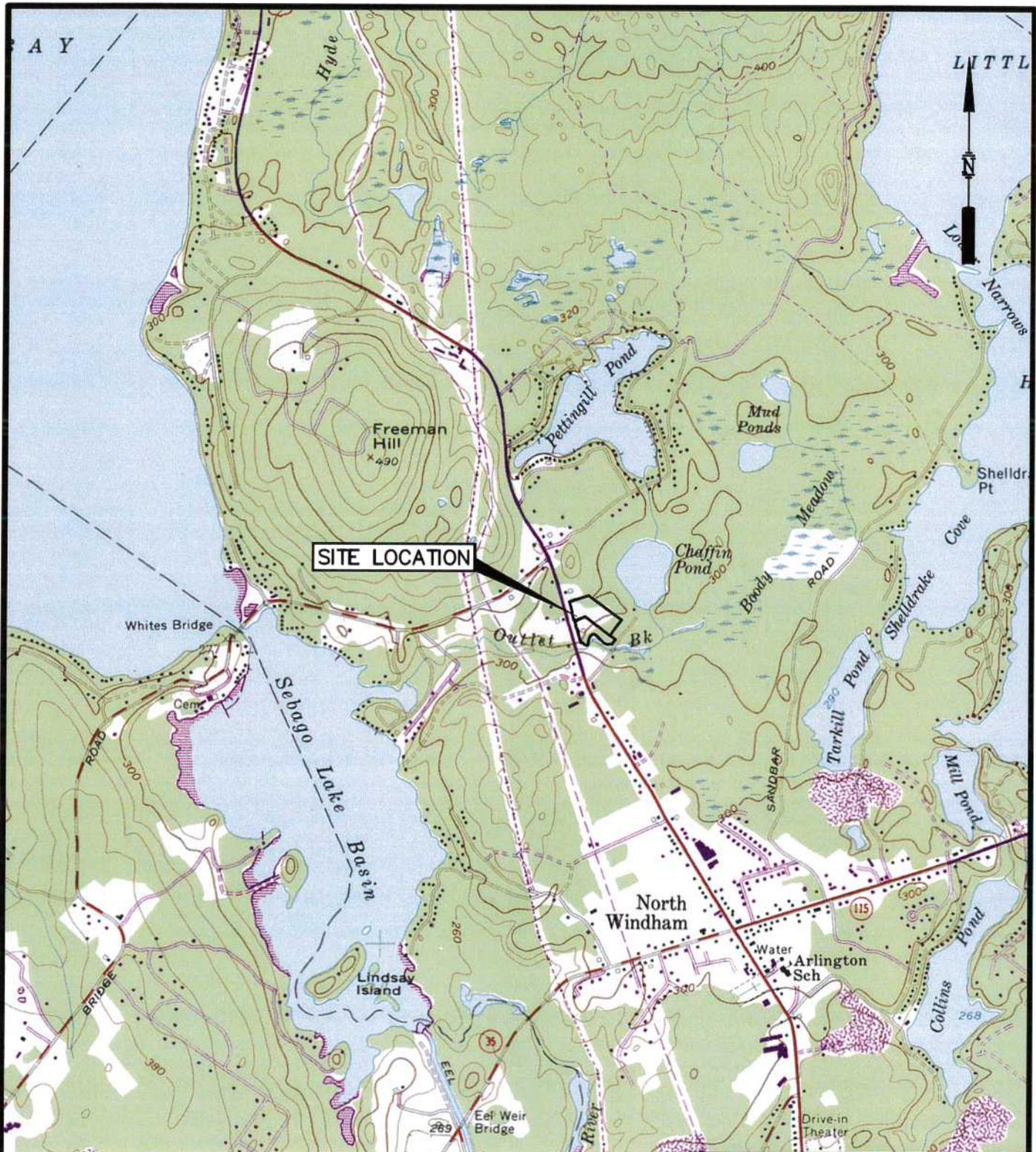
Maintenance of the stormwater control measures will be performed by Owner and those designated by the Owner. A Post-Construction Stormwater Management Plan has been prepared and attached as Appendix G. During construction, the site work contractor (not yet selected) will be responsible for all site maintenance. The Post-Construction Stormwater Management Plan describes the measures to be maintained and includes sample maintenance logs. There are no new drainage easements or deed restrictions proposed.

8.0 CONCLUSION

The stormwater management for the project was designed proactively in accordance with the MEDEP Chapter 500 requirements. The water quality treatment is provided by the underdrained soil filter described in Section 5.0. The peak flows from the property are conveyed to stable wooded areas managed by the Owner. There will be no adverse impact on adjacent properties or downstream drainage as a result of this project. The proposed inspection and maintenance requirements of the site stormwater management measures are detailed in the Post-Construction Stormwater Management Plan.

APPENDIX A

**FIGURE 1 – SITE LOCATION MAP
DRAWING D-100 – PRE-DEVELOPMENT WATERSHED MAP
DRAWING D-101 – POST DEVELOPMENT WATERSHED MAP**



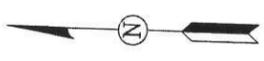
BASE MAP ADAPTED FROM 7.5 MIN USGS TOPO QUADS
 NORTH WINDHAM, ME - 1977



FIGURE 1
SITE LOCATION MAP
PLANNING PROJECT PHASE I
881 ROOSEVELT TRAIL
WINDHAM, MAINE

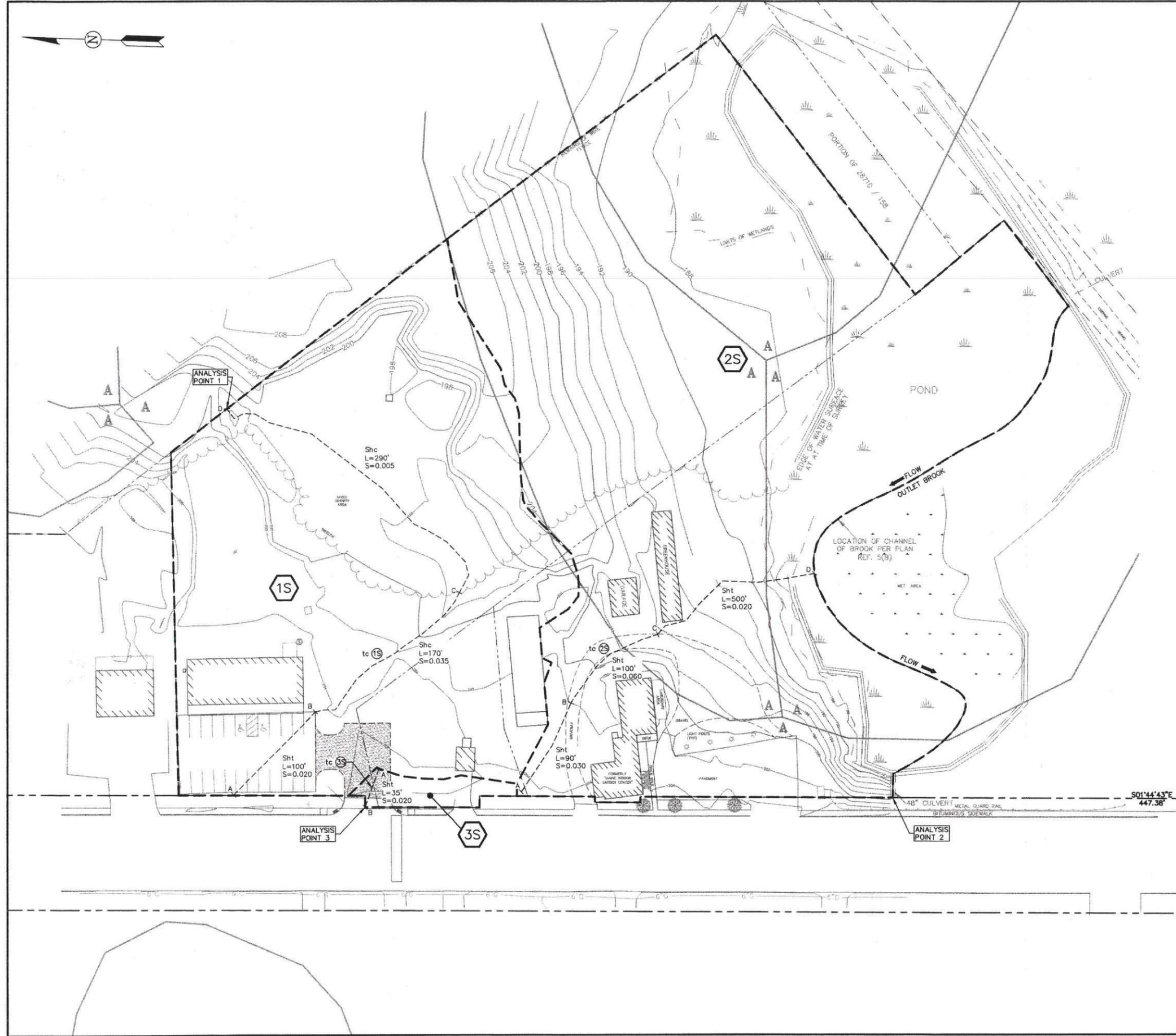


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STORMWATER MANAGEMENT LEGEND

- 1 SUBCATCHMENT DESIGNATION
- SUBCATCHMENT BOUNDARY
- A---B---C TIME OF CONCENTRATION SEGMENT DESIGNATION
TIME OF CONCENTRATION PATH
- HYDROLOGIC SOIL GROUP BOUNDARY
- A HYDROLOGIC SOIL GROUP DESIGNATION
- Sht L=50' S=0.005 TIME OF CONCENTRATION TYPE, LENGTH AND SLOPE. (75% TEXT HT)
- Sht SHEET FLOW
- Shc SHALLOW CONCENTRATED FLOW
- Cf CHANNEL FLOW
- DRAINAGE REACH
- R4 REACH DESIGNATION (HYDROCAD)
- A POND/STRUCTURE DESIGNATION (HYDROCAD)
- tc① TIME OF CONCENTRATION WITH SUBCATCHMENT DESIGNATION

