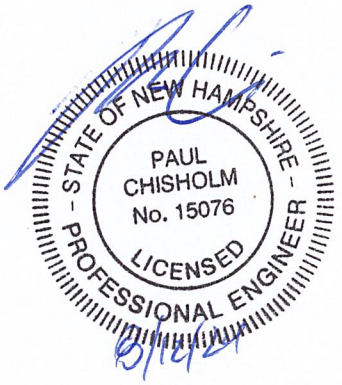
Stormwater Management Report

Miara Transportation

Tax Map 136; Lot 1
12 Bockes Road
Hudson, New Hampshire

November 15, 2016
Amended: August 12, 2024



KNA Project No. 16-0223-1

Prepared For: Joseph A. Miara Jr., Trustee
Granite Realty Trust
12 Bockes Road
Hudson, New Hampshire 03051

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KNA KEACH-NORDSTROM ASSOCIATES, INC.

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I. INTRODUCTION

A. Project Description

The subject property is located at 12 Bockes Road in Hudson, NH. The project proposes to expand the existing Miara Transportation facility in three phases, with the addition of a gravel trailer and specialty trailer storage area and a 2,430 square foot maintenance building. Phase I consists of reconstructing the existing paved access driveway (per the original site plan), expansion of the trailer and specialty trailer storage 'yard', fencing and landscape buffer, stormwater management provisions, relocating the existing onsite well, and other site appurtenances. Phase II consists of constructing the additional maintenance building, relocating the existing underground fuel tank and pump and constructing a new above ground storage tank, and paving a portion of the existing 'yard'. Phase III consists of constructing a 13,200-sf garage in the rear of the main building to allow for storage of fully loaded trailers during snow storms for safety. Phasing is proposed to allow the business to construct improvements as it grows.

The project received a Wetland Special Exception and Variance from the Zoning Board on September 29, 2016 to allow the wetland and wetland buffer impacts as shown on the plan and expand an existing non-conforming use.

B. Existing Site Conditions

The subject property, referenced on Hudson's Tax Map 136 as Lot 1, is located entirely within the Residential 2 (R-2) Zoning District and abuts the General (G-1) Zoning District. The 9.216 acre parcel is partially developed with the existing Miara Transportation facility consisting of a 23,188 square foot office and warehouse building, 2,430 square foot maintenance building, parking landscaping, gravel 'yard' area, onsite fuel pump and underground storage tank, and onsite well and septic systems. The remaining land area consists mainly of woodlands and wetlands. A 100'x100' utility easement, with a 1,001 square foot building and paved access driveway, is located near the southeastern corner of the lot. There are a few existing catch basins onsite but no treatment, detention, or mitigation systems.

Two separate wetland complexes exist onsite in the undeveloped portions of the property to the west and south. In April of 2016, Michele F. Grenier (C.W.S. #102), visited the site and flagged the boundaries of the existing wetland complexes; a large wetland spanning the entire length of the property along the southern boundary and a smaller wetland finger that extends into the site from the westerly abutter. On July 1, 2016, Ms. Grenier returned to the site to perform a Wetland Function-Value assessment for the smaller of the two wetlands, which will be impacted by the proposed project. It was determined that the existing wetland complex is of low function and value with insignificant wildlife habitat. In January of 2022 Christopher K. Danforth (C.W.S. #077) visited the property to update existing wetland boundaries.

The parcel abuts the Rolling Woods open space subdivision, which directly abuts the property to the south and west, Bockes Road to the east, and existing residences to the north.

According to the National Resource Conservation Service (NRCS) Soil Survey, the predominant soil types onsite are Deerfield loamy fine sand with slopes ranging from 3-8%, Hinckley loamy sand with 8-15% slopes, Windsor loamy sand with 3-8% slopes, and Scituate stony fine sandy loam with slopes ranging from 3-8%. Deerfield, Hinckley, and

Windsor are classified as Hydrologic Soil Group (HSG) 'A' soils, and Scituate is classified as a HSG 'C' soil. A copy of the NRCS Soil Survey used for the watershed is attached.

II. STORM DRAINAGE ANALYSIS & DESIGN

A. Methodology

In accordance with the Town of Hudson Stormwater Regulations and generally accepted engineering practice, the 2-year, 10-year, and 25-year frequency storms have each been used in the various aspects of analysis and design of stormwater management considerations for the subject site.

KNA utilizes HydroCAD version 10.0 to analyze both pre and post-development watershed characteristics. This computer software system is based largely on hydrology techniques (TR-20) developed by the Soil Conservation Service (now the Natural Resources Conservation Service). In addition, the software derives Time of Concentration values using the methodology contained within USDA-S.C.S. publication Urban Hydrology for Small Watersheds Technical Release No. 55 (TR 55).

All design and analysis calculations performed using the referenced methodologies are attached to this report. The minimum time of concentrations used for the analysis is 6 minutes. These calculations document each catchment area, a breakdown of surface type, time of concentration, rainfall intensity, peak discharge volume, Manning's "n" value, peak velocity, and other descriptive design data for each watershed and pipe segment evaluated. In addition, the "Pre/Post Development Drainage Area Plans" graphically define and illustrate the extent of each watershed or catchment area investigated.

B. Pre-Development Drainage Conditions

In the pre-development scenario, one (1) point of analysis (POA) has been identified as the appropriate point to compare pre vs. post development rates of stormwater discharge. This point of analysis reflects the main discharge point of the site, and was analyzed to show the impact from the proposed improvements.

The pre-development drainage model's POA is further described as follows:

- 1L Southerly Wetland Complex

In general, the site slopes from west to east toward a large wetland complex, spanning the length of the parcel, along the southern half of the property. Runoff from the developed and undeveloped portions of the property either flows overland or is collected in an existing closed system prior to entering the wetland complex. The existing site has a minimal stormwater system that currently provides no treatment or detention. The existing stormwater infrastructure is a simple conveyance system.

For a more visual description of the information presented in this section, please refer to the attached "Pre-Development Drainage Areas Plan" attached in the appendix of this report.

C. Post-Development Drainage Conditions:

The same POA that was identified in the pre-development scenario has been analyzed in the post-development scenario.

The proposed stormwater management system utilizes both open and closed drainage systems that incorporate various best management practices for the collection, storage, and treatment of stormwater runoff. Runoff generated from the proposed 'yard' expansion and proposed garage and maintenance building will be collected and conveyed into a proposed pocket pond that is outfitted with a sediment forebay for pre-treatment and permanent pool for treatment. The pond will be lined with an impermeable liner to prevent any unintended infiltration and maintain a permanent pool. The pocket pond was designed to treat the ½-inch water quality volume and reduce peak rates of runoff discharging to the southerly wetland.

Additionally, a swale is proposed, around the expansion, to convey stormwater in a similar direction to the pre-development conditions and re-create the function of the westerly wetland finger as a conveyance channel. The existing catch basins will be outfitted with oil/water separators to trap hydrocarbons that might enter the stormwater system from the fuel pump. No infiltration practices are proposed because the site is considered a 'high-load' site due to the presence of an onsite fuel pump.

The peak stormwater runoff rate and total storm volume for the specific storm frequencies are presented and analyzed in the subsequent summary section of this report (Tables 1 and 2).

For a more visual description of the information presented in this section, please refer to the attached "Post-Development Drainage Areas Plan" attached in the appendix of this report.

D. Summary:

As reported below, there is a decrease in all storms in the peak rate. Additionally, the design provides treatment for the proposed expansion area and improves the stormwater quality of the existing site.

Table 1: Peak Flow Discharge Rate

Site Pre-Development vs. Post-Development (cfs)						
Description	**2-Year**		**10-Year**		**25-Year**	
24-hr Rainfall	2.96 in/hr		4.49 in/hr		5.69 in/hr	
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**
1L	6.45	**5.93**	14.12	**12.75**	20.77	**19.53**

III. EROSION & SEDIMENTATION CONTROL PROVISIONS

A. Temporary Erosion Control Measures

As an integral part of the engineering design of this site, an erosion and sedimentation control plan has been developed with the intent of limiting the potential for soil loss and associated receiving water quality degradation, both during and after the construction period. As the project plans indicate, traditional temporary erosion and sedimentation control devices and practices, such as siltation fencing, block and gravel sediment filters, erosion control blankets, stone check dams, and seeding have been specified for use during the construction period. In preparation of these provisions, reference was made to the New Hampshire Stormwater Manual; Volume 3: Erosion and Sediment Temporary Controls During Construction. Construction details for each temporary erosion control

measure and practice specified have been added to the project plans. These plans also contain a number of erosion control notes, which are offered to the selected contractor in order to supplement the specified measures and practices to the extent practical.

B. Construction Sequence

A site specific construction sequence sensitive to limiting soil loss due to erosion and associated water quality degradation was prepared specifically for this project and is shown on the project plans. As pointed out in the erosion control notes, it is important for the contractor to recognize that proper judgment in the implementation of work will be essential if erosion is to be limited and protection of completed work is to be realized. Moreover, any specific changes in sequence and/or field conditions affecting the ability of specific erosion control measures to adequately serve their intended purpose should be reported to this office by the contractor. Further, the contractor is encouraged to supplement specified erosion control measures during the construction period where and when in his/ her best judgment additional protection is warranted.

C. Permanent Erosion Control Measures

In the original design of this site, consideration was given to limiting the potential for long-term erosion of completed improvements. As a result, several permanent erosion control measures were incorporated into the site design. These provisions include:

1) Specification of a turf establishment schedule and seed mixture, utilizing materials and workmanship recognized as appropriate for the site conditions at hand;

2) Utilizing best-management practices for pre-treatment and treatment of stormwater, including permanent stone check dams, a sediment forebay, and a permanent pool.

FIGURES

Map Scale: 1:3,610 if printed on B landscape (17" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 1:24,000.

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

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

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

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

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

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

Soil Survey Area: Hillsborough County, New Hampshire, Eastern Part
Survey Area Data: Version 17, Sep 18, 2015

Soil Survey Area: Rockingham County, New Hampshire
Survey Area Data: Version 17, Sep 18, 2015

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Apr 8, 2011—Apr 9, 2011

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

Map Unit Legend

Hillsborough County, New Hampshire, Eastern Part (NH601)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
CpC	Chatfield-Hollis-Canton complex, 8 to 15 percent slopes	8.4	5.6%
CsC	Chatfield-Hollis complex, 8 to 15 percent slopes	35.0	23.5%
DeB	Deerfield loamy fine sand, 3 to 8 percent slopes	9.5	6.4%
HsC	Hinckley loamy sand, 8 to 15 percent slopes	4.3	2.9%
LvA	Leicester-Walpole complex stony, 0 to 3 percent slopes	2.6	1.7%
Pu	Pootatuck fine sandy loam	0.5	0.3%
Rp	Rippowam fine sandy loam	6.8	4.5%
StB	Scituate stony fine sandy loam, 3 to 8 percent slopes	16.9	11.3%
W	Water (less than 40 acres)	4.6	3.1%
WdB	Windsor loamy sand, 3 to 8 percent slopes	32.6	21.9%
Subtotals for Soil Survey Area		**120.9**	**81.2%**
Totals for Area of Interest		**148.9**	**100.0%**

Rockingham County, New Hampshire (NH015)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
12B	Hinckley loamy sand, 3 to 8 percent slopes	15.7	10.5%
26B	Windsor loamy sand, 3 to 8 percent slopes	1.1	0.7%
140C	Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, very stony	1.5	1.0%
305	Lim-Pootatuck complex	9.7	6.5%
Subtotals for Soil Survey Area		**28.0**	**18.8%**
Totals for Area of Interest		**148.9**	**100.0%**

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JOB Miara Transportation
SHEET NO. 1 OF 1
CALCULATED BY PDC DATE 11/15/16
CHECKED BY _____ DATE _____
SCALE _____

Pocket Pond Water Quality Calculation

Total Contributing Area to Pocket Pond: 1.71-Acres

Total Impervious Area: 1.33-Acres

$$\text{½ Inch WQV} = 1.33\text{-Acres} \times \frac{43{,}560\text{-sf}}{1\text{-Acre}} \times \frac{0.5\text{-In}}{12\text{-in}/1\text{-ft}} = 2{,}414\text{-cf}$$