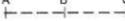


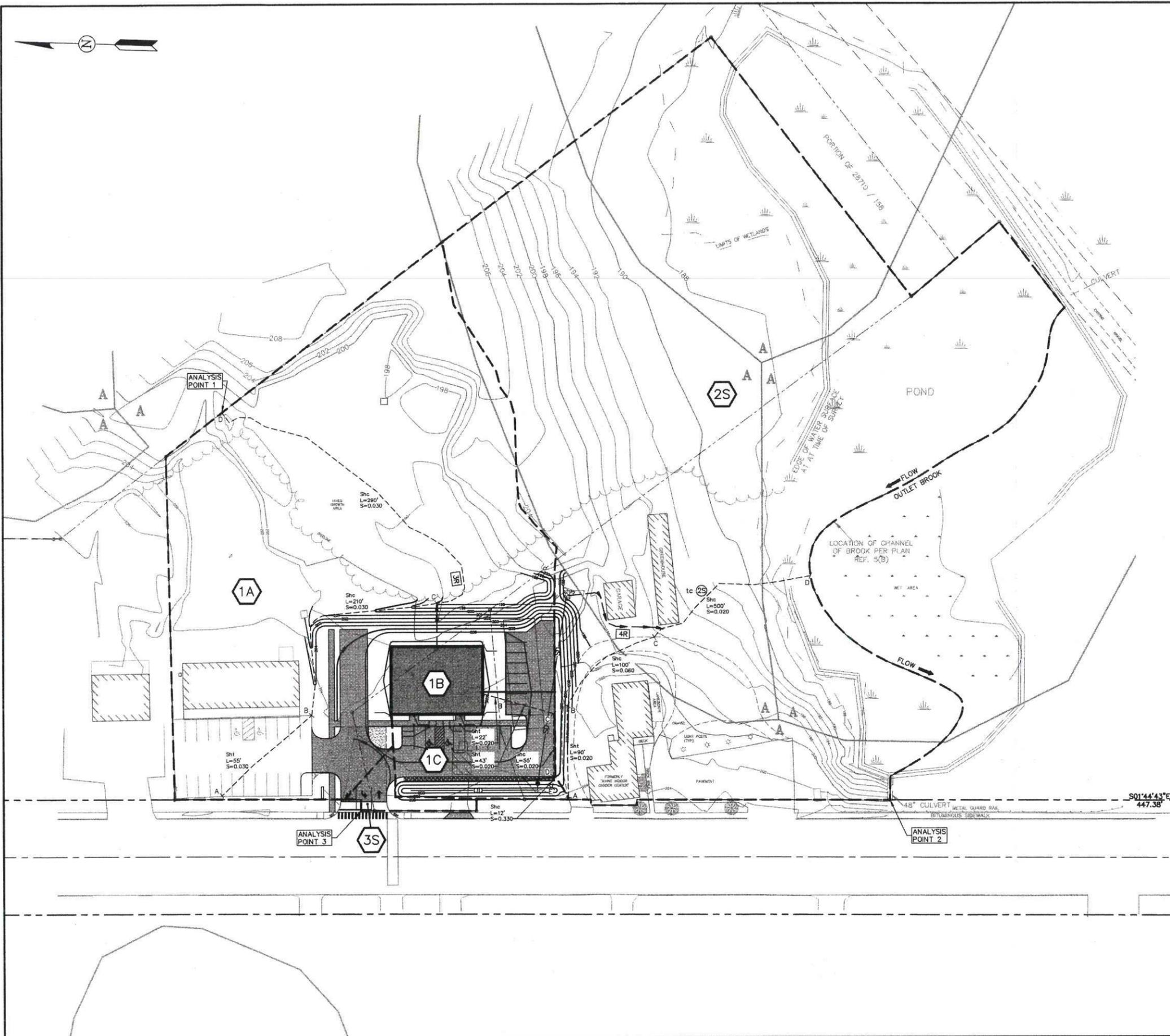
JCM	10/3/16	ISSUED TO TOWN FOR SITE PLAN REVIEW			
REV.	BY	DATE	STATUS		
<p>APPLE ANNIE'S ENTERPRISES, INC THE PLAZA - PHASE I 881 ROOSEVELT TRAIL WINDHAM, MAINE</p> <p>STORMWATER MANAGEMENT PLAN PRE-DEVELOPMENT CONDITIONS</p>					
			<p>SME Sevee & Maher Engineers, Inc.</p> <p>ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE</p> <p>1 Blanchard Road, PO Box 85A, Cumberland Center, Maine 04021 Phone: 207.829.5016 • Fax: 207.829.5692 • www.smeinc.com</p>		
			DESIGN BY: DPD	DRAWN BY: SJM	
			DATE: 9/28/2016	CHECKED BY: <i>[Signature]</i>	
			LMN: SMP-E	CTB: SME-STD	
JOB NO. 15243			DWG FILE BASE		D-100

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STORMWATER MANAGEMENT LEGEND

-  SUBCATCHMENT DESIGNATION
-  SUBCATCHMENT BOUNDARY
-  TIME OF CONCENTRATION SEGMENT DESIGNATION
-  TIME OF CONCENTRATION PATH
-  HYDROLOGIC SOIL GROUP BOUNDARY
-  HYDROLOGIC SOIL GROUP DESIGNATION
-  TIME OF CONCENTRATION TYPE, LENGTH AND SLOPE. (75% TEXT HT)
-  SHEET FLOW
-  SHALLOW CONCENTRATED FLOW
-  CHANNEL FLOW
-  DRAINAGE REACH
-  REACH DESIGNATION (HYDROCAD)
-  POND/STRUCTURE DESIGNATION (HYDROCAD)
-  TIME OF CONCENTRATION WITH SUBCATCHMENT DESIGNATION

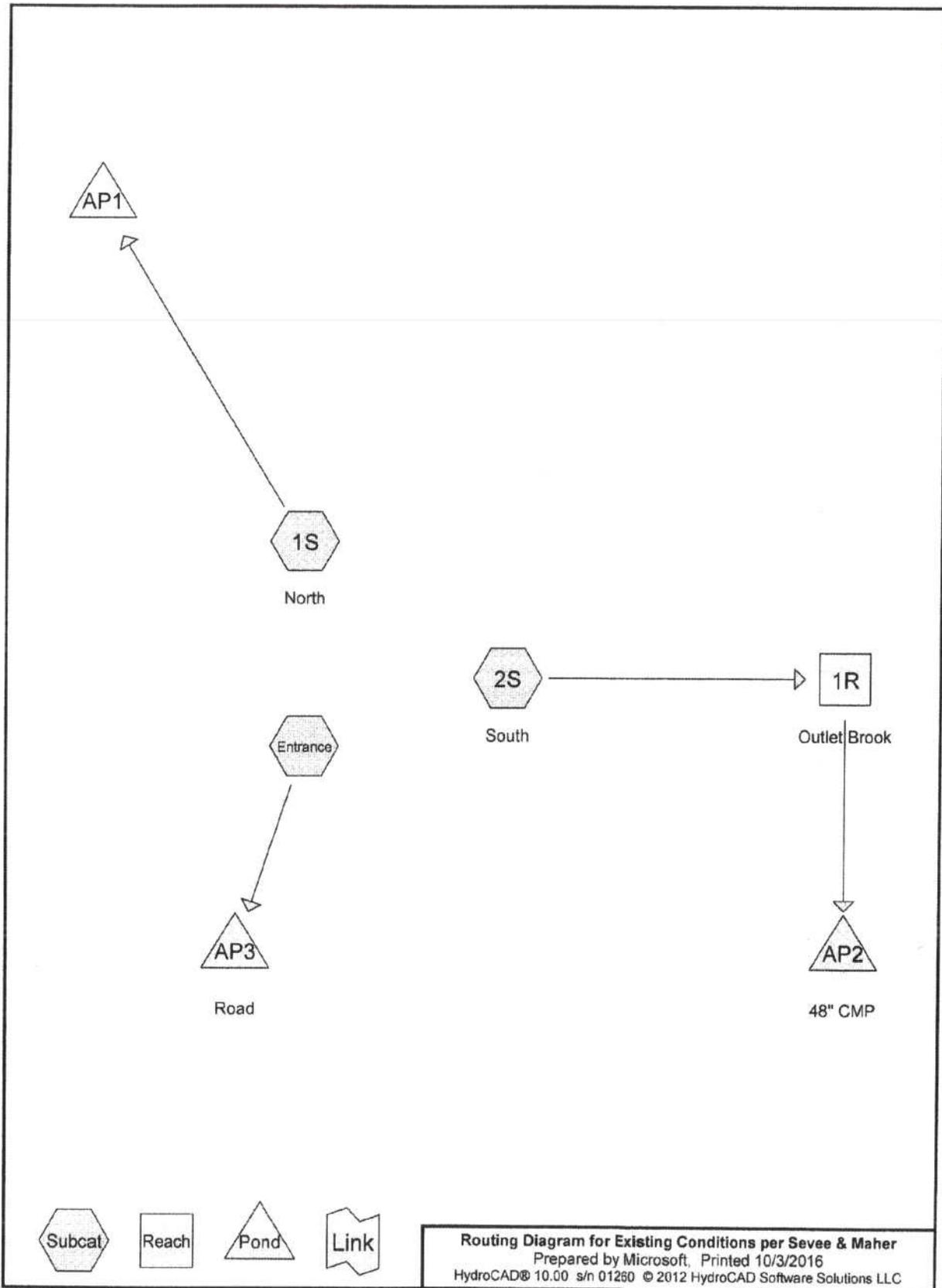


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REV.	BY	DATE	STATUS				
<p>APPLE ANNIE'S ENTERPRISES, INC THE PLAZA - PHASE I 881 ROOSEVELT TRAIL WINDHAM, MAINE</p> <p>STORMWATER MANAGEMENT PLAN POST DEVELOPMENT CONDITIONS</p>							
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		DESIGN BY: DPD		DRAWN BY: SJM		DATE: 9/28/2016	
		CHECKED BY: <i>[Signature]</i>		LMN: SMP-P		CTB: SME-STD	
JOB NO. 15243		DWG FILE BASE		D-101			

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APPENDIX B

PRE-DEVELOPMENT HYDROCAD MODELING



Routing Diagram for Existing Conditions per Sevee & Maher
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Existing Conditions per Sevee & Maher

Prepared by Microsoft

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Type III 24-hr Rainfall=3.10"

Printed 10/3/2016

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Summary for Subcatchment 1S: North

Runoff = 0.06 cfs @ 12.69 hrs, Volume= 0.024 af, Depth> 0.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Type III 24-hr Rainfall=3.10"

Area (ac)	CN	Description
1.173	36	Woods, Fair, HSG A
0.353	98	Paved parking, HSG A
1.019	48	Brush, Poor, HSG A
0.268	68	<50% Grass cover, Poor, HSG A
2.813	51	Weighted Average
2.460		87.45% Pervious Area
0.353		12.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	100	0.0200	0.75		Sheet Flow, 100'SF on Pavement n= 0.024 P2= 3.30"
2.2	170	0.0350	1.31		Shallow Concentrated Flow, 170' SCF on Grass Short Grass Pasture Kv= 7.0 fps
13.7	290	0.0050	0.35		Shallow Concentrated Flow, 290' SCF in Woods Woodland Kv= 5.0 fps
18.1	560	Total			