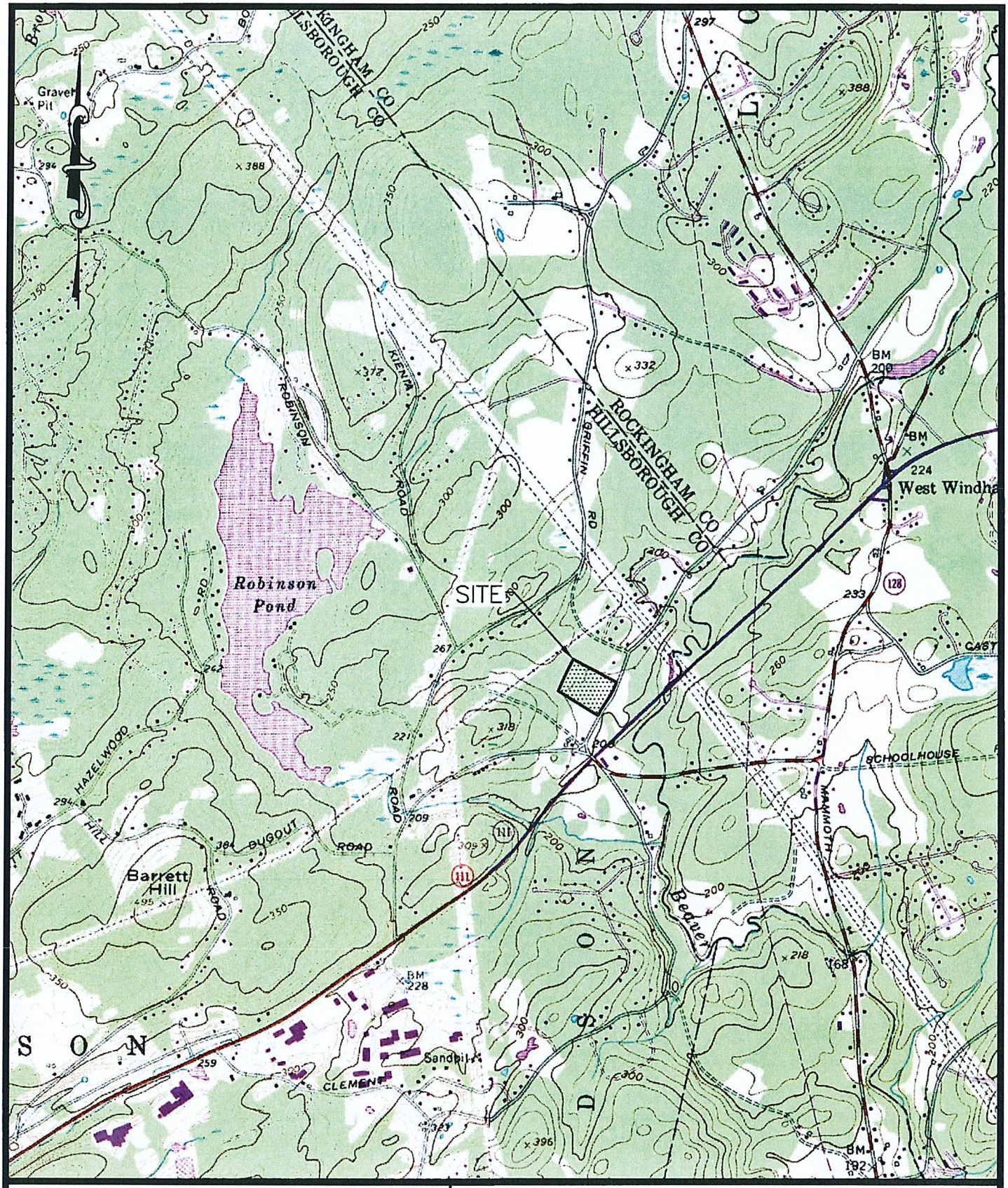
Permanent Pool Elevation Range = 207.0' – 210.2'

Storage Volume at Elevation 210.2' = 2,996-cf

So, 2,996-cf ≥ 2,414-cf

Stage-Area-Storage for Pond 10P: POCKET POND

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
207.00	373	0
207.10	405	39
207.20	437	81
207.30	469	126
207.40	501	175
207.50	533	227
207.60	565	281
207.70	597	339
207.80	629	401
207.90	661	465
208.00	693	533
208.10	732	604
208.20	770	679
208.30	809	758
208.40	848	841
208.50	887	928
208.60	925	1,019
208.70	964	1,113
208.80	1,003	1,211
208.90	1,042	1,314
209.00	1,081	1,420
209.10	1,119	1,530
209.20	1,158	1,644
209.30	1,197	1,761
209.40	1,236	1,883
209.50	1,274	2,008
209.60	1,313	2,138
209.70	1,352	2,271
209.80	1,391	2,408
209.90	1,429	2,549
210.00	1,468	2,694
210.10	1,512	2,843
210.20	1,556	2,996
210.30	1,600	3,154
210.40	1,645	3,317
210.50	1,689	3,483
210.60	1,733	3,654
210.70	1,777	3,830
210.80	1,821	4,010
210.90	1,865	4,194
211.00	1,910	4,383
211.10	1,954	4,576
211.20	1,998	4,773
211.30	2,042	4,975
211.40	2,086	5,182
211.50	2,130	5,393
211.60	2,174	5,608
211.70	2,219	5,828
211.80	2,263	6,052
211.90	2,307	6,280
212.00	2,351	6,513
212.10	2,401	6,751
212.20	2,450	6,993
212.30	2,500	7,241
212.40	2,549	7,493
212.50	2,599	7,751
212.60	2,649	8,013
212.70	2,698	8,280
212.80	2,748	8,553
212.90	2,797	8,830
213.00	2,847	9,112
213.10	2,897	9,399
213.20	2,946	9,691
213.30	2,996	9,988
213.40	3,045	10,290
213.50	3,095	10,598
213.60	3,145	10,909
213.70	3,194	11,226
213.80	3,244	11,548
213.90	3,293	11,875
214.00	3,343	12,207
214.10	3,398	12,544
214.20	3,452	12,887
214.30	3,507	13,235
214.40	3,562	13,588
214.50	3,617	13,947
214.60	3,671	14,311
214.70	3,726	14,681
214.80	3,781	15,056
214.90	3,835	15,437
215.00	**3,890**	**15,824**



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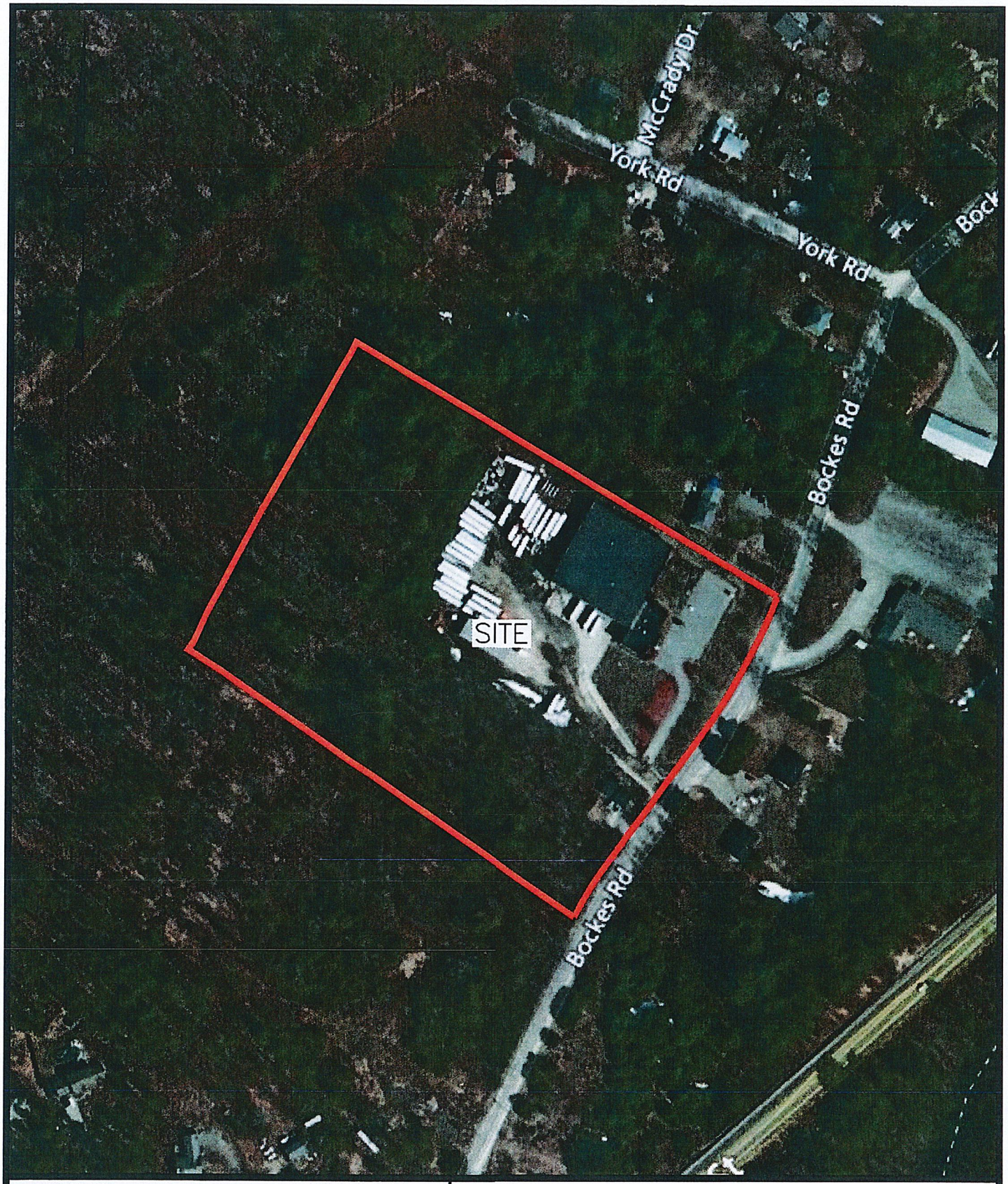
TITLE:

USGS EXHIBIT PREPARED FOR:

MIARA TRANSPORTATION

MAP 136; LOT 1 - 12 BOCKES ROAD - HUDSON, NEW HAMPSHIRE

DATE: 7/28/16	JOB. NO.16-0223-1
SCALE: 1" = 2,000'	SHEET 1 OF 1



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TITLE: AERIAL EXHIBIT PREPARED FOR:
MIARA TRANSPORTATION
MAP 136; LOT 1 - 12 BOCKES ROAD - HUDSON, NEW HAMPSHIRE

DRAWN BY: KMB DATE: 6/8/16 JOB. NO.16-0223-1

CHECKED BY: PDC SCALE: 1" = 200' SHEET 1 OF 1

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New Hampshire
Location	
Longitude	71.368 degrees West
Latitude	42.794 degrees North
Elevation	0 feet
Date/Time	Thu, 06 Oct 2016 11:52:12 -0400

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.27	0.42	0.52	0.68	0.85	1.06	**1yr**	0.73	1.01	1.23	1.55	1.96	2.48	2.70	**1yr**	2.19	2.60	3.03	3.71	4.32	**1yr**
2yr	0.33	0.51	0.63	0.83	1.05	1.32	**2yr**	0.91	1.21	1.52	1.90	2.37	2.96	3.29	**2yr**	2.62	3.16	3.67	4.38	4.98	**2yr**
5yr	0.39	0.61	0.76	1.02	1.31	1.66	**5yr**	1.13	1.51	1.93	2.42	3.01	3.75	4.19	**5yr**	3.32	4.03	4.65	5.51	6.24	**5yr**
10yr	0.44	0.69	0.87	1.19	1.55	1.98	**10yr**	1.33	1.79	2.31	2.90	3.62	4.49	5.03	**10yr**	3.97	4.84	5.57	6.55	7.39	**10yr**
25yr	0.52	0.83	1.06	1.46	1.93	2.50	**25yr**	1.67	2.24	2.92	3.68	4.60	5.69	6.43	**25yr**	5.04	6.18	7.08	8.25	9.27	**25yr**
50yr	0.58	0.94	1.21	1.69	2.29	2.99	**50yr**	1.98	2.65	3.51	4.43	5.53	6.82	7.73	**50yr**	6.03	7.43	8.49	9.82	10.99	**50yr**
100yr	0.67	1.09	1.41	1.99	2.71	3.57	**100yr**	2.34	3.15	4.20	5.31	6.62	8.17	9.31	**100yr**	7.23	8.95	10.18	11.69	13.05	**100yr**
200yr	0.77	1.25	1.62	2.33	3.22	4.26	**200yr**	2.78	3.74	5.03	6.37	7.94	9.78	11.21	**200yr**	8.66	10.78	12.22	13.92	15.50	**200yr**
500yr	0.92	1.52	1.98	2.88	4.04	5.39	**500yr**	3.49	4.69	6.38	8.10	10.10	12.44	14.34	**500yr**	11.01	13.79	15.55	17.56	19.46	**500yr**

Lower Confidence Limits

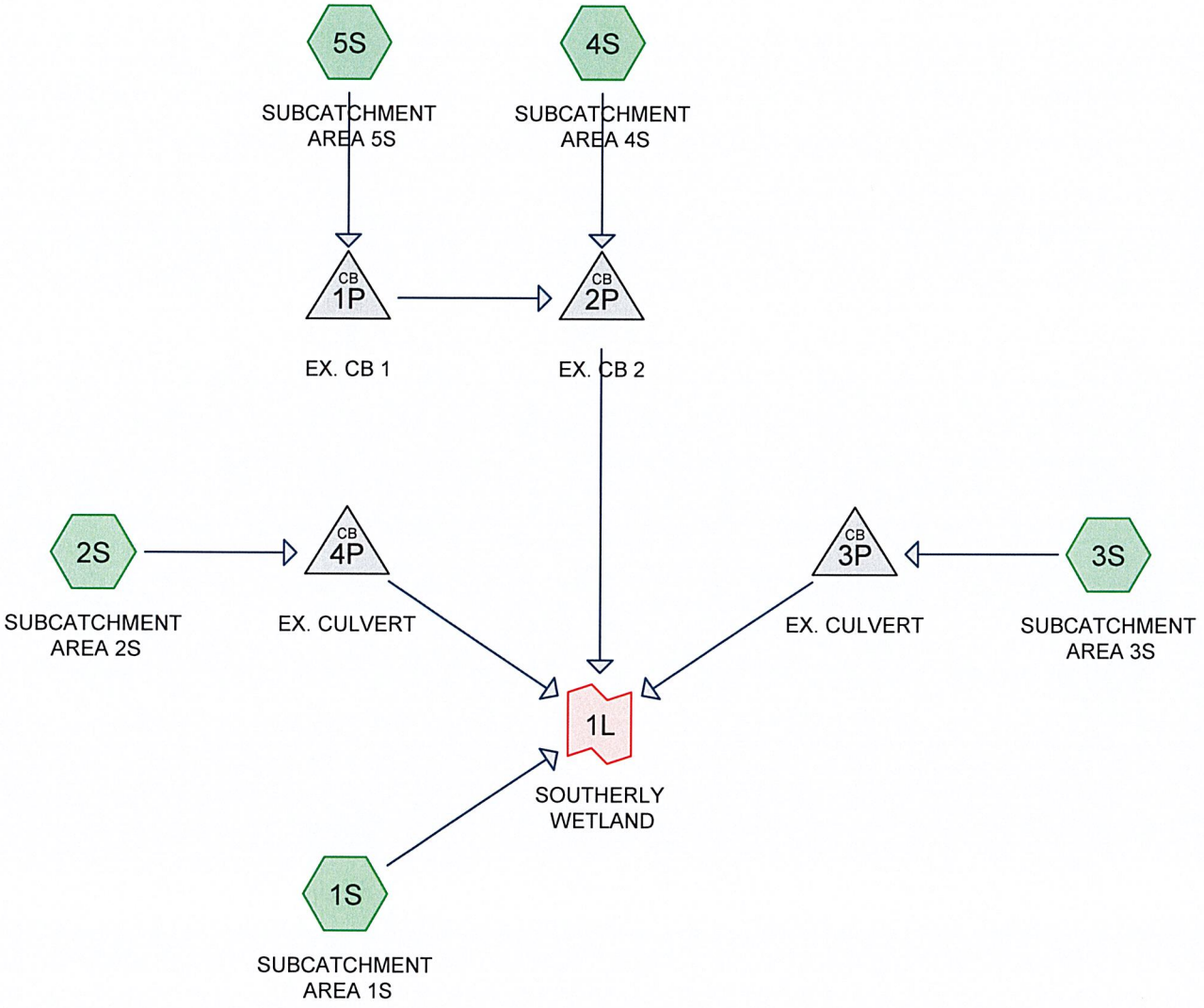
	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.23	0.35	0.43	0.58	0.71	0.82	**1yr**	0.61	0.80	1.08	1.31	1.66	2.19	2.54	**1yr**	1.94	2.44	2.69	3.03	3.85	**1yr**
2yr	0.31	0.49	0.60	0.81	1.00	1.19	**2yr**	0.86	1.17	1.37	1.79	2.30	2.84	3.16	**2yr**	2.51	3.04	3.54	4.23	4.81	**2yr**
5yr	0.36	0.55	0.69	0.94	1.20	1.42	**5yr**	1.03	1.39	1.62	2.10	2.68	3.51	3.77	**5yr**	3.11	3.62	4.21	5.04	5.71	**5yr**
10yr	0.39	0.61	0.75	1.05	1.36	1.61	**10yr**	1.17	1.57	1.83	2.37	3.02	4.06	4.28	**10yr**	3.59	4.12	4.81	5.75	6.46	**10yr**
25yr	0.45	0.68	0.85	1.21	1.60	1.89	**25yr**	1.38	1.85	2.16	2.78	3.51	4.91	5.08	**25yr**	4.34	4.89	5.74	6.87	7.52	**25yr**
50yr	0.49	0.75	0.93	1.34	1.80	2.15	**50yr**	1.55	2.10	2.45	3.16	3.94	5.68	5.81	**50yr**	5.03	5.58	6.60	7.88	8.41	**50yr**
100yr	0.54	0.82	1.02	1.48	2.03	2.43	**100yr**	1.75	2.37	2.78	3.59	4.43	5.70	6.64	**100yr**	5.04	6.38	7.61	9.06	9.41	**100yr**
200yr	0.60	0.90	1.14	1.65	2.30	2.76	**200yr**	1.99	2.70	3.14	4.08	5.00	6.41	7.61	**200yr**	5.67	7.32	8.80	10.44	10.51	**200yr**
500yr	0.68	1.02	1.31	1.90	2.71	3.27	**500yr**	2.34	3.20	3.72	4.85	5.90	7.49	9.20	**500yr**	6.63	8.85	10.70	12.63	12.18	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.31	0.47	0.57	0.77	0.95	1.11	**1yr**	0.82	1.08	1.25	1.64	2.08	2.73	2.86	**1yr**	2.41	2.75	3.41	4.14	4.83	**1yr**
2yr	0.35	0.54	0.66	0.90	1.10	1.30	**2yr**	0.95	1.27	1.48	1.91	2.46	3.12	3.49	**2yr**	2.77	3.36	3.84	4.58	5.27	**2yr**
5yr	0.43	0.67	0.83	1.14	1.45	1.65	**5yr**	1.25	1.62	1.89	2.43	3.05	4.04	4.67	**5yr**	3.58	4.49	5.10	6.04	6.79	**5yr**
10yr	0.52	0.81	1.00	1.40	1.80	2.02	**10yr**	1.56	1.97	2.28	2.90	3.63	5.01	5.85	**10yr**	4.43	5.63	6.35	7.45	8.36	**10yr**
25yr	0.68	1.03	1.29	1.84	2.41	2.61	**25yr**	2.08	2.55	2.94	3.68	4.53	6.65	7.92	**25yr**	5.89	7.62	8.47	9.83	11.03	**25yr**
50yr	0.82	1.25	1.56	2.24	3.02	3.18	**50yr**	2.61	3.11	3.57	4.42	5.36	8.25	9.97	**50yr**	7.30	9.59	10.51	12.10	13.62	**50yr**
100yr	1.01	1.52	1.91	2.75	3.78	3.88	**100yr**	3.26	3.80	4.34	5.29	6.36	11.46	12.53	**100yr**	10.14	12.05	13.03	14.92	16.83	**100yr**
200yr	1.23	1.85	2.34	3.39	4.73	4.73	**200yr**	4.08	4.63	5.26	6.33	7.55	14.46	15.71	**200yr**	12.80	15.11	16.13	18.38	20.81	**200yr**
500yr	1.61	2.39	3.08	4.47	6.36	6.14	**500yr**	5.49	6.00	6.81	8.04	9.46	19.73	21.21	**500yr**	17.46	20.40	21.41	24.21	27.56	**500yr**

HYDROCAD DRAINAGE ANALYSIS

I. 2-YR, PRE-DEVELOPMENT
II. 10-YR, PRE-DEVELOPMENT
III. 25-YR, PRE-DEVELOPMENT
V. 2-YR, PRE-DEVELOPMENT
VI. 10-YR, POST-DEVELOPMENT
VII. 25-YR, POST-DEVELOPMENT



Subcat Reach Pond Link

Routing Diagram for PRE DEVELOPMENT
Prepared by Keach-Nordstrom Associates, Inc. , Printed 8/12/2024
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.940	39	>75% Grass cover, Good, HSG A (1S, 3S, 5S)
0.065	74	>75% Grass cover, Good, HSG C (1S, 4S)
1.027	96	Gravel surface, HSG A (1S, 4S, 5S)
0.480	96	Gravel surface, HSG C (1S, 4S, 5S)
1.188	98	Paved parking (1S, 3S, 4S, 5S)
0.320	30	Woods, Good, HSG A (1S, 2S, 3S, 5S)
2.528	70	Woods, Good, HSG C (1S, 2S, 4S)
6.548	**75**	**TOTAL AREA**

Soil Listing (all nodes)

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

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: SUBCATCHMENT AREA Runoff Area=99,743 sf 9.96% Impervious Runoff Depth=0.93"
Tc=6.0 min CN=75 Runoff=2.37 cfs 0.178 af

Subcatchment 2S: SUBCATCHMENT AREA Runoff Area=72,132 sf 0.00% Impervious Runoff Depth=0.69"
Flow Length=566' Tc=13.4 min CN=70 Runoff=0.90 cfs 0.096 af

Subcatchment 3S: SUBCATCHMENT Runoff Area=54,724 sf 45.65% Impervious Runoff Depth=0.49"
Tc=6.0 min CN=65 Runoff=0.52 cfs 0.051 af

Subcatchment 4S: SUBCATCHMENT Runoff Area=24,191 sf 24.89% Impervious Runoff Depth=2.31"
Tc=6.0 min CN=94 Runoff=1.45 cfs 0.107 af

Subcatchment 5S: SUBCATCHMENT Runoff Area=34,451 sf 31.40% Impervious Runoff Depth=1.70"
Tc=6.0 min CN=87 Runoff=1.58 cfs 0.112 af

Pond 1P: EX. CB 1 Peak Elev=218.44' Inflow=1.58 cfs 0.112 af
8.0" Round Culvert n=0.013 L=110.0' S=0.0029 '/' Outflow=1.58 cfs 0.112 af

Pond 2P: EX. CB 2 Peak Elev=216.08' Inflow=3.03 cfs 0.219 af
8.0" Round Culvert n=0.013 L=142.0' S=0.0202 '/' Outflow=3.03 cfs 0.219 af

Pond 3P: EX. CULVERT Peak Elev=204.85' Inflow=0.52 cfs 0.051 af
10.0" Round Culvert n=0.013 L=40.0' S=0.0100 '/' Outflow=0.52 cfs 0.051 af

Pond 4P: EX. CULVERT Peak Elev=210.49' Inflow=0.90 cfs 0.096 af
24.0" Round Culvert n=0.013 L=260.0' S=0.0197 '/' Outflow=0.90 cfs 0.096 af

Link 1L: SOUTHERLY WETLAND Inflow=6.45 cfs 0.544 af
Primary=6.45 cfs 0.544 af

Total Runoff Area = 6.548 ac Runoff Volume = 0.544 af Average Runoff Depth = 1.00"
81.85% Pervious = 5.360 ac 18.15% Impervious = 1.188 ac

Summary for Subcatchment 1S: SUBCATCHMENT AREA 1S

Runoff = 2.37 cfs @ 12.10 hrs, Volume= 0.178 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=2.96"

	Area (sf)	CN	Description
*	9,939	98	Paved parking
	20,128	96	Gravel surface, HSG A
	12,165	96	Gravel surface, HSG C
	11,093	39	>75% Grass cover, Good, HSG A
	2,002	74	>75% Grass cover, Good, HSG C
	8,003	30	Woods, Good, HSG A
	36,413	70	Woods, Good, HSG C
	99,743	75	Weighted Average
	89,804		90.04% Pervious Area
	9,939		9.96% Impervious Area

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

Summary for Subcatchment 2S: SUBCATCHMENT AREA 2S

Runoff = 0.90 cfs @ 12.21 hrs, Volume= 0.096 af, Depth= 0.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=2.96"

Area (sf)	CN	Description
493	30	Woods, Good, HSG A
71,639	70	Woods, Good, HSG C
72,132	70	Weighted Average
72,132		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.1200	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.97"
6.2	337	0.0330	0.91		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	179	0.0450	3.18		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
13.4	566	Total			