Summary for Subcatchment 2S: South

Runoff = 1.51 cfs @ 12.30 hrs, Volume= 0.179 af, Depth> 0.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Type III 24-hr Rainfall=3.10"

Area (ac)	CN	Description
0.638	79	Woods, Fair, HSG D
0.288	78	Meadow, non-grazed, HSG D
1.223	83	Brush, Poor, HSG D
1.433	36	Woods, Fair, HSG A
0.739	49	50-75% Grass cover, Fair, HSG A
0.445	98	Paved parking, HSG A
4.766	64	Weighted Average
4.321		90.66% Pervious Area
0.445		9.34% Impervious Area

Existing Conditions per Sevee & Maher

Type III 24-hr Rainfall=3.10"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	90	0.0300	0.20		Sheet Flow, 90' SF on Grass Grass: Short n= 0.150 P2= 3.30"
0.4	100	0.0600	3.94		Shallow Concentrated Flow, 100' SCF on Gravel Drive Unpaved Kv= 16.1 fps
8.4	500	0.0200	0.99		Shallow Concentrated Flow, 500' SCF on grass Short Grass Pasture Kv= 7.0 fps
16.3	690	Total			

Summary for Subcatchment Entrance:

Runoff = 0.25 cfs @ 12.01 hrs, Volume= 0.017 af, Depth> 2.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.10"

Area (ac)	CN	Description
0.075	98	Paved parking, HSG A
0.075		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	35	0.0200	0.61		Sheet Flow, 35' SF on Pavement n= 0.024 P2= 3.30"

Summary for Reach 1R: Outlet Brook

Inflow Area = 4.766 ac, 9.34% Impervious, Inflow Depth > 0.45"
Inflow = 1.51 cfs @ 12.30 hrs, Volume= 0.179 af
Outflow = 1.35 cfs @ 12.56 hrs, Volume= 0.176 af, Atten= 10%, Lag= 15.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.61 fps, Min. Travel Time= 7.4 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 13.0 min

Peak Storage= 603 cf @ 12.43 hrs
Average Depth at Peak Storage= 0.85'
Bank-Full Depth= 2.00' Flow Area= 8.0 sf, Capacity= 7.95 cfs

6.00' x 2.00' deep Parabolic Channel, n= 0.070 Sluggish weedy reaches w/pools
Length= 270.0' Slope= 0.0020 '/'
Inlet Invert= 185.00', Outlet Invert= 184.46'



Existing Conditions per Sevee & Maher

Type III 24-hr Rainfall=3.10"

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Summary for Pond AP1:

Inflow Area = 2.813 ac, 12.55% Impervious, Inflow Depth > 0.10"
Inflow = 0.06 cfs @ 12.69 hrs, Volume= 0.024 af
Primary = 0.06 cfs @ 12.69 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond AP2: 48" CMP

Inflow Area = 4.766 ac, 9.34% Impervious, Inflow Depth > 0.44"
Inflow = 1.35 cfs @ 12.56 hrs, Volume= 0.176 af
Primary = 1.35 cfs @ 12.56 hrs, Volume= 0.176 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond AP3: Road

Inflow Area = 0.075 ac, 100.00% Impervious, Inflow Depth > 2.68"
Inflow = 0.25 cfs @ 12.01 hrs, Volume= 0.017 af
Primary = 0.25 cfs @ 12.01 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Existing Conditions per Sevee & Maher

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Type III 24-hr Rainfall=4.60"

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Page 1

Summary for Subcatchment 1S: North

Runoff = 0.82 cfs @ 12.39 hrs, Volume= 0.118 af, Depth> 0.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=4.60"

Area (ac)	CN	Description
1.173	36	Woods, Fair, HSG A
0.353	98	Paved parking, HSG A
1.019	48	Brush, Poor, HSG A
0.268	68	<50% Grass cover, Poor, HSG A
2.813	51	Weighted Average
2.460		87.45% Pervious Area
0.353		12.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	100	0.0200	0.75		Sheet Flow, 100'SF on Pavement n= 0.024 P2= 3.30"
2.2	170	0.0350	1.31		Shallow Concentrated Flow, 170' SCF on Grass Short Grass Pasture Kv= 7.0 fps
13.7	290	0.0050	0.35		Shallow Concentrated Flow, 290' SCF in Woods Woodland Kv= 5.0 fps
18.1	560	Total			

Summary for Subcatchment 2S: South

Runoff = 4.94 cfs @ 12.25 hrs, Volume= 0.476 af, Depth> 1.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=4.60"

Area (ac)	CN	Description
0.638	79	Woods, Fair, HSG D
0.288	78	Meadow, non-grazed, HSG D
1.223	83	Brush, Poor, HSG D
1.433	36	Woods, Fair, HSG A
0.739	49	50-75% Grass cover, Fair, HSG A
0.445	98	Paved parking, HSG A
4.766	64	Weighted Average
4.321		90.66% Pervious Area
0.445		9.34% Impervious Area

Existing Conditions per Sevee & Maher

Type III 24-hr Rainfall=4.60"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	90	0.0300	0.20		Sheet Flow, 90' SF on Grass Grass: Short n= 0.150 P2= 3.30"
0.4	100	0.0600	3.94		Shallow Concentrated Flow, 100' SCF on Gravel Drive Unpaved Kv= 16.1 fps
8.4	500	0.0200	0.99		Shallow Concentrated Flow, 500' SCF on grass Short Grass Pasture Kv= 7.0 fps
16.3	690	Total			

Summary for Subcatchment Entrance:

Runoff = 0.38 cfs @ 12.01 hrs, Volume= 0.025 af, Depth> 4.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=4.60"

Area (ac)	CN	Description
0.075	98	Paved parking, HSG A
0.075		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	35	0.0200	0.61		Sheet Flow, 35' SF on Pavement n= 0.024 P2= 3.30"

Summary for Reach 1R: Outlet Brook

Inflow Area = 4.766 ac, 9.34% Impervious, Inflow Depth > 1.20"
Inflow = 4.94 cfs @ 12.25 hrs, Volume= 0.476 af
Outflow = 4.58 cfs @ 12.42 hrs, Volume= 0.471 af, Atten= 7%, Lag= 9.9 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.85 fps, Min. Travel Time= 5.3 min
Avg. Velocity = 0.43 fps, Avg. Travel Time= 10.5 min

Peak Storage= 1,453 cf @ 12.32 hrs
Average Depth at Peak Storage= 1.54'
Bank-Full Depth= 2.00' Flow Area= 8.0 sf, Capacity= 7.95 cfs

6.00' x 2.00' deep Parabolic Channel, n= 0.070 Sluggish weedy reaches w/pools
Length= 270.0' Slope= 0.0020 '/
Inlet Invert= 185.00', Outlet Invert= 184.46'



Existing Conditions per Sevee & Maher

Prepared by Microsoft

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Type III 24-hr Rainfall=4.60"

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Page 3

Summary for Pond AP1:

Inflow Area = 2.813 ac, 12.55% Impervious, Inflow Depth > 0.50"
Inflow = 0.82 cfs @ 12.39 hrs, Volume= 0.118 af
Primary = 0.82 cfs @ 12.39 hrs, Volume= 0.118 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond AP2: 48" CMP

Inflow Area = 4.766 ac, 9.34% Impervious, Inflow Depth > 1.19"
Inflow = 4.58 cfs @ 12.42 hrs, Volume= 0.471 af
Primary = 4.58 cfs @ 12.42 hrs, Volume= 0.471 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond AP3: Road

Inflow Area = 0.075 ac, 100.00% Impervious, Inflow Depth > 4.05"
Inflow = 0.38 cfs @ 12.01 hrs, Volume= 0.025 af
Primary = 0.38 cfs @ 12.01 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Existing Conditions per Sevee & Maher

Type III 24-hr Rainfall=5.80"

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Summary for Subcatchment 1S: North

Runoff = 2.03 cfs @ 12.31 hrs, Volume= 0.231 af, Depth> 0.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.80"

Area (ac)	CN	Description
1.173	36	Woods, Fair, HSG A
0.353	98	Paved parking, HSG A
1.019	48	Brush, Poor, HSG A
0.268	68	<50% Grass cover, Poor, HSG A
2.813	51	Weighted Average
2.460		87.45% Pervious Area
0.353		12.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	100	0.0200	0.75		Sheet Flow, 100'SF on Pavement n= 0.024 P2= 3.30"
2.2	170	0.0350	1.31		Shallow Concentrated Flow, 170' SCF on Grass Short Grass Pasture Kv= 7.0 fps
13.7	290	0.0050	0.35		Shallow Concentrated Flow, 290' SCF in Woods Woodland Kv= 5.0 fps
18.1	560	Total			

Summary for Subcatchment 2S: South

Runoff = 8.31 cfs @ 12.24 hrs, Volume= 0.769 af, Depth> 1.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.80"

Area (ac)	CN	Description
0.638	79	Woods, Fair, HSG D
0.288	78	Meadow, non-grazed, HSG D
1.223	83	Brush, Poor, HSG D
1.433	36	Woods, Fair, HSG A
0.739	49	50-75% Grass cover, Fair, HSG A
0.445	98	Paved parking, HSG A
4.766	64	Weighted Average
4.321		90.66% Pervious Area
0.445		9.34% Impervious Area

Existing Conditions per Sevee & Maher

Type III 24-hr Rainfall=5.80"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	90	0.0300	0.20		Sheet Flow, 90' SF on Grass Grass: Short n= 0.150 P2= 3.30"
0.4	100	0.0600	3.94		Shallow Concentrated Flow, 100' SCF on Gravel Drive Unpaved Kv= 16.1 fps
8.4	500	0.0200	0.99		Shallow Concentrated Flow, 500' SCF on grass Short Grass Pasture Kv= 7.0 fps
16.3	690	Total			

Summary for Subcatchment Entrance:

Runoff = 0.48 cfs @ 12.01 hrs, Volume= 0.032 af, Depth> 5.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.80"

Area (ac)	CN	Description
0.075	98	Paved parking, HSG A
0.075		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	35	0.0200	0.61		Sheet Flow, 35' SF on Pavement n= 0.024 P2= 3.30"