Summary for Subcatchment 3S: SUBCATCHMENT AREA 3S

Runoff = 0.52 cfs @ 12.11 hrs, Volume= 0.051 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=2.96"

	Area (sf)	CN	Description
*	24,983	98	Paved parking
	27,071	39	>75% Grass cover, Good, HSG A
	2,670	30	Woods, Good, HSG A
	54,724	65	Weighted Average
	29,741		54.35% Pervious Area
	24,983		45.65% Impervious Area

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

Summary for Subcatchment 4S: SUBCATCHMENT AREA 4S

Runoff = 1.45 cfs @ 12.08 hrs, Volume= 0.107 af, Depth= 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=2.96"

	Area (sf)	CN	Description
*	6,020	98	Paved parking
	6,865	96	Gravel surface, HSG A
	8,418	96	Gravel surface, HSG C
	824	74	>75% Grass cover, Good, HSG C
	2,064	70	Woods, Good, HSG C
	24,191	94	Weighted Average
	18,171		75.11% Pervious Area
	6,020		24.89% Impervious Area

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

Summary for Subcatchment 5S: SUBCATCHMENT AREA 5S

Runoff = 1.58 cfs @ 12.09 hrs, Volume= 0.112 af, Depth= 1.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=2.96"

	Area (sf)	CN	Description
*	10,817	98	Paved parking
	17,733	96	Gravel surface, HSG A
	339	96	Gravel surface, HSG C
	2,799	39	>75% Grass cover, Good, HSG A
	2,763	30	Woods, Good, HSG A
	34,451	87	Weighted Average
	23,634		68.60% Pervious Area
	10,817		31.40% Impervious Area

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

Summary for Pond 1P: EX. CB 1

[58] Hint: Peaked 6.49' above defined flood level

Inflow Area = 0.791 ac, 31.40% Impervious, Inflow Depth = 1.70" for 2-YR event
Inflow = 1.58 cfs @ 12.09 hrs, Volume= 0.112 af
Outflow = 1.58 cfs @ 12.09 hrs, Volume= 0.112 af, Atten= 0%, Lag= 0.0 min
Primary = 1.58 cfs @ 12.09 hrs, Volume= 0.112 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 218.44' @ 12.09 hrs
Flood Elev= 211.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	208.10'	**8.0" Round Culvert** L= 110.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 208.10' / 207.78' S= 0.0029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.58 cfs @ 12.09 hrs HW=218.41' TW=216.05' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 1.58 cfs @ 4.52 fps)

Summary for Pond 2P: EX. CB 2

[58] Hint: Peaked 6.58' above defined flood level

Inflow Area = 1.346 ac, 28.71% Impervious, Inflow Depth = 1.95" for 2-YR event
Inflow = 3.03 cfs @ 12.09 hrs, Volume= 0.219 af
Outflow = 3.03 cfs @ 12.09 hrs, Volume= 0.219 af, Atten= 0%, Lag= 0.0 min
Primary = 3.03 cfs @ 12.09 hrs, Volume= 0.219 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 216.08' @ 12.09 hrs
Flood Elev= 209.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	207.58'	**8.0" Round Culvert**

L= 142.0' CPP, square edge headwall, Ke= 0.500
Inlet / Outlet Invert= 207.58' / 204.71' S= 0.0202 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=3.02 cfs @ 12.09 hrs HW=216.04' TW=0.00' (Dynamic Tailwater)
1=Culvert (Barrel Controls 3.02 cfs @ 8.66 fps)

Summary for Pond 3P: EX. CULVERT

Inflow Area = 1.256 ac, 45.65% Impervious, Inflow Depth = 0.49" for 2-YR event
Inflow = 0.52 cfs @ 12.11 hrs, Volume= 0.051 af
Outflow = 0.52 cfs @ 12.11 hrs, Volume= 0.051 af, Atten= 0%, Lag= 0.0 min
Primary = 0.52 cfs @ 12.11 hrs, Volume= 0.051 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 204.85' @ 12.11 hrs
Flood Elev= 206.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	204.45'	**10.0" Round Culvert**
			L= 40.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 204.45' / 204.05' S= 0.0100 '/' Cc= 0.900
			n= 0.013 Cast iron, coated, Flow Area= 0.55 sf

Primary OutFlow Max=0.52 cfs @ 12.11 hrs HW=204.85' TW=0.00' (Dynamic Tailwater)
1=Culvert (Barrel Controls 0.52 cfs @ 2.95 fps)

Summary for Pond 4P: EX. CULVERT

Inflow Area = 1.656 ac, 0.00% Impervious, Inflow Depth = 0.69" for 2-YR event
Inflow = 0.90 cfs @ 12.21 hrs, Volume= 0.096 af
Outflow = 0.90 cfs @ 12.21 hrs, Volume= 0.096 af, Atten= 0%, Lag= 0.0 min
Primary = 0.90 cfs @ 12.21 hrs, Volume= 0.096 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 210.49' @ 12.21 hrs
Flood Elev= 214.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	210.10'	**24.0" Round Culvert**
			L= 260.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 210.10' / 204.99' S= 0.0197 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.90 cfs @ 12.21 hrs HW=210.49' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.90 cfs @ 2.12 fps)

Summary for Link 1L: SOUTHERLY WETLAND

Inflow Area = 6.548 ac, 18.15% Impervious, Inflow Depth = 1.00" for 2-YR event
Inflow = 6.45 cfs @ 12.10 hrs, Volume= 0.544 af
Primary = 6.45 cfs @ 12.10 hrs, Volume= 0.544 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: SUBCATCHMENT AREA Runoff Area=99,743 sf 9.96% Impervious Runoff Depth=2.04"
Tc=6.0 min CN=75 Runoff=5.45 cfs 0.390 af

Subcatchment 2S: SUBCATCHMENT AREA Runoff Area=72,132 sf 0.00% Impervious Runoff Depth=1.67"
Flow Length=566' Tc=13.4 min CN=70 Runoff=2.47 cfs 0.230 af

Subcatchment 3S: SUBCATCHMENT Runoff Area=54,724 sf 45.65% Impervious Runoff Depth=1.32"
Tc=6.0 min CN=65 Runoff=1.81 cfs 0.139 af

Subcatchment 4S: SUBCATCHMENT Runoff Area=24,191 sf 24.89% Impervious Runoff Depth=3.81"
Tc=6.0 min CN=94 Runoff=2.32 cfs 0.176 af

Subcatchment 5S: SUBCATCHMENT Runoff Area=34,451 sf 31.40% Impervious Runoff Depth=3.09"
Tc=6.0 min CN=87 Runoff=2.83 cfs 0.204 af

Pond 1P: EX. CB 1 Peak Elev=243.87' Inflow=2.83 cfs 0.204 af
8.0" Round Culvert n=0.013 L=110.0' S=0.0029 '/' Outflow=2.83 cfs 0.204 af

Pond 2P: EX. CB 2 Peak Elev=236.29' Inflow=5.15 cfs 0.380 af
8.0" Round Culvert n=0.013 L=142.0' S=0.0202 '/' Outflow=5.15 cfs 0.380 af

Pond 3P: EX. CULVERT Peak Elev=205.35' Inflow=1.81 cfs 0.139 af
10.0" Round Culvert n=0.013 L=40.0' S=0.0100 '/' Outflow=1.81 cfs 0.139 af

Pond 4P: EX. CULVERT Peak Elev=210.76' Inflow=2.47 cfs 0.230 af
24.0" Round Culvert n=0.013 L=260.0' S=0.0197 '/' Outflow=2.47 cfs 0.230 af

Link 1L: SOUTHERLY WETLAND Inflow=14.12 cfs 1.138 af
Primary=14.12 cfs 1.138 af

Total Runoff Area = 6.548 ac Runoff Volume = 1.138 af Average Runoff Depth = 2.09"
81.85% Pervious = 5.360 ac 18.15% Impervious = 1.188 ac

Summary for Subcatchment 1S: SUBCATCHMENT AREA 1S

Runoff = 5.45 cfs @ 12.09 hrs, Volume= 0.390 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.49"

	Area (sf)	CN	Description
*	9,939	98	Paved parking
	20,128	96	Gravel surface, HSG A
	12,165	96	Gravel surface, HSG C
	11,093	39	>75% Grass cover, Good, HSG A
	2,002	74	>75% Grass cover, Good, HSG C
	8,003	30	Woods, Good, HSG A
	36,413	70	Woods, Good, HSG C
	99,743	75	Weighted Average
	89,804		90.04% Pervious Area
	9,939		9.96% Impervious Area

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

Summary for Subcatchment 2S: SUBCATCHMENT AREA 2S

Runoff = 2.47 cfs @ 12.19 hrs, Volume= 0.230 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.49"

Area (sf)	CN	Description
493	30	Woods, Good, HSG A
71,639	70	Woods, Good, HSG C
72,132	70	Weighted Average
72,132		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.1200	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.97"
6.2	337	0.0330	0.91		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	179	0.0450	3.18		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
13.4	566	Total			

Summary for Subcatchment 3S: SUBCATCHMENT AREA 3S

Runoff = 1.81 cfs @ 12.10 hrs, Volume= 0.139 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.49"

	Area (sf)	CN	Description
*	24,983	98	Paved parking
	27,071	39	>75% Grass cover, Good, HSG A
	2,670	30	Woods, Good, HSG A
	54,724	65	Weighted Average
	29,741		54.35% Pervious Area
	24,983		45.65% Impervious Area

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

Summary for Subcatchment 4S: SUBCATCHMENT AREA 4S

Runoff = 2.32 cfs @ 12.08 hrs, Volume= 0.176 af, Depth= 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.49"

	Area (sf)	CN	Description
*	6,020	98	Paved parking
	6,865	96	Gravel surface, HSG A
	8,418	96	Gravel surface, HSG C
	824	74	>75% Grass cover, Good, HSG C
	2,064	70	Woods, Good, HSG C
	24,191	94	Weighted Average
	18,171		75.11% Pervious Area
	6,020		24.89% Impervious Area

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

Summary for Subcatchment 5S: SUBCATCHMENT AREA 5S

Runoff = 2.83 cfs @ 12.09 hrs, Volume= 0.204 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.49"

	Area (sf)	CN	Description
*	10,817	98	Paved parking
	17,733	96	Gravel surface, HSG A
	339	96	Gravel surface, HSG C
	2,799	39	>75% Grass cover, Good, HSG A
	2,763	30	Woods, Good, HSG A
	34,451	87	Weighted Average
	23,634		68.60% Pervious Area
	10,817		31.40% Impervious Area

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

Summary for Pond 1P: EX. CB 1

[58] Hint: Peaked 31.92' above defined flood level

Inflow Area = 0.791 ac, 31.40% Impervious, Inflow Depth = 3.09" for 10-YR event
Inflow = 2.83 cfs @ 12.09 hrs, Volume= 0.204 af
Outflow = 2.83 cfs @ 12.09 hrs, Volume= 0.204 af, Atten= 0%, Lag= 0.0 min
Primary = 2.83 cfs @ 12.09 hrs, Volume= 0.204 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 243.87' @ 12.09 hrs
Flood Elev= 211.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	208.10'	**8.0" Round Culvert** L= 110.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 208.10' / 207.78' S= 0.0029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=2.82 cfs @ 12.09 hrs HW=243.73' TW=236.18' (Dynamic Tailwater)
1=Culvert (Outlet Controls 2.82 cfs @ 8.09 fps)

Summary for Pond 2P: EX. CB 2

[58] Hint: Peaked 26.79' above defined flood level

Inflow Area = 1.346 ac, 28.71% Impervious, Inflow Depth = 3.38" for 10-YR event
Inflow = 5.15 cfs @ 12.09 hrs, Volume= 0.380 af
Outflow = 5.15 cfs @ 12.09 hrs, Volume= 0.380 af, Atten= 0%, Lag= 0.0 min
Primary = 5.15 cfs @ 12.09 hrs, Volume= 0.380 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 236.29' @ 12.09 hrs
Flood Elev= 209.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	207.58'	**8.0" Round Culvert**

L= 142.0' CPP, square edge headwall, Ke= 0.500
Inlet / Outlet Invert= 207.58' / 204.71' S= 0.0202 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=5.14 cfs @ 12.09 hrs HW=236.18' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 5.14 cfs @ 14.72 fps)