Summary for Reach 1R: Outlet Brook

Inflow Area = 4.766 ac, 9.34% Impervious, Inflow Depth > 1.94"
Inflow = 8.31 cfs @ 12.24 hrs, Volume= 0.769 af
Outflow = 7.77 cfs @ 12.38 hrs, Volume= 0.763 af, Atten= 6%, Lag= 8.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.99 fps, Min. Travel Time= 4.5 min
Avg. Velocity = 0.47 fps, Avg. Travel Time= 9.5 min

Peak Storage= 2,142 cf @ 12.30 hrs
Average Depth at Peak Storage= 1.99'
Bank-Full Depth= 2.00' Flow Area= 8.0 sf, Capacity= 7.95 cfs

6.00' x 2.00' deep Parabolic Channel, n= 0.070 Sluggish weedy reaches w/pools
Length= 270.0' Slope= 0.0020 '/'
Inlet Invert= 185.00', Outlet Invert= 184.46'



Existing Conditions per Sevee & Maher

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Type III 24-hr Rainfall=5.80"

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Summary for Pond AP1:

Inflow Area = 2.813 ac, 12.55% Impervious, Inflow Depth > 0.99"
Inflow = 2.03 cfs @ 12.31 hrs, Volume= 0.231 af
Primary = 2.03 cfs @ 12.31 hrs, Volume= 0.231 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond AP2: 48" CMP

Inflow Area = 4.766 ac, 9.34% Impervious, Inflow Depth > 1.92"
Inflow = 7.77 cfs @ 12.38 hrs, Volume= 0.763 af
Primary = 7.77 cfs @ 12.38 hrs, Volume= 0.763 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

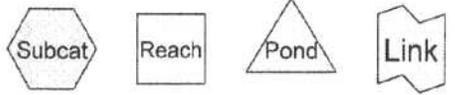
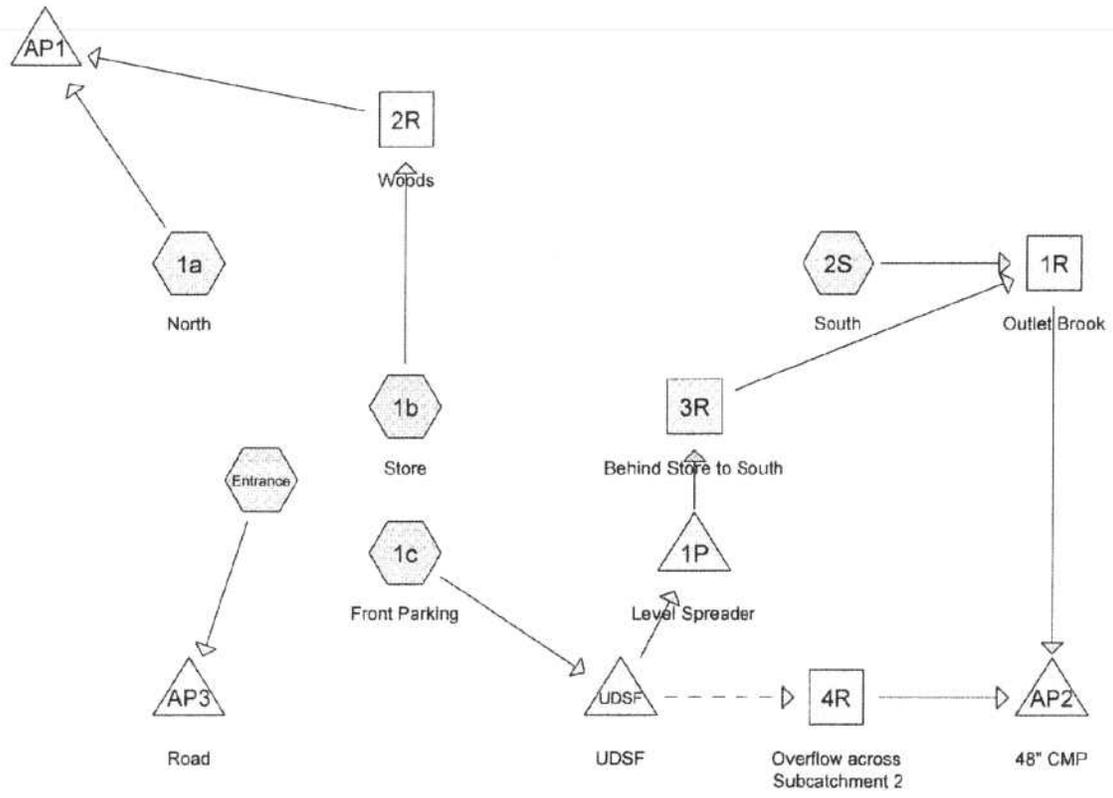
Summary for Pond AP3: Road

Inflow Area = 0.075 ac, 100.00% Impervious, Inflow Depth > 5.15"
Inflow = 0.48 cfs @ 12.01 hrs, Volume= 0.032 af
Primary = 0.48 cfs @ 12.01 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

APPENDIX C

POST-DEVELOPMENT HYDROCAD MODELING



Routing Diagram for Proposed per Sevee & Maher
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Type III 24-hr Rainfall=3.10"

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Summary for Subcatchment 1a: North

Runoff = 0.02 cfs @ 15.11 hrs, Volume= 0.011 af, Depth> 0.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.10"

Area (ac)	CN	Description
1.173	36	Woods, Fair, HSG A
0.476	98	Paved parking, HSG A
0.436	35	Brush, Fair, HSG A
0.446	39	>75% Grass cover, Good, HSG A
2.531	48	Weighted Average
2.055		81.19% Pervious Area
0.476		18.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	55	0.0300	0.78		Sheet Flow, 55'SF on Pavement n= 0.024 P2= 3.30"
2.9	210	0.0300	1.21		Shallow Concentrated Flow, 210' SCF on Dense Grass Short Grass Pasture Kv= 7.0 fps
27.3	290	0.0050	0.18		Shallow Concentrated Flow, 290' SCF in Woods Forest w/Heavy Litter Kv= 2.5 fps
31.4	555	Total			

Summary for Subcatchment 1b: Store

Runoff = 0.33 cfs @ 12.07 hrs, Volume= 0.025 af, Depth> 2.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.10"

Area (ac)	CN	Description
0.110	98	Roofs, HSG A
0.110		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,
0.2	60	0.0200	4.78	0.94	Pipe Channel, Roof Leader 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.011 PVC, smooth interior
5.2	60	Total			

Proposed per Sevee & Maher

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Type III 24-hr Rainfall=3.10"

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Summary for Subcatchment 1c: Front Parking

Runoff = 0.38 cfs @ 12.07 hrs, Volume= 0.025 af, Depth> 1.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.10"

Area (ac)	CN	Description
0.176	98	Paved parking, HSG A
0.091	39	>75% Grass cover, Good, HSG A
0.267	78	Weighted Average
0.091		34.08% Pervious Area
0.176		65.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	22	0.0200	0.13		Sheet Flow, 22' SF on Grass Grass: Short n= 0.150 P2= 3.30"
1.1	43	0.0200	0.63		Sheet Flow, 43' SF on Pavement n= 0.024 P2= 3.30"
0.5	55	0.0100	2.03		Shallow Concentrated Flow, 55' SCF along Curb Paved Kv= 20.3 fps
0.0	12	0.3300	8.62		Shallow Concentrated Flow, 12' SCF into Soil Filter Grassed Waterway Kv= 15.0 fps
4.5	132	Total			

Summary for Subcatchment 2S: South

Runoff = 1.31 cfs @ 12.31 hrs, Volume= 0.163 af, Depth> 0.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.10"

Area (ac)	CN	Description
0.638	79	Woods, Fair, HSG D
0.288	78	Meadow, non-grazed, HSG D
1.223	83	Brush, Poor, HSG D
1.433	36	Woods, Fair, HSG A
0.063	49	50-75% Grass cover, Fair, HSG A
0.445	98	Paved parking, HSG A
0.611	39	>75% Grass cover, Good, HSG A
4.701	63	Weighted Average
4.256		90.53% Pervious Area
0.445		9.47% Impervious Area

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Type III 24-hr Rainfall=3.10"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	90	0.0300	0.20		Sheet Flow, 100' SF on Grass Grass: Short n= 0.150 P2= 3.30"
0.4	100	0.0600	3.94		Shallow Concentrated Flow, 100' SCF on Gravel Drive Unpaved Kv= 16.1 fps
8.4	500	0.0200	0.99		Shallow Concentrated Flow, 500' SCF on grass Short Grass Pasture Kv= 7.0 fps
16.3	690	Total			

Summary for Subcatchment Entrance:

Runoff = 0.07 cfs @ 12.02 hrs, Volume= 0.004 af, Depth> 0.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.10"

Area (ac)	CN	Description
0.031	98	Paved parking, HSG A
0.018	39	>75% Grass cover, Good, HSG A
0.049	76	Weighted Average
0.018		36.73% Pervious Area
0.031		63.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	35	0.0200	0.61		Sheet Flow, 35' SF on Pavement n= 0.024 P2= 3.30"

Summary for Reach 1R: Outlet Brook

Inflow Area = 4.968 ac, 12.50% Impervious, Inflow Depth > 0.44"

Inflow = 1.31 cfs @ 12.31 hrs, Volume= 0.184 af

Outflow = 1.18 cfs @ 12.59 hrs, Volume= 0.181 af, Atten= 10%, Lag= 16.9 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Max. Velocity= 0.58 fps, Min. Travel Time= 7.7 min

Avg. Velocity = 0.35 fps, Avg. Travel Time= 12.8 min

Peak Storage= 549 cf @ 12.46 hrs

Average Depth at Peak Storage= 0.80'

Bank-Full Depth= 2.00' Flow Area= 8.0 sf, Capacity= 7.95 cfs

6.00' x 2.00' deep Parabolic Channel, n= 0.070 Sluggish weedy reaches w/pools

Length= 270.0' Slope= 0.0020 '/'

Inlet Invert= 185.00', Outlet Invert= 184.46'

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Type III 24-hr Rainfall=3.10"

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Summary for Reach 2R: Woods

Inflow Area = 0.110 ac, 100.00% Impervious, Inflow Depth > 2.68"
Inflow = 0.33 cfs @ 12.07 hrs, Volume= 0.025 af
Outflow = 0.10 cfs @ 13.43 hrs, Volume= 0.023 af, Atten= 69%, Lag= 81.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.08 fps, Min. Travel Time= 62.9 min
Avg. Velocity = 0.05 fps, Avg. Travel Time= 104.5 min

Peak Storage= 382 cf @ 12.38 hrs
Average Depth at Peak Storage= 0.25'
Bank-Full Depth= 0.10' Flow Area= 0.4 sf, Capacity= 0.02 cfs