Summary for Pond 3P: EX. CULVERT

Inflow Area =	1.256 ac,	45.65% Impervious,	Inflow Depth =	1.32"	for 10-YR event
Inflow =	1.81 cfs @	12.10 hrs,	Volume=	0.139 af	
Outflow =	1.81 cfs @	12.10 hrs,	Volume=	0.139 af,	Atten= 0%, Lag= 0.0 min
Primary =	1.81 cfs @	12.10 hrs,	Volume=	0.139 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 205.35' @ 12.10 hrs
Flood Elev= 206.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	204.45'	**10.0" Round Culvert**
			L= 40.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 204.45' / 204.05' S= 0.0100 '/' Cc= 0.900
			n= 0.013 Cast iron, coated, Flow Area= 0.55 sf

Primary OutFlow Max=1.81 cfs @ 12.10 hrs HW=205.35' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 1.81 cfs @ 3.83 fps)

Summary for Pond 4P: EX. CULVERT

Inflow Area =	1.656 ac,	0.00% Impervious,	Inflow Depth =	1.67"	for 10-YR event
Inflow =	2.47 cfs @	12.19 hrs,	Volume=	0.230 af	
Outflow =	2.47 cfs @	12.19 hrs,	Volume=	0.230 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.47 cfs @	12.19 hrs,	Volume=	0.230 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 210.76' @ 12.19 hrs
Flood Elev= 214.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	210.10'	**24.0" Round Culvert**
			L= 260.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 210.10' / 204.99' S= 0.0197 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=2.46 cfs @ 12.19 hrs HW=210.75' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 2.46 cfs @ 2.75 fps)

Summary for Link 1L: SOUTHERLY WETLAND

Inflow Area = 6.548 ac, 18.15% Impervious, Inflow Depth = 2.09" for 10-YR event
Inflow = 14.12 cfs @ 12.10 hrs, Volume= 1.138 af
Primary = 14.12 cfs @ 12.10 hrs, Volume= 1.138 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: SUBCATCHMENT AREA Runoff Area=99,743 sf 9.96% Impervious Runoff Depth=3.02"
Tc=6.0 min CN=75 Runoff=8.11 cfs 0.576 af

Subcatchment 2S: SUBCATCHMENT AREA Runoff Area=72,132 sf 0.00% Impervious Runoff Depth=2.56"
Flow Length=566' Tc=13.4 min CN=70 Runoff=3.88 cfs 0.353 af

Subcatchment 3S: SUBCATCHMENT Runoff Area=54,724 sf 45.65% Impervious Runoff Depth=2.13"
Tc=6.0 min CN=65 Runoff=3.05 cfs 0.223 af

Subcatchment 4S: SUBCATCHMENT Runoff Area=24,191 sf 24.89% Impervious Runoff Depth=4.99"
Tc=6.0 min CN=94 Runoff=3.00 cfs 0.231 af

Subcatchment 5S: SUBCATCHMENT Runoff Area=34,451 sf 31.40% Impervious Runoff Depth=4.22"
Tc=6.0 min CN=87 Runoff=3.82 cfs 0.278 af

Pond 1P: EX. CB 1 Peak Elev=273.26' Inflow=3.82 cfs 0.278 af
8.0" Round Culvert n=0.013 L=110.0' S=0.0029 '/' Outflow=3.82 cfs 0.278 af

Pond 2P: EX. CB 2 Peak Elev=259.48' Inflow=6.81 cfs 0.509 af
8.0" Round Culvert n=0.013 L=142.0' S=0.0202 '/' Outflow=6.81 cfs 0.509 af

Pond 3P: EX. CULVERT Peak Elev=206.39' Inflow=3.05 cfs 0.223 af
10.0" Round Culvert n=0.013 L=40.0' S=0.0100 '/' Outflow=3.05 cfs 0.223 af

Pond 4P: EX. CULVERT Peak Elev=210.94' Inflow=3.88 cfs 0.353 af
24.0" Round Culvert n=0.013 L=260.0' S=0.0197 '/' Outflow=3.88 cfs 0.353 af

Link 1L: SOUTHERLY WETLAND Inflow=20.77 cfs 1.662 af
Primary=20.77 cfs 1.662 af

Total Runoff Area = 6.548 ac Runoff Volume = 1.662 af Average Runoff Depth = 3.04"
81.85% Pervious = 5.360 ac 18.15% Impervious = 1.188 ac

Summary for Subcatchment 1S: SUBCATCHMENT AREA 1S

Runoff = 8.11 cfs @ 12.09 hrs, Volume= 0.576 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.69"

	Area (sf)	CN	Description
*	9,939	98	Paved parking
	20,128	96	Gravel surface, HSG A
	12,165	96	Gravel surface, HSG C
	11,093	39	>75% Grass cover, Good, HSG A
	2,002	74	>75% Grass cover, Good, HSG C
	8,003	30	Woods, Good, HSG A
	36,413	70	Woods, Good, HSG C
	99,743	75	Weighted Average
	89,804		90.04% Pervious Area
	9,939		9.96% Impervious Area

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

Summary for Subcatchment 2S: SUBCATCHMENT AREA 2S

Runoff = 3.88 cfs @ 12.19 hrs, Volume= 0.353 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.69"

Area (sf)	CN	Description
493	30	Woods, Good, HSG A
71,639	70	Woods, Good, HSG C
72,132	70	Weighted Average
72,132		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.1200	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.97"
6.2	337	0.0330	0.91		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	179	0.0450	3.18		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
13.4	566	Total			

Summary for Subcatchment 3S: SUBCATCHMENT AREA 3S

Runoff = 3.05 cfs @ 12.09 hrs, Volume= 0.223 af, Depth= 2.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.69"

	Area (sf)	CN	Description
*	24,983	98	Paved parking
	27,071	39	>75% Grass cover, Good, HSG A
	2,670	30	Woods, Good, HSG A
	54,724	65	Weighted Average
	29,741		54.35% Pervious Area
	24,983		45.65% Impervious Area

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

Summary for Subcatchment 4S: SUBCATCHMENT AREA 4S

Runoff = 3.00 cfs @ 12.08 hrs, Volume= 0.231 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.69"

	Area (sf)	CN	Description
*	6,020	98	Paved parking
	6,865	96	Gravel surface, HSG A
	8,418	96	Gravel surface, HSG C
	824	74	>75% Grass cover, Good, HSG C
	2,064	70	Woods, Good, HSG C
	24,191	94	Weighted Average
	18,171		75.11% Pervious Area
	6,020		24.89% Impervious Area

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

Summary for Subcatchment 5S: SUBCATCHMENT AREA 5S

Runoff = 3.82 cfs @ 12.09 hrs, Volume= 0.278 af, Depth= 4.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.69"

	Area (sf)	CN	Description
*	10,817	98	Paved parking
	17,733	96	Gravel surface, HSG A
	339	96	Gravel surface, HSG C
	2,799	39	>75% Grass cover, Good, HSG A
	2,763	30	Woods, Good, HSG A
	34,451	87	Weighted Average
	23,634		68.60% Pervious Area
	10,817		31.40% Impervious Area

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

Summary for Pond 1P: EX. CB 1

[58] Hint: Peaked 61.31' above defined flood level

Inflow Area = 0.791 ac, 31.40% Impervious, Inflow Depth = 4.22" for 25-YR event
Inflow = 3.82 cfs @ 12.09 hrs, Volume= 0.278 af
Outflow = 3.82 cfs @ 12.09 hrs, Volume= 0.278 af, Atten= 0%, Lag= 0.0 min
Primary = 3.82 cfs @ 12.09 hrs, Volume= 0.278 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 273.26' @ 12.08 hrs
Flood Elev= 211.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	208.10'	**8.0" Round Culvert** L= 110.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 208.10' / 207.78' S= 0.0029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=3.81 cfs @ 12.09 hrs HW=273.01' TW=259.28' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 3.81 cfs @ 10.91 fps)

Summary for Pond 2P: EX. CB 2

[58] Hint: Peaked 49.98' above defined flood level

Inflow Area = 1.346 ac, 28.71% Impervious, Inflow Depth = 4.54" for 25-YR event
Inflow = 6.81 cfs @ 12.08 hrs, Volume= 0.509 af
Outflow = 6.81 cfs @ 12.08 hrs, Volume= 0.509 af, Atten= 0%, Lag= 0.0 min
Primary = 6.81 cfs @ 12.08 hrs, Volume= 0.509 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 259.48' @ 12.08 hrs
Flood Elev= 209.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	207.58'	**8.0" Round Culvert**

L= 142.0' CPP, square edge headwall, Ke= 0.500
Inlet / Outlet Invert= 207.58' / 204.71' S= 0.0202 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=6.80 cfs @ 12.08 hrs HW=259.28' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 6.80 cfs @ 19.47 fps)

Summary for Pond 3P: EX. CULVERT

[58] Hint: Peaked 0.39' above defined flood level

Inflow Area =	1.256 ac,	45.65% Impervious,	Inflow Depth =	2.13" for 25-YR event
Inflow =	3.05 cfs @	12.09 hrs, Volume=	0.223 af	
Outflow =	3.05 cfs @	12.09 hrs, Volume=	0.223 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.05 cfs @	12.09 hrs, Volume=	0.223 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 206.39' @ 12.09 hrs
Flood Elev= 206.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	204.45'	**10.0" Round Culvert**
			L= 40.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 204.45' / 204.05' S= 0.0100 '/' Cc= 0.900
			n= 0.013 Cast iron, coated, Flow Area= 0.55 sf

Primary OutFlow Max=3.04 cfs @ 12.09 hrs HW=206.38' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 3.04 cfs @ 5.58 fps)

Summary for Pond 4P: EX. CULVERT

Inflow Area =	1.656 ac,	0.00% Impervious,	Inflow Depth =	2.56" for 25-YR event
Inflow =	3.88 cfs @	12.19 hrs, Volume=	0.353 af	
Outflow =	3.88 cfs @	12.19 hrs, Volume=	0.353 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.88 cfs @	12.19 hrs, Volume=	0.353 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 210.94' @ 12.19 hrs
Flood Elev= 214.00'

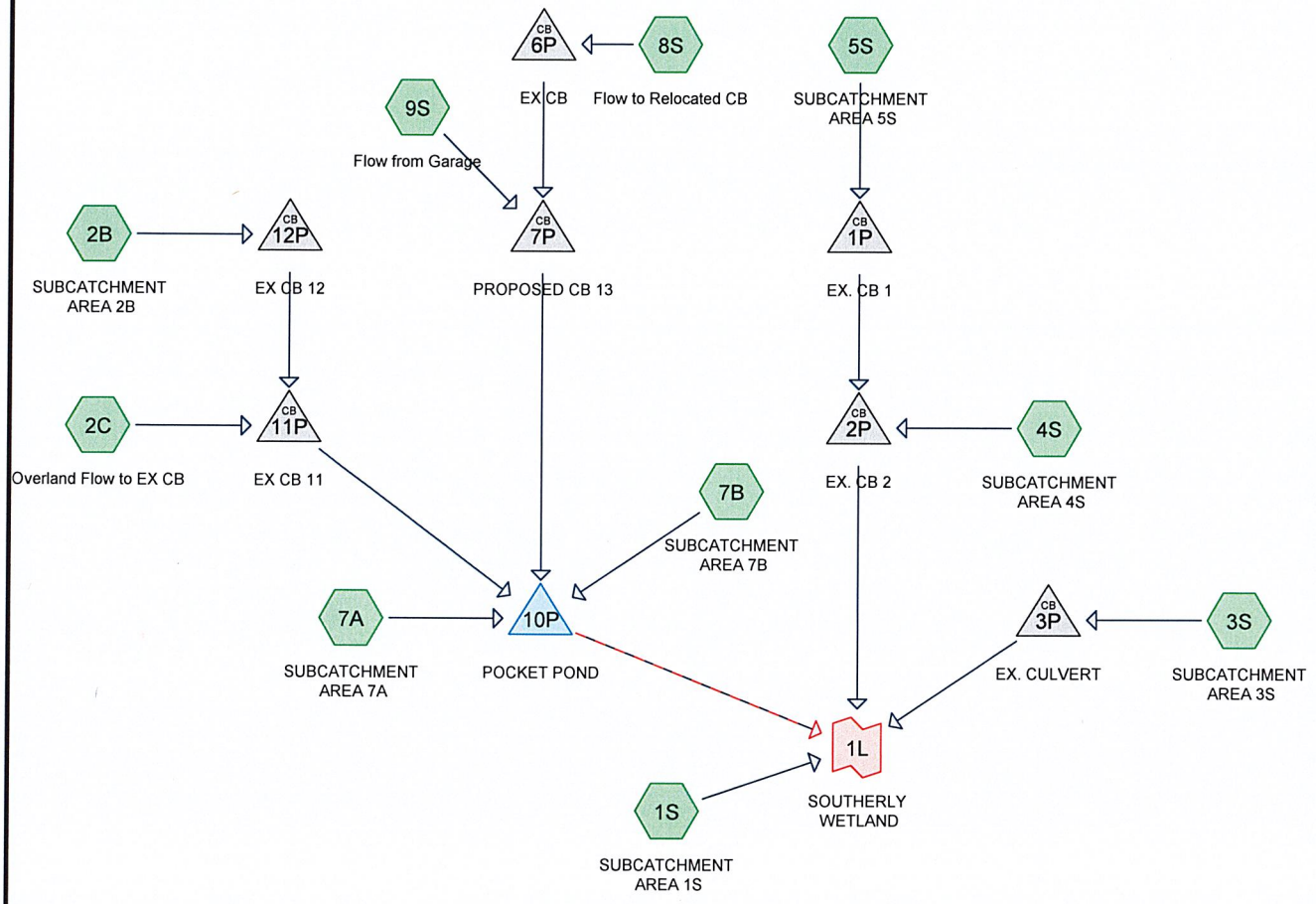
Device	Routing	Invert	Outlet Devices
#1	Primary	210.10'	**24.0" Round Culvert**
			L= 260.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 210.10' / 204.99' S= 0.0197 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=3.88 cfs @ 12.19 hrs HW=210.94' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 3.88 cfs @ 3.12 fps)