6.00' x 0.10' deep Parabolic Channel, n= 0.800 Sheet flow: Woods+dense brush
Length= 300.0' Slope= 0.0400 '/'
Inlet Invert= 198.00', Outlet Invert= 186.00'



‡

Summary for Reach 3R: Behind Store to South

Inflow Area = 0.267 ac, 65.92% Impervious, Inflow Depth > 1.00"
Inflow = 0.29 cfs @ 12.05 hrs, Volume= 0.022 af
Outflow = 0.15 cfs @ 12.80 hrs, Volume= 0.021 af, Atten= 47%, Lag= 44.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.16 fps, Min. Travel Time= 26.5 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 45.7 min

Peak Storage= 243 cf @ 12.35 hrs
Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 0.10' Flow Area= 0.7 sf, Capacity= 0.09 cfs

10.00' x 0.10' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 250.0' Slope= 0.0510 '/'
Inlet Invert= 198.75', Outlet Invert= 186.00'



‡

Summary for Reach 4R: Overflow across Subcatchment 2

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 5.00 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 0.25' Flow Area= 1.0 sf, Capacity= 2.93 cfs

6.00' x 0.25' deep Parabolic Channel, n= 0.035 High grass
 Length= 340.0' Slope= 0.0522 '/'
 Inlet Invert= 203.75', Outlet Invert= 186.00'



‡

Summary for Pond 1P: Level Spreader

Inflow Area = 0.267 ac, 65.92% Impervious, Inflow Depth > 1.10"
 Inflow = 0.28 cfs @ 12.14 hrs, Volume= 0.025 af
 Outflow = 0.29 cfs @ 12.05 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.29 cfs @ 12.05 hrs, Volume= 0.022 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 198.80' @ 12.05 hrs Surf.Area= 180 sf Storage= 112 cf

Plug-Flow detention time=44.5 min calculated for 0.022 af (90% of inflow)
 Center-of-Mass det. time= 13.2 min (822.9 - 809.7)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	150 cf	Custom Stage Data (Prismatic) listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
198.00	100	0	0
199.00	200	150	150

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Type III 24-hr Rainfall=3.10"

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Device	Routing	Invert	Outlet Devices
#1	Primary	198.75'	10.0' long x 6.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=0.29 cfs @ 12.05 hrs HW=198.80' (Free Discharge)
←1=Broad-Crested Rectangular Weir (Weir Controls 0.29 cfs @ 0.54 fps)

Summary for Pond AP1:

Inflow Area = 2.641 ac, 22.19% Impervious, Inflow Depth > 0.15"
Inflow = 0.12 cfs @ 13.48 hrs, Volume= 0.034 af
Primary = 0.12 cfs @ 13.48 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond AP2: 48" CMP

Inflow Area = 4.968 ac, 12.50% Impervious, Inflow Depth > 0.44"
Inflow = 1.18 cfs @ 12.59 hrs, Volume= 0.181 af
Primary = 1.18 cfs @ 12.59 hrs, Volume= 0.181 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond AP3: Road

Inflow Area = 0.049 ac, 63.27% Impervious, Inflow Depth > 0.99"
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

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond UDSF: UDSF

Inflow Area = 0.267 ac, 65.92% Impervious, Inflow Depth > 1.10"
Inflow = 0.38 cfs @ 12.07 hrs, Volume= 0.025 af
Outflow = 0.28 cfs @ 12.14 hrs, Volume= 0.025 af, Atten= 25%, Lag= 4.2 min
Primary = 0.28 cfs @ 12.14 hrs, Volume= 0.025 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 202.07' @ 12.14 hrs Surf.Area= 601 sf Storage= 40 cf

Plug-Flow detention time= 1.0 min calculated for 0.025 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (809.7 - 808.8)

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Type III 24-hr Rainfall=3.10"

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Volume	Invert	Avail.Storage	Storage Description
#1	202.00'	4,087 cf	Custom Stage Data (Prismatic) listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
202.00	542	0	0
203.00	1,395	969	969
204.00	2,300	1,848	2,816
204.50	2,785	1,271	4,087

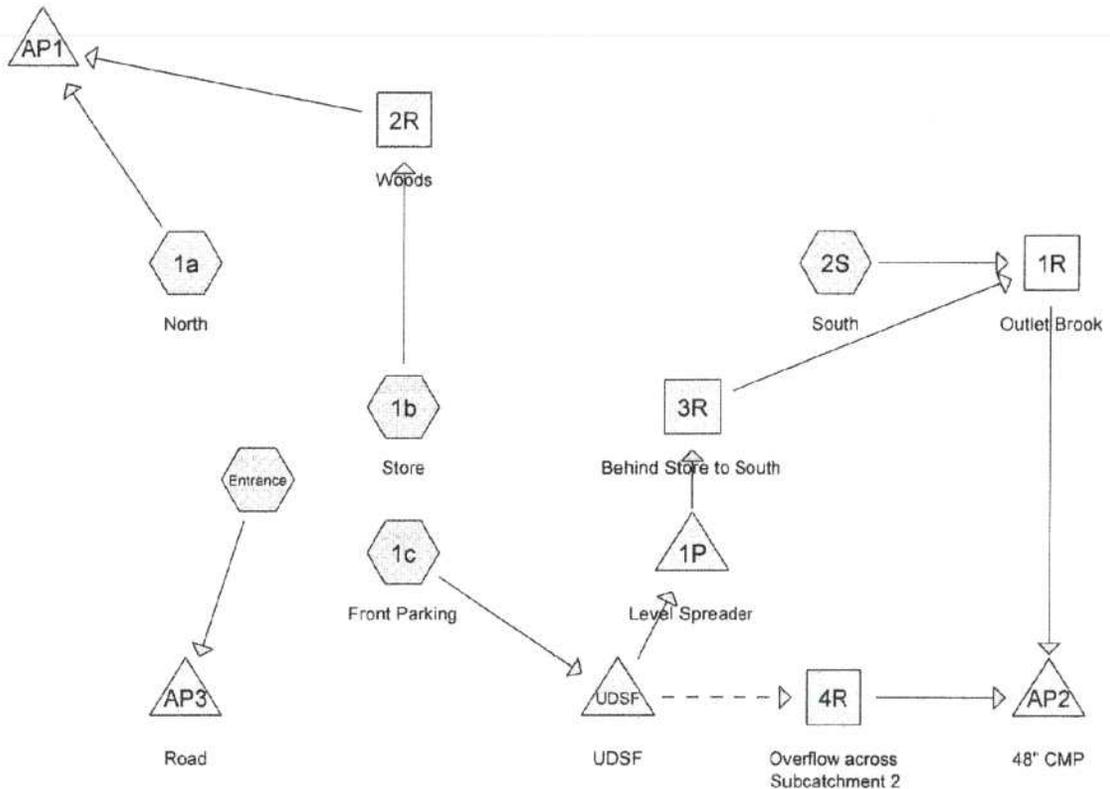
Device	Routing	Invert	Outlet Devices
#1	Primary	199.83'	4.0" Round Culvert L= 162.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 199.83' / 198.90' S= 0.0057 ' / S= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.09 sf
#2	Secondary	203.75'	10.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=0.28 cfs @ 12.14 hrs HW=202.07' (Free Discharge)

↑1=Culvert (Barrel Controls 0.28 cfs @ 3.25 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=202.00' (Free Discharge)

↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)



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Type III 24-hr Rainfall=4.60"

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Summary for Subcatchment 1a: North

Runoff = 0.39 cfs @ 12.66 hrs, Volume= 0.079 af, Depth> 0.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=4.60"

Area (ac)	CN	Description
1.173	36	Woods, Fair, HSG A
0.476	98	Paved parking, HSG A
0.436	35	Brush, Fair, HSG A
0.446	39	>75% Grass cover, Good, HSG A
2.531	48	Weighted Average
2.055		81.19% Pervious Area
0.476		18.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	55	0.0300	0.78		Sheet Flow, 55'SF on Pavement n= 0.024 P2= 3.30"
2.9	210	0.0300	1.21		Shallow Concentrated Flow, 210' SCF on Dense Grass Short Grass Pasture Kv= 7.0 fps
27.3	290	0.0050	0.18		Shallow Concentrated Flow, 290' SCF in Woods Forest w/Heavy Litter Kv= 2.5 fps
31.4	555	Total			

Summary for Subcatchment 1b: Store

Runoff = 0.49 cfs @ 12.07 hrs, Volume= 0.037 af, Depth> 4.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=4.60"

Area (ac)	CN	Description
0.110	98	Roofs, HSG A
0.110		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,
0.2	60	0.0200	4.78	0.94	Pipe Channel, Roof Leader 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.011 PVC, smooth interior
5.2	60	Total			

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Type III 24-hr Rainfall=4.60"

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Summary for Subcatchment 1c: Front Parking

Runoff = 0.76 cfs @ 12.07 hrs, Volume= 0.049 af, Depth> 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Type III 24-hr Rainfall=4.60"

Area (ac)	CN	Description
0.176	98	Paved parking, HSG A
0.091	39	>75% Grass cover, Good, HSG A
0.267	78	Weighted Average
0.091		34.08% Pervious Area
0.176		65.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	22	0.0200	0.13		Sheet Flow, 22' SF on Grass Grass: Short n= 0.150 P2= 3.30"
1.1	43	0.0200	0.63		Sheet Flow, 43' SF on Pavement n= 0.024 P2= 3.30"
0.5	55	0.0100	2.03		Shallow Concentrated Flow, 55' SCF along Curb Paved Kv= 20.3 fps
0.0	12	0.3300	8.62		Shallow Concentrated Flow, 12' SCF into Soil Filter Grassed Waterway Kv= 15.0 fps
4.5	132	Total			

Summary for Subcatchment 2S: South

Runoff = 4.57 cfs @ 12.25 hrs, Volume= 0.445 af, Depth> 1.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Type III 24-hr Rainfall=4.60"

Area (ac)	CN	Description
0.638	79	Woods, Fair, HSG D
0.288	78	Meadow, non-grazed, HSG D
1.223	83	Brush, Poor, HSG D
1.433	36	Woods, Fair, HSG A
0.063	49	50-75% Grass cover, Fair, HSG A
0.445	98	Paved parking, HSG A
0.611	39	>75% Grass cover, Good, HSG A
4.701	63	Weighted Average
4.256		90.53% Pervious Area
0.445		9.47% Impervious Area