Summary for Link 1L: SOUTHERLY WETLAND

Inflow Area = 6.548 ac, 18.15% Impervious, Inflow Depth = 3.04" for 25-YR event
Inflow = 20.77 cfs @ 12.09 hrs, Volume= 1.662 af
Primary = 20.77 cfs @ 12.09 hrs, Volume= 1.662 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs



Subcat Reach Pond Link

Routing Diagram for POST DEVELOPMENT

Prepared by Keach-Nordstrom Associates, Inc. , Printed 8/12/2024

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.973	39	>75% Grass cover, Good, HSG A (1S, 3S, 5S, 8S, 9S)
0.573	74	>75% Grass cover, Good, HSG C (1S, 2C, 7A, 9S)
1.188	98	Paved parking (3S, 4S, 7B)
0.958	98	Paved parking, HSG A (1S, 5S, 9S)
1.283	98	Paved parking, HSG C (1S, 2B, 2C, 5S, 7A, 8S, 9S)
0.037	98	Roofs, HSG A (1S, 9S)
0.337	98	Roofs, HSG C (1S, 2C, 9S)
0.319	30	Woods, Good, HSG A (1S, 3S, 5S, 8S, 9S)
0.880	70	Woods, Good, HSG C (1S, 2C, 7A, 9S)
6.548	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.287	HSG A	1S, 3S, 5S, 8S, 9S
0.000	HSG B	
3.073	HSG C	1S, 2B, 2C, 5S, 7A, 8S, 9S
0.000	HSG D	
1.188	Other	3S, 4S, 7B
6.548		**TOTAL AREA**

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: SUBCATCHMENT Runoff Area=99,840 sf 39.30% Impervious Runoff Depth=0.93"
Tc=6.0 min CN=75 Runoff=2.37 cfs 0.179 af

Subcatchment 2B: SUBCATCHMENT AREA Runoff Area=97 sf 100.00% Impervious Runoff Depth=2.73"
Tc=6.0 min CN=98 Runoff=0.01 cfs 0.001 af

Subcatchment 2C: Overland Flow to EX CB Runoff Area=48,598 sf 81.00% Impervious Runoff Depth=2.22"
Flow Length=337' Tc=8.3 min CN=93 Runoff=2.61 cfs 0.206 af

Subcatchment 3S: SUBCATCHMENT Runoff Area=54,724 sf 45.65% Impervious Runoff Depth=0.49"
Tc=6.0 min CN=65 Runoff=0.52 cfs 0.051 af

Subcatchment 4S: SUBCATCHMENT Runoff Area=24,332 sf 100.00% Impervious Runoff Depth=2.73"
Tc=6.0 min CN=98 Runoff=1.60 cfs 0.127 af

Subcatchment 5S: SUBCATCHMENT Runoff Area=26,352 sf 81.13% Impervious Runoff Depth=1.63"
Tc=6.0 min CN=86 Runoff=1.16 cfs 0.082 af

Subcatchment 7A: SUBCATCHMENT AREA Runoff Area=9,420 sf 29.32% Impervious Runoff Depth=1.28"
Tc=6.0 min CN=81 Runoff=0.32 cfs 0.023 af

Subcatchment 7B: SUBCATCHMENT Runoff Area=2,430 sf 100.00% Impervious Runoff Depth=2.73"
Tc=6.0 min CN=98 Runoff=0.16 cfs 0.013 af

Subcatchment 8S: Flow to Relocated CB Runoff Area=693 sf 7.79% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=36 Runoff=0.00 cfs 0.000 af

Subcatchment 9S: Flow from Garage Runoff Area=18,732 sf 58.92% Impervious Runoff Depth=1.63"
Tc=6.0 min CN=86 Runoff=0.82 cfs 0.058 af

Pond 1P: EX. CB 1 Peak Elev=215.50' Inflow=1.16 cfs 0.082 af
8.0" Round Culvert n=0.013 L=110.0' S=0.0029 '/' Outflow=1.16 cfs 0.082 af

Pond 2P: EX. CB 2 Peak Elev=214.24' Inflow=2.76 cfs 0.209 af
8.0" Round Culvert n=0.013 L=142.0' S=0.0202 '/' Outflow=2.76 cfs 0.209 af

Pond 3P: EX. CULVERT Peak Elev=204.85' Inflow=0.52 cfs 0.051 af
10.0" Round Culvert n=0.013 L=40.0' S=0.0100 '/' Outflow=0.52 cfs 0.051 af

Pond 6P: EX CB Peak Elev=215.60' Inflow=0.00 cfs 0.000 af
15.0" Round Culvert n=0.013 L=80.0' S=0.0107 '/' Outflow=0.00 cfs 0.000 af

Pond 7P: PROPOSED CB 13 Peak Elev=215.07' Inflow=0.82 cfs 0.058 af
15.0" Round Culvert n=0.013 L=199.4' S=0.0100 '/' Outflow=0.82 cfs 0.058 af

Pond 10P: POCKET POND Peak Elev=212.53' Storage=7,821 cf Inflow=3.88 cfs 0.301 af
Primary=0.97 cfs 0.300 af Secondary=0.00 cfs 0.000 af Outflow=0.97 cfs 0.300 af

Pond 11P: EX CB 11 Peak Elev=214.65' Inflow=2.61 cfs 0.207 af
15.0" Round Culvert n=0.013 L=59.5' S=0.0045 '/' Outflow=2.61 cfs 0.207 af

Pond 12P: EX CB 12 Peak Elev=214.79' Inflow=0.01 cfs 0.001 af
12.0" Round Culvert n=0.013 L=111.0' S=0.0095 '/' Outflow=0.01 cfs 0.001 af

Link 1L: SOUTHERLY WETLAND Inflow=6.09 cfs 0.739 af
Primary=6.09 cfs 0.739 af

Total Runoff Area = 6.548 ac Runoff Volume = 0.739 af Average Runoff Depth = 1.36"
41.91% Pervious = 2.744 ac 58.09% Impervious = 3.803 ac

Summary for Subcatchment 1S: SUBCATCHMENT AREA 1S

Runoff = 2.37 cfs @ 12.10 hrs, Volume= 0.179 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=2.96"

Area (sf)	CN	Description
24,949	98	Paved parking, HSG A
11,159	98	Paved parking, HSG C
12,685	39	>75% Grass cover, Good, HSG A
12,256	74	>75% Grass cover, Good, HSG C
7,475	30	Woods, Good, HSG A
28,186	70	Woods, Good, HSG C
1,525	98	Roofs, HSG C
1,605	98	Roofs, HSG A
99,840	75	Weighted Average
60,602		60.70% Pervious Area
39,238		39.30% Impervious Area

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

Summary for Subcatchment 2B: SUBCATCHMENT AREA 2B

Runoff = 0.01 cfs @ 12.08 hrs, Volume= 0.001 af, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=2.96"

Area (sf)	CN	Description
97	98	Paved parking, HSG C
97		100.00% Impervious Area

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

Summary for Subcatchment 2C: Overland Flow to EX CB

Runoff = 2.61 cfs @ 12.11 hrs, Volume= 0.206 af, Depth= 2.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=2.96"

Area (sf)	CN	Description
34,562	98	Paved parking, HSG C
4,800	98	Roofs, HSG C
3,746	74	>75% Grass cover, Good, HSG C
5,490	70	Woods, Good, HSG C
48,598	93	Weighted Average
9,236		19.00% Pervious Area
39,362		81.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	34	0.0580	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.97"
0.8	16	0.3125	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.97"
1.4	287	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.3	337	Total			

Summary for Subcatchment 3S: SUBCATCHMENT AREA 3S

Runoff = 0.52 cfs @ 12.11 hrs, Volume= 0.051 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=2.96"

	Area (sf)	CN	Description
*	24,983	98	Paved parking
	27,071	39	>75% Grass cover, Good, HSG A
	2,670	30	Woods, Good, HSG A
	54,724	65	Weighted Average
	29,741		54.35% Pervious Area
	24,983		45.65% Impervious Area

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

Summary for Subcatchment 4S: SUBCATCHMENT AREA 4S

Runoff = 1.60 cfs @ 12.08 hrs, Volume= 0.127 af, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=2.96"

	Area (sf)	CN	Description
*	24,332	98	Paved parking
	24,332		100.00% Impervious Area

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

Summary for Subcatchment 5S: SUBCATCHMENT AREA 5S

Runoff = 1.16 cfs @ 12.09 hrs, Volume= 0.082 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=2.96"

Area (sf)	CN	Description
4,999	98	Paved parking, HSG C
16,381	98	Paved parking, HSG A
2,338	39	>75% Grass cover, Good, HSG A
2,634	30	Woods, Good, HSG A
26,352	86	Weighted Average
4,972		18.87% Pervious Area
21,380		81.13% Impervious Area

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

Summary for Subcatchment 7A: SUBCATCHMENT AREA 7A

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 0.023 af, Depth= 1.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=2.96"

Area (sf)	CN	Description
6,369	74	>75% Grass cover, Good, HSG C
2,762	98	Paved parking, HSG C
289	70	Woods, Good, HSG C
9,420	81	Weighted Average
6,658		70.68% Pervious Area
2,762		29.32% Impervious Area

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

Summary for Subcatchment 7B: SUBCATCHMENT AREA 7B

Runoff = 0.16 cfs @ 12.08 hrs, Volume= 0.013 af, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=2.96"

	Area (sf)	CN	Description
*	2,430	98	Paved parking
	2,430		100.00% Impervious Area

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

Summary for Subcatchment 8S: Flow to Relocated CB

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=2.96"

Area (sf)	CN	Description
608	30	Woods, Good, HSG A
31	39	>75% Grass cover, Good, HSG A
54	98	Paved parking, HSG C
693	36	Weighted Average
639		92.21% Pervious Area
54		7.79% Impervious Area

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

Summary for Subcatchment 9S: Flow from Garage

Runoff = 0.82 cfs @ 12.09 hrs, Volume= 0.058 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=2.96"

Area (sf)	CN	Description
2,250	98	Paved parking, HSG C
8,372	98	Roofs, HSG C
2,585	74	>75% Grass cover, Good, HSG C
4,364	70	Woods, Good, HSG C
386	98	Paved parking, HSG A
239	39	>75% Grass cover, Good, HSG A
508	30	Woods, Good, HSG A
28	98	Roofs, HSG A
18,732	86	Weighted Average
7,696		41.08% Pervious Area
11,036		58.92% Impervious Area

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

Summary for Pond 1P: EX. CB 1

[58] Hint: Peaked 3.55' above defined flood level

Inflow Area = 0.605 ac, 81.13% Impervious, Inflow Depth = 1.63" for 2-YR event
Inflow = 1.16 cfs @ 12.09 hrs, Volume= 0.082 af
Outflow = 1.16 cfs @ 12.09 hrs, Volume= 0.082 af, Atten= 0%, Lag= 0.0 min
Primary = 1.16 cfs @ 12.09 hrs, Volume= 0.082 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 215.50' @ 12.09 hrs
Flood Elev= 211.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	208.10'	**8.0" Round Culvert** L= 110.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 208.10' / 207.78' S= 0.0029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.15 cfs @ 12.09 hrs HW=215.47' TW=214.21' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 1.15 cfs @ 3.31 fps)