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Type III 24-hr Rainfall=4.60"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	90	0.0300	0.20		Sheet Flow, 100' SF on Grass Grass: Short n= 0.150 P2= 3.30"
0.4	100	0.0600	3.94		Shallow Concentrated Flow, 100' SCF on Gravel Drive Unpaved Kv= 16.1 fps
8.4	500	0.0200	0.99		Shallow Concentrated Flow, 500' SCF on grass Short Grass Pasture Kv= 7.0 fps
16.3	690	Total			

Summary for Subcatchment Entrance:

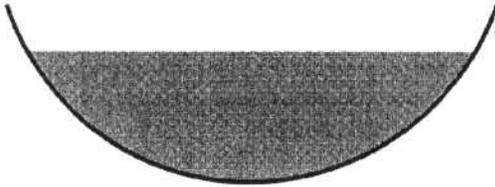
Runoff = 0.14 cfs @ 12.02 hrs, Volume= 0.008 af, Depth > 2.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=4.60"

Area (ac)	CN	Description
0.031	98	Paved parking, HSG A
0.018	39	>75% Grass cover, Good, HSG A
0.049	76	Weighted Average
0.018		36.73% Pervious Area
0.031		63.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	35	0.0200	0.61		Sheet Flow, 35' SF on Pavement n= 0.024 P2= 3.30"

Summary for Reach 1R: Outlet BrookInflow Area = 4.968 ac, 12.50% Impervious, Inflow Depth > 1.18"
Inflow = 4.65 cfs @ 12.26 hrs, Volume= 0.491 af
Outflow = 4.31 cfs @ 12.42 hrs, Volume= 0.486 af, Atten= 7%, Lag= 10.1 minRouting by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.84 fps, Min. Travel Time= 5.4 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 10.3 minPeak Storage= 1,386 cf @ 12.33 hrs
Average Depth at Peak Storage= 1.49'
Bank-Full Depth= 2.00' Flow Area= 8.0 sf, Capacity= 7.95 cfs6.00' x 2.00' deep Parabolic Channel, n= 0.070 Sluggish weedy reaches w/pools
Length= 270.0' Slope= 0.0020 '/'
Inlet Invert= 185.00', Outlet Invert= 184.46'



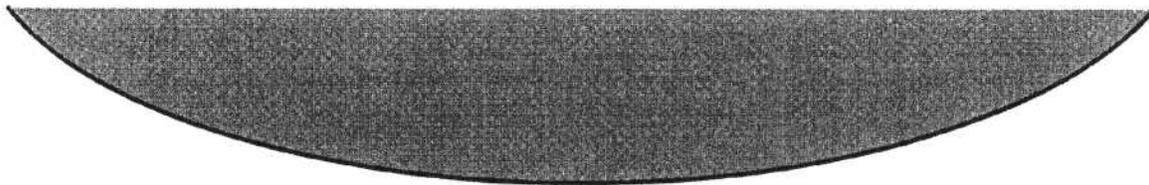
Summary for Reach 2R: Woods

Inflow Area = 0.110 ac, 100.00% Impervious, Inflow Depth > 4.05"
 Inflow = 0.49 cfs @ 12.07 hrs, Volume= 0.037 af
 Outflow = 0.15 cfs @ 13.39 hrs, Volume= 0.035 af, Atten= 69%, Lag= 79.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.08 fps, Min. Travel Time= 60.9 min
 Avg. Velocity = 0.05 fps, Avg. Travel Time= 92.9 min

Peak Storage= 556 cf @ 12.38 hrs
 Average Depth at Peak Storage= 0.34'
 Bank-Full Depth= 0.10' Flow Area= 0.4 sf, Capacity= 0.02 cfs

6.00' x 0.10' deep Parabolic Channel, n= 0.800 Sheet flow: Woods+dense brush
 Length= 300.0' Slope= 0.0400 '/
 Inlet Invert= 198.00', Outlet Invert= 186.00'



‡

Summary for Reach 3R: Behind Store to South

Inflow Area = 0.267 ac, 65.92% Impervious, Inflow Depth > 2.10"
 Inflow = 0.30 cfs @ 12.31 hrs, Volume= 0.047 af
 Outflow = 0.28 cfs @ 13.25 hrs, Volume= 0.045 af, Atten= 7%, Lag= 56.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.17 fps, Min. Travel Time= 24.0 min
 Avg. Velocity = 0.11 fps, Avg. Travel Time= 38.8 min

Peak Storage= 401 cf @ 12.85 hrs
 Average Depth at Peak Storage= 0.19'
 Bank-Full Depth= 0.10' Flow Area= 0.7 sf, Capacity= 0.09 cfs

10.00' x 0.10' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
 Length= 250.0' Slope= 0.0510 '/
 Inlet Invert= 198.75', Outlet Invert= 186.00'



Summary for Reach 4R: Overflow across Subcatchment 2

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity= 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 5.00 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 0.25' Flow Area= 1.0 sf, Capacity= 2.93 cfs

6.00' x 0.25' deep Parabolic Channel, n= 0.035 High grass
 Length= 340.0' Slope= 0.0522 '/
 Inlet Invert= 203.75', Outlet Invert= 186.00'



Summary for Pond 1P: Level Spreader

Inflow Area = 0.267 ac, 65.92% Impervious, Inflow Depth > 2.21"
 Inflow = 0.30 cfs @ 12.32 hrs, Volume= 0.049 af
 Outflow = 0.30 cfs @ 12.31 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.30 cfs @ 12.31 hrs, Volume= 0.047 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 198.80' @ 12.31 hrs Surf.Area= 180 sf Storage= 113 cf

Plug-Flow detention time= 26.7 min calculated for 0.047 af (95% of inflow)
 Center-of-Mass det. time= 9.5 min (807.6 - 798.2)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	150 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
198.00	100	0	0
199.00	200	150	150

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Type III 24-hr Rainfall=4.60"

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Device	Routing	Invert	Outlet Devices
#1	Primary	198.75'	10.0' long x 6.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=0.30 cfs @ 12.31 hrs HW=198.80' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.30 cfs @ 0.55 fps)

Summary for Pond AP1:

Inflow Area = 2.641 ac, 22.19% Impervious, Inflow Depth > 0.52"
Inflow = 0.43 cfs @ 12.67 hrs, Volume= 0.114 af
Primary = 0.43 cfs @ 12.67 hrs, Volume= 0.114 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond AP2: 48" CMP

Inflow Area = 4.968 ac, 12.50% Impervious, Inflow Depth > 1.17"
Inflow = 4.31 cfs @ 12.42 hrs, Volume= 0.486 af
Primary = 4.31 cfs @ 12.42 hrs, Volume= 0.486 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond AP3: Road

Inflow Area = 0.049 ac, 63.27% Impervious, Inflow Depth > 2.05"
Inflow = 0.14 cfs @ 12.02 hrs, Volume= 0.008 af
Primary = 0.14 cfs @ 12.02 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond UDSF: UDSF

Inflow Area = 0.267 ac, 65.92% Impervious, Inflow Depth > 2.21"
Inflow = 0.76 cfs @ 12.07 hrs, Volume= 0.049 af
Outflow = 0.30 cfs @ 12.32 hrs, Volume= 0.049 af, Atten= 61%, Lag= 14.7 min
Primary = 0.30 cfs @ 12.32 hrs, Volume= 0.049 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 202.40' @ 12.32 hrs Surf.Area= 886 sf Storage= 288 cf

Plug-Flow detention time=(not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.9 min (798.2 - 793.2)

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Type III 24-hr Rainfall=4.60"

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Volume	Invert	Avail.Storage	Storage Description
#1	202.00'	4,087 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
202.00	542	0	0
203.00	1,395	969	969
204.00	2,300	1,848	2,816
204.50	2,785	1,271	4,087

Device	Routing	Invert	Outlet Devices
#1	Primary	199.83'	4.0" Round Culvert L= 162.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 199.83' / 198.90' S= 0.0057 '/ Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.09 sf
#2	Secondary	203.75'	10.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=0.30 cfs @ 12.32 hrs HW=202.40' (Free Discharge)

↳1=Culvert (Barrel Controls 0.30 cfs @ 3.44 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=202.00' (Free Discharge)

↳2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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Type III 24-hr Rainfall=5.80"

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Summary for Subcatchment 1a: North

Runoff = 1.10 cfs @ 12.56 hrs, Volume= 0.167 af, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.80"

Area (ac)	CN	Description
1.173	36	Woods, Fair, HSG A
0.476	98	Paved parking, HSG A
0.436	35	Brush, Fair, HSG A
0.446	39	>75% Grass cover, Good, HSG A
2.531	48	Weighted Average
2.055		81.19% Pervious Area
0.476		18.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	55	0.0300	0.78		Sheet Flow, 55'SF on Pavement n= 0.024 P2= 3.30"
2.9	210	0.0300	1.21		Shallow Concentrated Flow, 210' SCF on Dense Grass Short Grass Pasture Kv= 7.0 fps
27.3	290	0.0050	0.18		Shallow Concentrated Flow, 290' SCF in Woods Forest w/Heavy Litter Kv= 2.5 fps
31.4	555	Total			

Summary for Subcatchment 1b: Store

Runoff = 0.62 cfs @ 12.07 hrs, Volume= 0.047 af, Depth> 5.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.80"

Area (ac)	CN	Description
0.110	98	Roofs, HSG A
0.110		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,
0.2	60	0.0200	4.78	0.94	Pipe Channel, Roof Leader 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.011 PVC, smooth interior
5.2	60	Total			

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Type III 24-hr Rainfall=5.80"

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Summary for Subcatchment 1c: Front Parking

Runoff = 1.09 cfs @ 12.07 hrs, Volume= 0.071 af, Depth> 3.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.80"

Area (ac)	CN	Description
0.176	98	Paved parking, HSG A
0.091	39	>75% Grass cover, Good, HSG A
0.267	78	Weighted Average
0.091		34.08% Pervious Area
0.176		65.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	22	0.0200	0.13		Sheet Flow, 22' SF on Grass Grass: Short n= 0.150 P2= 3.30"
1.1	43	0.0200	0.63		Sheet Flow, 43' SF on Pavement n= 0.024 P2= 3.30"
0.5	55	0.0100	2.03		Shallow Concentrated Flow, 55' SCF along Curb Paved Kv= 20.3 fps
0.0	12	0.3300	8.62		Shallow Concentrated Flow, 12' SCF into Soil Filter Grassed Waterway Kv= 15.0 fps
4.5	132	Total			

Summary for Subcatchment 2S: South

Runoff = 7.82 cfs @ 12.24 hrs, Volume= 0.727 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.80"

Area (ac)	CN	Description
0.638	79	Woods, Fair, HSG D
0.288	78	Meadow, non-grazed, HSG D
1.223	83	Brush, Poor, HSG D
1.433	36	Woods, Fair, HSG A
0.063	49	50-75% Grass cover, Fair, HSG A
0.445	98	Paved parking, HSG A
0.611	39	>75% Grass cover, Good, HSG A
4.701	63	Weighted Average
4.256		90.53% Pervious Area
0.445		9.47% Impervious Area

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Type III 24-hr Rainfall=5.80"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	90	0.0300	0.20		Sheet Flow, 100' SF on Grass Grass: Short n= 0.150 P2= 3.30"
0.4	100	0.0600	3.94		Shallow Concentrated Flow, 100' SCF on Gravel Drive Unpaved Kv= 16.1 fps
8.4	500	0.0200	0.99		Shallow Concentrated Flow, 500' SCF on grass Short Grass Pasture Kv= 7.0 fps
16.3	690	Total			

Summary for Subcatchment Entrance:

Runoff = 0.21 cfs @ 12.02 hrs, Volume= 0.012 af, Depth > 3.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=5.80"

Area (ac)	CN	Description
0.031	98	Paved parking, HSG A
0.018	39	>75% Grass cover, Good, HSG A
0.049	76	Weighted Average
0.018		36.73% Pervious Area
0.031		63.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0	35	0.0200	0.61		Sheet Flow, 35' SF on Pavement n= 0.024 P2= 3.30"

Summary for Reach 1R: Outlet Brook

Inflow Area = 4.968 ac, 12.50% Impervious, Inflow Depth > 1.92"

Inflow = 7.95 cfs @ 12.24 hrs, Volume= 0.794 af

Outflow = 7.44 cfs @ 12.39 hrs, Volume= 0.788 af, Atten= 6%, Lag= 8.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Max. Velocity= 0.98 fps, Min. Travel Time= 4.6 min

Avg. Velocity = 0.48 fps, Avg. Travel Time= 9.4 min

Peak Storage= 2,075 cf @ 12.31 hrs

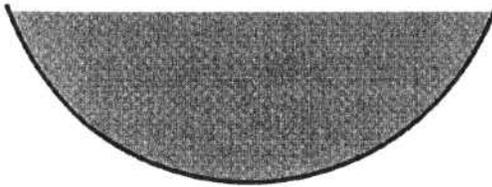
Average Depth at Peak Storage= 1.95'

Bank-Full Depth= 2.00' Flow Area= 8.0 sf, Capacity= 7.95 cfs

6.00' x 2.00' deep Parabolic Channel, n= 0.070 Sluggish weedy reaches w/pools

Length= 270.0' Slope= 0.0020 '/'

Inlet Invert= 185.00', Outlet Invert= 184.46'



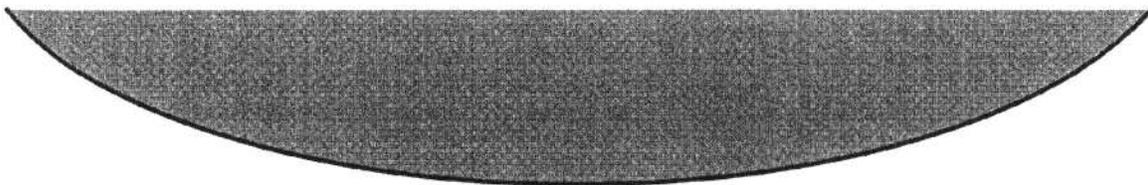
Summary for Reach 2R: Woods

Inflow Area = 0.110 ac, 100.00% Impervious, Inflow Depth > 5.15"
Inflow = 0.62 cfs @ 12.07 hrs, Volume= 0.047 af
Outflow = 0.19 cfs @ 13.38 hrs, Volume= 0.045 af, Atten= 69%, Lag= 78.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.08 fps, Min. Travel Time= 60.1 min
Avg. Velocity = 0.06 fps, Avg. Travel Time= 87.2 min

Peak Storage= 693 cf @ 12.38 hrs
Average Depth at Peak Storage= 0.42'
Bank-Full Depth= 0.10' Flow Area= 0.4 sf, Capacity= 0.02 cfs

6.00' x 0.10' deep Parabolic Channel, n= 0.800 Sheet flow: Woods+dense brush
Length= 300.0' Slope= 0.0400 '/'
Inlet Invert= 198.00', Outlet Invert= 186.00'



‡

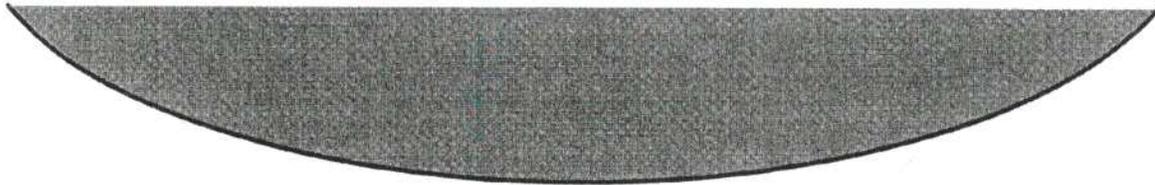
Summary for Reach 3R: Behind Store to South

Inflow Area = 0.267 ac, 65.92% Impervious, Inflow Depth > 3.07"
Inflow = 0.31 cfs @ 12.42 hrs, Volume= 0.068 af
Outflow = 0.30 cfs @ 13.39 hrs, Volume= 0.066 af, Atten= 4%, Lag= 58.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.18 fps, Min. Travel Time= 23.8 min
Avg. Velocity = 0.12 fps, Avg. Travel Time= 35.9 min

Peak Storage= 430 cf @ 12.99 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 0.10' Flow Area= 0.7 sf, Capacity= 0.09 cfs

10.00' x 0.10' deep Parabolic Channel, n= 0.400 Sheet flow: Woods+light brush
Length= 250.0' Slope= 0.0510 '/'
Inlet Invert= 198.75', Outlet Invert= 186.00'



‡

Summary for Reach 4R: Overflow across Subcatchment 2

Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 5.00 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 0.25' Flow Area= 1.0 sf, Capacity= 2.93 cfs

6.00' x 0.25' deep Parabolic Channel, n= 0.035 High grass
 Length= 340.0' Slope= 0.0522 '/'
 Inlet Invert= 203.75', Outlet Invert= 186.00'



‡

Summary for Pond 1P: Level Spreader

Inflow Area = 0.267 ac, 65.92% Impervious, Inflow Depth > 3.18"
 Inflow = 0.31 cfs @ 12.41 hrs, Volume= 0.071 af
 Outflow = 0.31 cfs @ 12.42 hrs, Volume= 0.068 af, Atten= 0%, Lag= 0.5 min
 Primary = 0.31 cfs @ 12.42 hrs, Volume= 0.068 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 198.81' @ 12.42 hrs Surf.Area= 181 sf Storage= 113 cf

Plug-Flow detention time= 20.7 min calculated for 0.068 af (97% of inflow)
 Center-of-Mass det. time= 8.3 min (804.0 - 795.6)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	150 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
198.00	100	0	0
199.00	200	150	150

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Type III 24-hr Rainfall=5.80"

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Device	Routing	Invert	Outlet Devices
#1	Primary	198.75'	10.0' long x 6.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=0.31 cfs @ 12.42 hrs HW=198.81' (Free Discharge)
←1=Broad-Crested Rectangular Weir (Weir Controls 0.31 cfs @ 0.56 fps)

Summary for Pond AP1:

Inflow Area = 2.641 ac, 22.19% Impervious, Inflow Depth > 0.96"
Inflow = 1.14 cfs @ 12.57 hrs, Volume= 0.211 af
Primary = 1.14 cfs @ 12.57 hrs, Volume= 0.211 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond AP2: 48" CMP

Inflow Area = 4.968 ac, 12.50% Impervious, Inflow Depth > 1.90"
Inflow = 7.44 cfs @ 12.39 hrs, Volume= 0.788 af
Primary = 7.44 cfs @ 12.39 hrs, Volume= 0.788 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond AP3: Road

Inflow Area = 0.049 ac, 63.27% Impervious, Inflow Depth > 3.00"
Inflow = 0.21 cfs @ 12.02 hrs, Volume= 0.012 af
Primary = 0.21 cfs @ 12.02 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond UDSF: UDSF

Inflow Area = 0.267 ac, 65.92% Impervious, Inflow Depth > 3.18"
Inflow = 1.09 cfs @ 12.07 hrs, Volume= 0.071 af
Outflow = 0.31 cfs @ 12.41 hrs, Volume= 0.071 af, Atten= 71%, Lag= 20.8 min
Primary = 0.31 cfs @ 12.41 hrs, Volume= 0.071 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 202.72' @ 12.41 hrs Surf.Area= 1,159 sf Storage= 615 cf

Plug-Flow detention time=11.0 min calculated for 0.071 af (100% of inflow)
Center-of-Mass det. time= 10.8 min (795.6 - 784.8)

Proposed per Sevee & Maher

Type III 24-hr Rainfall=5.80"

Prepared by Microsoft

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Volume	Invert	Avail.Storage	Storage Description
#1	202.00'	4,087 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
202.00	542	0	0
203.00	1,395	969	969
204.00	2,300	1,848	2,816
204.50	2,785	1,271	4,087

Device	Routing	Invert	Outlet Devices
#1	Primary	199.83'	4.0" Round Culvert L= 162.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 199.83' / 198.90' S= 0.0057 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.09 sf
#2	Secondary	203.75'	10.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=0.31 cfs @ 12.41 hrs HW=202.72' (Free Discharge)

↑1=Culvert (Barrel Controls 0.31 cfs @ 3.61 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=202.00' (Free Discharge)

↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

APPENDIX D

STORMWATER MANAGEMENT DESIGN CALCULATIONS

Underdrained Soil Filter - Front & half of Side Parking Lot - **PROPOSED*****

PAVED AREAS CAPTURED: (proposed) = 4,500 sf

GRASS AREAS CAPTURED:(proposed) = 3,850 sf

DEP MIN. FILTER BED SIZE:

(1"/12") 4,500 + (0.4"/12") 3,850 = 503 cf min. bed Water Quality Vol.(WQV)

5% 4,500 + 2% 3,850 = 302 sf minimum bed area

Actual Bed Volume Proposed @ 18" Water Depth = 1,670 cf

Actual Bed Area Proposed = 537 sf

Volume Check-1.5feet Deep

Prepared by Microsoft

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Type III 24-hr Rainfall=9.10"