Summary for Pond 2P: EX. CB 2

[58] Hint: Peaked 4.74' above defined flood level

Inflow Area = 1.164 ac, 90.19% Impervious, Inflow Depth = 2.16" for 2-YR event
Inflow = 2.76 cfs @ 12.09 hrs, Volume= 0.209 af
Outflow = 2.76 cfs @ 12.09 hrs, Volume= 0.209 af, Atten= 0%, Lag= 0.0 min
Primary = 2.76 cfs @ 12.09 hrs, Volume= 0.209 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 214.24' @ 12.09 hrs
Flood Elev= 209.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	207.58'	**8.0" Round Culvert** L= 142.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 207.58' / 204.71' S= 0.0202 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=2.75 cfs @ 12.09 hrs HW=214.20' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 2.75 cfs @ 7.88 fps)

Summary for Pond 3P: EX. CULVERT

Inflow Area = 1.256 ac, 45.65% Impervious, Inflow Depth = 0.49" for 2-YR event
Inflow = 0.52 cfs @ 12.11 hrs, Volume= 0.051 af
Outflow = 0.52 cfs @ 12.11 hrs, Volume= 0.051 af, Atten= 0%, Lag= 0.0 min
Primary = 0.52 cfs @ 12.11 hrs, Volume= 0.051 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 204.85' @ 12.11 hrs
Flood Elev= 206.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	204.45'	**10.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 204.45' / 204.05' S= 0.0100 '/' Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 0.55 sf

Primary OutFlow Max=0.52 cfs @ 12.11 hrs HW=204.85' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 0.52 cfs @ 2.95 fps)

Summary for Pond 6P: EX CB

Inflow Area = 0.016 ac, 7.79% Impervious, Inflow Depth = 0.00" for 2-YR event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 215.60' @ 0.00 hrs
Flood Elev= 219.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	215.60'	**15.0" Round Culvert** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 215.60' / 214.74' S= 0.0107 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=215.60' TW=214.64' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)

Summary for Pond 7P: PROPOSED CB 13

Inflow Area = 0.446 ac, 57.09% Impervious, Inflow Depth = 1.57" for 2-YR event
Inflow = 0.82 cfs @ 12.09 hrs, Volume= 0.058 af
Outflow = 0.82 cfs @ 12.09 hrs, Volume= 0.058 af, Atten= 0%, Lag= 0.0 min
Primary = 0.82 cfs @ 12.09 hrs, Volume= 0.058 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 215.07' @ 12.09 hrs
Flood Elev= 217.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	214.64'	**15.0" Round Culvert** L= 199.4' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.64' / 212.65' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.82 cfs @ 12.09 hrs HW=215.07' TW=211.63' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.82 cfs @ 2.22 fps)

Summary for Pond 10P: POCKET POND

Inflow Area =	1.836 ac, 69.70% Impervious, Inflow Depth =	1.97"	for 2-YR event	
Inflow =	3.88 cfs @	12.11 hrs, Volume=	0.301 af	
Outflow =	0.97 cfs @	12.51 hrs, Volume=	0.300 af,	Atten= 75%, Lag= 24.5 min
Primary =	0.97 cfs @	12.51 hrs, Volume=	0.300 af	
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 210.20' Surf.Area= 1,556 sf Storage= 2,996 cf
Peak Elev= 212.53' @ 12.51 hrs Surf.Area= 2,612 sf Storage= 7,821 cf (4,825 cf above start)
Flood Elev= 215.00' Surf.Area= 3,890 sf Storage= 15,824 cf (12,827 cf above start)

Plug-Flow detention time= 228.1 min calculated for 0.232 af (77% of inflow)
Center-of-Mass det. time= 85.8 min (890.6 - 804.8)

Volume	Invert	Avail.Storage	Storage Description
#1	207.00'	15,824 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
207.00	373	0	0
208.00	693	533	533
210.00	1,468	2,161	2,694
212.00	2,351	3,819	6,513
214.00	3,343	5,694	12,207
215.00	3,890	3,617	15,824

Device	Routing	Invert	Outlet Devices
#1	Primary	210.20'	**24.0" Round Culvert** L= 260.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 210.20' / 204.99' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	210.20'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	212.20'	**7.0" W x 12.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	213.90'	**48.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	214.50'	**10.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.97 cfs @ 12.51 hrs HW=212.53' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.97 cfs of 17.43 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.62 cfs @ 7.08 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.35 cfs @ 1.84 fps)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=210.20' TW=0.00' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 11P: EX CB 11

Inflow Area = 1.118 ac, 81.03% Impervious, Inflow Depth = 2.22" for 2-YR event
Inflow = 2.61 cfs @ 12.11 hrs, Volume= 0.207 af
Outflow = 2.61 cfs @ 12.11 hrs, Volume= 0.207 af, Atten= 0%, Lag= 0.0 min
Primary = 2.61 cfs @ 12.11 hrs, Volume= 0.207 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 214.65' @ 12.11 hrs
Flood Elev= 217.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	213.67'	**15.0" Round Culvert** L= 59.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.67' / 213.40' S= 0.0045 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.61 cfs @ 12.11 hrs HW=214.65' TW=211.77' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 2.61 cfs @ 3.49 fps)

Summary for Pond 12P: EX CB 12

Inflow Area = 0.002 ac,100.00% Impervious, Inflow Depth = 2.73" for 2-YR event
Inflow = 0.01 cfs @ 12.08 hrs, Volume= 0.001 af
Outflow = 0.01 cfs @ 12.08 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min
Primary = 0.01 cfs @ 12.08 hrs, Volume= 0.001 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 214.79' @ 12.10 hrs
Flood Elev= 219.03'

Device	Routing	Invert	Outlet Devices
#1	Primary	214.72'	**12.0" Round Culvert** L= 111.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.72' / 213.67' S= 0.0095 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.01 cfs @ 12.08 hrs HW=214.79' TW=214.61' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.01 cfs @ 0.45 fps)

Summary for Link 1L: SOUTHERLY WETLAND

Inflow Area = 6.548 ac, 58.09% Impervious, Inflow Depth = 1.35" for 2-YR event
Inflow = 6.09 cfs @ 12.09 hrs, Volume= 0.739 af
Primary = 6.09 cfs @ 12.09 hrs, Volume= 0.739 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: SUBCATCHMENT Runoff Area=99,840 sf 39.30% Impervious Runoff Depth=2.04"
Tc=6.0 min CN=75 Runoff=5.45 cfs 0.390 af

Subcatchment 2B: SUBCATCHMENT AREA Runoff Area=97 sf 100.00% Impervious Runoff Depth=4.25"
Tc=6.0 min CN=98 Runoff=0.01 cfs 0.001 af

Subcatchment 2C: Overland Flow to EX CB Runoff Area=48,598 sf 81.00% Impervious Runoff Depth=3.70"
Flow Length=337' Tc=8.3 min CN=93 Runoff=4.24 cfs 0.344 af

Subcatchment 3S: SUBCATCHMENT Runoff Area=54,724 sf 45.65% Impervious Runoff Depth=1.32"
Tc=6.0 min CN=65 Runoff=1.81 cfs 0.139 af

Subcatchment 4S: SUBCATCHMENT Runoff Area=24,332 sf 100.00% Impervious Runoff Depth=4.25"
Tc=6.0 min CN=98 Runoff=2.45 cfs 0.198 af

Subcatchment 5S: SUBCATCHMENT Runoff Area=26,352 sf 81.13% Impervious Runoff Depth=2.99"
Tc=6.0 min CN=86 Runoff=2.10 cfs 0.151 af

Subcatchment 7A: SUBCATCHMENT AREA Runoff Area=9,420 sf 29.32% Impervious Runoff Depth=2.54"
Tc=6.0 min CN=81 Runoff=0.64 cfs 0.046 af

Subcatchment 7B: SUBCATCHMENT Runoff Area=2,430 sf 100.00% Impervious Runoff Depth=4.25"
Tc=6.0 min CN=98 Runoff=0.24 cfs 0.020 af

Subcatchment 8S: Flow to Relocated CB Runoff Area=693 sf 7.79% Impervious Runoff Depth=0.05"
Tc=6.0 min CN=36 Runoff=0.00 cfs 0.000 af

Subcatchment 9S: Flow from Garage Runoff Area=18,732 sf 58.92% Impervious Runoff Depth=2.99"
Tc=6.0 min CN=86 Runoff=1.50 cfs 0.107 af

Pond 1P: EX. CB 1 Peak Elev=233.76' Inflow=2.10 cfs 0.151 af
8.0" Round Culvert n=0.013 L=110.0' S=0.0029 '/' Outflow=2.10 cfs 0.151 af

Pond 2P: EX. CB 2 Peak Elev=229.57' Inflow=4.55 cfs 0.349 af
8.0" Round Culvert n=0.013 L=142.0' S=0.0202 '/' Outflow=4.55 cfs 0.349 af

Pond 3P: EX. CULVERT Peak Elev=205.35' Inflow=1.81 cfs 0.139 af
10.0" Round Culvert n=0.013 L=40.0' S=0.0100 '/' Outflow=1.81 cfs 0.139 af

Pond 6P: EX CB Peak Elev=215.61' Inflow=0.00 cfs 0.000 af
15.0" Round Culvert n=0.013 L=80.0' S=0.0107 '/' Outflow=0.00 cfs 0.000 af

Pond 7P: PROPOSED CB 13 Peak Elev=215.23' Inflow=1.50 cfs 0.107 af
15.0" Round Culvert n=0.013 L=199.4' S=0.0100 '/' Outflow=1.50 cfs 0.107 af

Pond 10P: POCKET POND Peak Elev=213.29' Storage=9,970 cf Inflow=6.56 cfs 0.517 af
Primary=2.81 cfs 0.517 af Secondary=0.00 cfs 0.000 af Outflow=2.81 cfs 0.517 af

Pond 11P: EX CB 11 Peak Elev=215.05' Inflow=4.25 cfs 0.345 af
15.0" Round Culvert n=0.013 L=59.5' S=0.0045 '/' Outflow=4.25 cfs 0.345 af

Pond 12P: EX CB 12 Peak Elev=215.05' Inflow=0.01 cfs 0.001 af
12.0" Round Culvert n=0.013 L=111.0' S=0.0095 '/' Outflow=0.01 cfs 0.001 af

Link 1L: SOUTHERLY WETLAND Inflow=12.97 cfs 1.395 af
Primary=12.97 cfs 1.395 af

Total Runoff Area = 6.548 ac Runoff Volume = 1.395 af Average Runoff Depth = 2.56"
41.91% Pervious = 2.744 ac 58.09% Impervious = 3.803 ac

Summary for Subcatchment 1S: SUBCATCHMENT AREA 1S

Runoff = 5.45 cfs @ 12.09 hrs, Volume= 0.390 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.49"

Area (sf)	CN	Description
24,949	98	Paved parking, HSG A
11,159	98	Paved parking, HSG C
12,685	39	>75% Grass cover, Good, HSG A
12,256	74	>75% Grass cover, Good, HSG C
7,475	30	Woods, Good, HSG A
28,186	70	Woods, Good, HSG C
1,525	98	Roofs, HSG C
1,605	98	Roofs, HSG A
99,840	75	Weighted Average
60,602		60.70% Pervious Area
39,238		39.30% Impervious Area

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

Summary for Subcatchment 2B: SUBCATCHMENT AREA 2B

Runoff = 0.01 cfs @ 12.08 hrs, Volume= 0.001 af, Depth= 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.49"

Area (sf)	CN	Description
97	98	Paved parking, HSG C
97		100.00% Impervious Area

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

Summary for Subcatchment 2C: Overland Flow to EX CB

Runoff = 4.24 cfs @ 12.11 hrs, Volume= 0.344 af, Depth= 3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.49"

Area (sf)	CN	Description
34,562	98	Paved parking, HSG C
4,800	98	Roofs, HSG C
3,746	74	>75% Grass cover, Good, HSG C
5,490	70	Woods, Good, HSG C
48,598	93	Weighted Average
9,236		19.00% Pervious Area
39,362		81.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	34	0.0580	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.97"
0.8	16	0.3125	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.97"
1.4	287	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.3	337	Total			

Summary for Subcatchment 3S: SUBCATCHMENT AREA 3S

Runoff = 1.81 cfs @ 12.10 hrs, Volume= 0.139 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.49"

	Area (sf)	CN	Description
*	24,983	98	Paved parking
	27,071	39	>75% Grass cover, Good, HSG A
	2,670	30	Woods, Good, HSG A
	54,724	65	Weighted Average
	29,741		54.35% Pervious Area
	24,983		45.65% Impervious Area

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

Summary for Subcatchment 4S: SUBCATCHMENT AREA 4S

Runoff = 2.45 cfs @ 12.08 hrs, Volume= 0.198 af, Depth= 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.49"