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Summary for Pond UDSF: UDSF

Inflow Area = 0.267 ac, 65.92% Impervious, Inflow Depth > 6.04"
 Inflow = 2.03 cfs @ 12.07 hrs, Volume= 0.134 af
 Outflow = 0.35 cfs @ 12.53 hrs, Volume= 0.134 af, Atten= 83%, Lag= 27.6 min
 Primary = 0.35 cfs @ 12.53 hrs, Volume= 0.134 af
 Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 203.50' @ 12.53 hrs Surf.Area= 1,846 sf Storage= 1,777 cf

Plug-Flow detention time= 34.5 min calculated for 0.134 af (100% of inflow)
 Center-of-Mass det. time= 34.4 min (804.1 - 769.7)

Volume	Invert	Avail.Storage	Storage Description
#1	202.00'	4,087 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
202.00	542	0	0
203.00	1,395	969	969
204.00	2,300	1,848	2,816
204.50	2,785	1,271	4,087

Device	Routing	Invert	Outlet Devices
#1	Primary	199.83'	4.0" Round Culvert L= 162.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 199.83' / 198.90' S= 0.0057 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.09 sf
#2	Secondary	203.75'	10.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=0.35 cfs @ 12.53 hrs HW=203.50' (Free Discharge)
 ↑1=Culvert (Barrel Controls 0.35 cfs @ 3.99 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=202.00' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

APPENDIX E

POST-CONSTRUCTION STORMWATER MANAGEMENT PLAN

**POST-CONSTRUCTION STORMWATER
MANAGEMENT PLAN
THE PLAZA – PHASE I
881 ROOSEVELT TRAIL
WINDHAM, MAINE**

Prepared for

**MARTIN LIPPMAN
DBA
APPLE ANNIE'S ENTERPRISES, INC.
95 WHITES BRIDGE ROAD
WINDHAM, MAINE**

September 30, 2016



ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE



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POST-CONSTRUCTION STORMWATER MANAGEMENT PLAN WINDHAM PLAZA - PHASE I

1.0 SITE DESCRIPTION

The site referenced in this document refers to "The Plaza - Phase I" at the 881 Roosevelt Trail (U.S. Route 302), in Windham, Maine referred to herein as the "Project."

The Project consists of redevelopment of a portion of the frontage for a 4,800-square-foot retail building. Development for the Project includes new paved areas, lawn areas, and stormwater control measures. Refer to the site plans prepared by Sevee & Maher Engineers, Inc. (SME) dated September 28, 2016. The stormwater treatment system as referenced within this document refers to the system of underdrained soil filters, pipes, swales, and roof drains designed to collect, convey, and treat stormwater runoff from the site.

2.0 FACILITY CONTACTS

Facility:	The Plaza – Phase I 881 Roosevelt Trail (U.S. Route 302) Windham, ME 04062
Owner:	APPLE ANNIE'S ENTERPRISES, INC. 95 Whites Bridge Road Windham, ME 04062 Attn: Martin Lippman Tel 329-8191
Owner Representative:	Planning / Design Associates 9 Alexander Drive Windham, ME 04062 Attn: Fred Panicho Tel. 892-2640
Design Engineer:	Sevee & Maher Engineers, Inc. 4 Blanchard Road Cumberland, Maine 04021 Telephone: 207-829-5016 Attn: Daniel P. Diffin, P.E. dpd@smemaine.com

3.0 OVERVIEW AND OBJECTIVES

The Post Construction Stormwater Management Plan (PSWMP) is an important component of the overall stormwater management system for the site. PSWMP addresses various maintenance activities that should occur after construction and site stabilization. Proper implementation of the SWP can minimize pollutant generation and transport and maintain the stormwater treatment system to ensure proper operation. This PSWMP includes three primary components:

1. Site Management Practices
2. Inspections
3. Routine Maintenance and Corrective Actions

3.1 Site Management Practices

Site management practices are aimed at reducing pollutants by minimizing use of certain materials, using alternative materials, or removing pollutants prior to discharge to the stormwater treatment system. These practices shall include:

- a. Use slow release sulfur or plastic coated ureaform fertilizers (e.g., Nutralene).
- b. Do not fertilize vegetated swales once vegetation is established.
- c. Minimize use of pesticides by using a sound integrated pest management (IPM) approach to monitor and control the actual pests present.
- d. Collect and remove autumn leaves to minimize transport to the stormwater treatment system.
- e. Minimize use of de-icing materials and sand.
- f. Routine sweeping of parking areas and driveways.
- g. Fertilizers, pesticides and other hazardous materials should be stored in enclosed areas to avoid exposure to precipitation.
- h. Material handling should be conducted to minimize risk of spillage and release to the stormwater treatment system.

3.2 Inspections

A series of routine inspections shall be completed to allow for the early identification of potential problems, and to guide routine maintenance activities. Inspections shall be carried out in accordance with the Site Inspection Schedule (Table 1). Dates and observations shall be recorded for each inspection on the attached 'Inspection Log'.

3.3 Routine Maintenance and Corrective Actions

Routine maintenance activities are designed to ensure proper function of the stormwater management system and minimize pollutant transport from the site. Routine maintenance activities must be completed according to the schedule (Table 1) provided in this plan. This schedule is the minimum amount of maintenance required, and maintenance that is more frequent may be needed when indicated by the inspections. Corrective actions (supplemental maintenance activities or repairs) should be completed within 7 days of the inspection identifying the problem. Each maintenance activity will be recorded on the attached 'Maintenance and Repair Log'.

During construction, the Sitework Contractor (not yet selected by Bid process) shall be responsible for cleaning and maintaining stormwater components on the schedule outlined in Table 1.

Following completion of construction, the mill will be responsible for cleaning and maintaining stormwater components on the schedule outlined in Table 1.

Place removed sediments in an area of low erosion potential, either on-site or off-site, and seed with erosion control seed mix.

The following describes specific stormwater facilities maintenance requirements and minimum schedule of inspection and maintenance.

TABLE 1
THE PLAZA PHASE I
LONG-TERM INSPECTION & MAINTENANCE PLAN

	Spring	Fall or Yearly	After Major Storm	Every 2-5 Years
Vegetated Areas				
Inspect all slopes and embankments	X		X	
Replant bare areas or areas with sparse growth	X		X	
Armor areas with rill erosion with an appropriate lining or divert the erosive flows to on-site areas able to withstand concentrated flows.	X		X	
Stormwater Channels				
Inspect ditches, swales and other open stormwater channels	X	X	X	
Remove any obstructions and accumulated sediments or debris	X	X		
Control vegetated growth and woody vegetation		X		
Repair any erosion of the ditch lining		X		
Mow vegetated ditches		X		
Remove woody vegetation growing through riprap		X		
Repair any slumping side slopes		X		
Replace riprap where underlying filter fabric /underdrain gravel is showing or stones dislodged		X		
Culverts				
Remove accumulated sediments /debris at the inlet, at the outlet, and within the conduit	X	X	X	
Repair any erosion damage at the culvert's inlet and outlet	X	X	X	
Catch Basin Systems/Outlet Control Structures				
Remove and legally dispose of accumulated sediments and debris from the bottom of the basin, inlet grates, inflow channels to the basin, and pipes between basins	X	X		
Remove floating debris and floating oils (using oil absorptive pads) from any trap designed for such, and dispose in a legal manner	X	X		
Driveways and Parking Surfaces				
Clear accumulated winter sand in parking lots and along roadways	X			
Sweep pavement to remove sediment	X			
Grade road shoulders and remove excess sand either manually or by front-end loader	X			
Ensure stormwater is not impeded by accumulations of material or false ditches in shoulder	X			
Rake and replace Superhumus in areas where necessary				
Vegetated Under-drained Filter Basins or Infiltration Basins				
Inspect soil filter to see that collected water drains within 24 hours.	X	X	X	
Rototill top 6" soil, or remove and replace the top 3" to 4" of filter soil with clean soil to the proper specification, when the bed fails to drain dry within 24 to 48 hours.				X
Remove accumulated sediment, dead portions of plants, excessive growth, and weeds.		X		
Mow grass-covered filter bed no shorter than 6", at a frequency of no more than 2 times per growing season to maintain a high-grass meadow. Do not fertilize unless absolutely needed.	X	X		

1. Open swales and ditches need to be inspected in the spring and fall, or after a major rainfall event, to assure that debris or sediments do not reduce the effectiveness of the system. Debris needs to be removed at that time. Sign of erosion or blockage shall be immediately repaired to assure a vigorous growth of vegetation for the stability of the structure and proper functioning. Swales that show newly formed channels or gullies will be immediately repaired by reseeding/sodding of bare spots, removal of trash, leaves and/or accumulated sediments, and the control of woody or other undesirable vegetation.
2. Vegetated ditches should be mowed at least once during the growing season. Larger brush or trees must not be allowed to become established in the channel. Any areas where the vegetation fails will be subject to erosion and should be repaired and revegetated.
3. If sediment in culverts or piped drainage systems exceeds 20% of the diameter of the pipe, it should be removed. This may be accomplished by hydraulic flushing or other mechanical means; however, care should be taken to not flush the sediments into the filter basins, or retention/detention pond as it will reduce the pond's capacity and hasten the time when it must be cleaned. Storm pipes should be inspected on an annual basis.
4. Catch basin sumps and the outlet control structures shall be cleaned of debris and sediment at least annually to minimize clogging and transportation of sediment during rainfall events.
5. Under-drained Soil Filter Basins shall be inspected after every major storm (2 inches of rainfall in a 24-hour period) during the first 6 months following construction to ensure proper operation. Thereafter, the facilities shall be inspected at least once every six months following significant rainfall to ensure that the facility is draining between 24 and 48 hours. Facilities that do not drain shall be rototilled to a depth of 8 inches. If rototilling does not result in improved drainage, the top several inches of filter bed material shall be removed and

properly disposed of. New filter bed material shall be placed in the bed and revegetated.

6. Some erosion may occur at the inflow point of the soil filter basins. This needs to be corrected, as necessary. The surface of the treatment basins may clog with fine sediments over time. Maintenance of good grass cover will minimize this. Grass should be mowed not more than two times per season. Any bare areas should be seeded or sodded, as necessary. Inspect the basin's drainage area semi-annually for eroding soil and other sediment sources. Repair eroding areas using appropriate erosion control BMPs immediately. Control sediment sources, such as stockpiles of winter sand, by removing them from the basin's drainage area or surrounding them with sediment control BMPs. Prohibit vehicle access to all filtration areas. Heavy equipment used to maintain or rehabilitate the basins should work from the basin's perimeter.

7. Paved surfaces shall be swept or vacuumed at least annually in the spring to remove winter sand and periodically during the year on an as-needed basis to minimize the transportation of sediment during rainfall events.