	Area (sf)	CN	Description
*	24,332	98	Paved parking
	24,332		100.00% Impervious Area

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

Summary for Subcatchment 5S: SUBCATCHMENT AREA 5S

Runoff = 2.10 cfs @ 12.09 hrs, Volume= 0.151 af, Depth= 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.49"

Area (sf)	CN	Description
4,999	98	Paved parking, HSG C
16,381	98	Paved parking, HSG A
2,338	39	>75% Grass cover, Good, HSG A
2,634	30	Woods, Good, HSG A
26,352	86	Weighted Average
4,972		18.87% Pervious Area
21,380		81.13% Impervious Area

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

Summary for Subcatchment 7A: SUBCATCHMENT AREA 7A

Runoff = 0.64 cfs @ 12.09 hrs, Volume= 0.046 af, Depth= 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.49"

Area (sf)	CN	Description
6,369	74	>75% Grass cover, Good, HSG C
2,762	98	Paved parking, HSG C
289	70	Woods, Good, HSG C
9,420	81	Weighted Average
6,658		70.68% Pervious Area
2,762		29.32% Impervious Area

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

Summary for Subcatchment 7B: SUBCATCHMENT AREA 7B

Runoff = 0.24 cfs @ 12.08 hrs, Volume= 0.020 af, Depth= 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.49"

	Area (sf)	CN	Description
*	2,430	98	Paved parking
	2,430		100.00% Impervious Area

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

Summary for Subcatchment 8S: Flow to Relocated CB

Runoff = 0.00 cfs @ 15.66 hrs, Volume= 0.000 af, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.49"

Area (sf)	CN	Description
608	30	Woods, Good, HSG A
31	39	>75% Grass cover, Good, HSG A
54	98	Paved parking, HSG C
693	36	Weighted Average
639		92.21% Pervious Area
54		7.79% Impervious Area

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

Summary for Subcatchment 9S: Flow from Garage

Runoff = 1.50 cfs @ 12.09 hrs, Volume= 0.107 af, Depth= 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.49"

Area (sf)	CN	Description
2,250	98	Paved parking, HSG C
8,372	98	Roofs, HSG C
2,585	74	>75% Grass cover, Good, HSG C
4,364	70	Woods, Good, HSG C
386	98	Paved parking, HSG A
239	39	>75% Grass cover, Good, HSG A
508	30	Woods, Good, HSG A
28	98	Roofs, HSG A
18,732	86	Weighted Average
7,696		41.08% Pervious Area
11,036		58.92% Impervious Area

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

Summary for Pond 1P: EX. CB 1

[58] Hint: Peaked 21.81' above defined flood level

Inflow Area = 0.605 ac, 81.13% Impervious, Inflow Depth = 2.99" for 10-YR event
Inflow = 2.10 cfs @ 12.09 hrs, Volume= 0.151 af
Outflow = 2.10 cfs @ 12.09 hrs, Volume= 0.151 af, Atten= 0%, Lag= 0.0 min
Primary = 2.10 cfs @ 12.09 hrs, Volume= 0.151 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 233.76' @ 12.09 hrs
Flood Elev= 211.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	208.10'	**8.0" Round Culvert** L= 110.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 208.10' / 207.78' S= 0.0029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=2.10 cfs @ 12.09 hrs HW=233.66' TW=229.48' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 2.10 cfs @ 6.02 fps)

Summary for Pond 2P: EX. CB 2

[58] Hint: Peaked 20.07' above defined flood level

Inflow Area = 1.164 ac, 90.19% Impervious, Inflow Depth = 3.60" for 10-YR event
Inflow = 4.55 cfs @ 12.08 hrs, Volume= 0.349 af
Outflow = 4.55 cfs @ 12.08 hrs, Volume= 0.349 af, Atten= 0%, Lag= 0.0 min
Primary = 4.55 cfs @ 12.08 hrs, Volume= 0.349 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 229.57' @ 12.08 hrs
Flood Elev= 209.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	207.58'	**8.0" Round Culvert** L= 142.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 207.58' / 204.71' S= 0.0202 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=4.55 cfs @ 12.08 hrs HW=229.48' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 4.55 cfs @ 13.02 fps)

Summary for Pond 3P: EX. CULVERT

Inflow Area = 1.256 ac, 45.65% Impervious, Inflow Depth = 1.32" for 10-YR event
Inflow = 1.81 cfs @ 12.10 hrs, Volume= 0.139 af
Outflow = 1.81 cfs @ 12.10 hrs, Volume= 0.139 af, Atten= 0%, Lag= 0.0 min
Primary = 1.81 cfs @ 12.10 hrs, Volume= 0.139 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 205.35' @ 12.10 hrs
Flood Elev= 206.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	204.45'	**10.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 204.45' / 204.05' S= 0.0100 '/' Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 0.55 sf

Primary OutFlow Max=1.81 cfs @ 12.10 hrs HW=205.35' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 1.81 cfs @ 3.83 fps)

Summary for Pond 6P: EX CB

Inflow Area = 0.016 ac, 7.79% Impervious, Inflow Depth = 0.05" for 10-YR event
Inflow = 0.00 cfs @ 15.66 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 15.66 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 15.66 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 215.61' @ 15.62 hrs
Flood Elev= 219.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	215.60'	**15.0" Round Culvert** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 215.60' / 214.74' S= 0.0107 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.00 cfs @ 15.66 hrs HW=215.61' TW=214.75' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.00 cfs @ 0.23 fps)

Summary for Pond 7P: PROPOSED CB 13

Inflow Area = 0.446 ac, 57.09% Impervious, Inflow Depth = 2.89" for 10-YR event
Inflow = 1.50 cfs @ 12.09 hrs, Volume= 0.107 af
Outflow = 1.50 cfs @ 12.09 hrs, Volume= 0.107 af, Atten= 0%, Lag= 0.0 min
Primary = 1.50 cfs @ 12.09 hrs, Volume= 0.107 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 215.23' @ 12.09 hrs
Flood Elev= 217.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	214.64'	**15.0" Round Culvert** L= 199.4' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.64' / 212.65' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.49 cfs @ 12.09 hrs HW=215.23' TW=212.59' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.49 cfs @ 2.62 fps)

Summary for Pond 10P: POCKET POND

Inflow Area = 1.836 ac, 69.70% Impervious, Inflow Depth = 3.38" for 10-YR event
Inflow = 6.56 cfs @ 12.10 hrs, Volume= 0.517 af
Outflow = 2.81 cfs @ 12.33 hrs, Volume= 0.517 af, Atten= 57%, Lag= 13.9 min
Primary = 2.81 cfs @ 12.33 hrs, Volume= 0.517 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 210.20' Surf.Area= 1,556 sf Storage= 2,996 cf
Peak Elev= 213.29' @ 12.33 hrs Surf.Area= 2,993 sf Storage= 9,970 cf (6,973 cf above start)
Flood Elev= 215.00' Surf.Area= 3,890 sf Storage= 15,824 cf (12,827 cf above start)

Plug-Flow detention time= 170.6 min calculated for 0.448 af (87% of inflow)
Center-of-Mass det. time= 72.9 min (864.0 - 791.1)

Volume	Invert	Avail.Storage	Storage Description
#1	207.00'	15,824 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
207.00	373	0	0
208.00	693	533	533
210.00	1,468	2,161	2,694
212.00	2,351	3,819	6,513
214.00	3,343	5,694	12,207
215.00	3,890	3,617	15,824

Device	Routing	Invert	Outlet Devices
#1	Primary	210.20'	**24.0" Round Culvert** L= 260.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 210.20' / 204.99' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	210.20'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	212.20'	**7.0" W x 12.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	213.90'	**48.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	214.50'	**10.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=2.81 cfs @ 12.33 hrs HW=213.29' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.81 cfs of 21.89 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.72 cfs @ 8.24 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 2.09 cfs @ 3.58 fps)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=210.20' TW=0.00' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 11P: EX CB 11

Inflow Area = 1.118 ac, 81.03% Impervious, Inflow Depth = 3.70" for 10-YR event
Inflow = 4.25 cfs @ 12.11 hrs, Volume= 0.345 af
Outflow = 4.25 cfs @ 12.11 hrs, Volume= 0.345 af, Atten= 0%, Lag= 0.0 min
Primary = 4.25 cfs @ 12.11 hrs, Volume= 0.345 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 215.05' @ 12.11 hrs
Flood Elev= 217.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	213.67'	**15.0" Round Culvert** L= 59.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.67' / 213.40' S= 0.0045 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=4.24 cfs @ 12.11 hrs HW=215.04' TW=212.77' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 4.24 cfs @ 3.92 fps)

Summary for Pond 12P: EX CB 12

Inflow Area = 0.002 ac,100.00% Impervious, Inflow Depth = 4.25" for 10-YR event
Inflow = 0.01 cfs @ 12.08 hrs, Volume= 0.001 af
Outflow = 0.01 cfs @ 12.08 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min
Primary = 0.01 cfs @ 12.08 hrs, Volume= 0.001 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 215.05' @ 12.11 hrs
Flood Elev= 219.03'

Device	Routing	Invert	Outlet Devices
#1	Primary	214.72'	**12.0" Round Culvert** L= 111.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.72' / 213.67' S= 0.0095 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.01 cfs @ 12.08 hrs HW=214.99' TW=214.98' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.01 cfs @ 0.09 fps)

Summary for Link 1L: SOUTHERLY WETLAND

Inflow Area = 6.548 ac, 58.09% Impervious, Inflow Depth = 2.56" for 10-YR event
Inflow = 12.97 cfs @ 12.10 hrs, Volume= 1.395 af
Primary = 12.97 cfs @ 12.10 hrs, Volume= 1.395 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: SUBCATCHMENT Runoff Area=99,840 sf 39.30% Impervious Runoff Depth=3.02"
Tc=6.0 min CN=75 Runoff=8.12 cfs 0.577 af

Subcatchment 2B: SUBCATCHMENT AREA Runoff Area=97 sf 100.00% Impervious Runoff Depth=5.45"
Tc=6.0 min CN=98 Runoff=0.01 cfs 0.001 af

Subcatchment 2C: Overland Flow to EX CB Runoff Area=48,598 sf 81.00% Impervious Runoff Depth=4.88"
Flow Length=337' Tc=8.3 min CN=93 Runoff=5.50 cfs 0.453 af

Subcatchment 3S: SUBCATCHMENT Runoff Area=54,724 sf 45.65% Impervious Runoff Depth=2.13"
Tc=6.0 min CN=65 Runoff=3.05 cfs 0.223 af

Subcatchment 4S: SUBCATCHMENT Runoff Area=24,332 sf 100.00% Impervious Runoff Depth=5.45"
Tc=6.0 min CN=98 Runoff=3.11 cfs 0.254 af

Subcatchment 5S: SUBCATCHMENT Runoff Area=26,352 sf 81.13% Impervious Runoff Depth=4.12"
Tc=6.0 min CN=86 Runoff=2.86 cfs 0.207 af

Subcatchment 7A: SUBCATCHMENT AREA Runoff Area=9,420 sf 29.32% Impervious Runoff Depth=3.60"
Tc=6.0 min CN=81 Runoff=0.91 cfs 0.065 af

Subcatchment 7B: SUBCATCHMENT Runoff Area=2,430 sf 100.00% Impervious Runoff Depth=5.45"
Tc=6.0 min CN=98 Runoff=0.31 cfs 0.025 af

Subcatchment 8S: Flow to Relocated CB Runoff Area=693 sf 7.79% Impervious Runoff Depth=0.23"
Tc=6.0 min CN=36 Runoff=0.00 cfs 0.000 af

Subcatchment 9S: Flow from Garage Runoff Area=18,732 sf 58.92% Impervious Runoff Depth=4.12"
Tc=6.0 min CN=86 Runoff=2.03 cfs 0.147 af

Pond 1P: EX. CB 1 Peak Elev=254.72' Inflow=2.86 cfs 0.207 af
8.0" Round Culvert n=0.013 L=110.0' S=0.0029 '/' Outflow=2.86 cfs 0.207 af

Pond 2P: EX. CB 2 Peak Elev=246.98' Inflow=5.97 cfs 0.461 af
8.0" Round Culvert n=0.013 L=142.0' S=0.0202 '/' Outflow=5.97 cfs 0.461 af

Pond 3P: EX. CULVERT Peak Elev=206.39' Inflow=3.05 cfs 0.223 af
10.0" Round Culvert n=0.013 L=40.0' S=0.0100 '/' Outflow=3.05 cfs 0.223 af

Pond 6P: EX CB Peak Elev=215.62' Inflow=0.00 cfs 0.000 af
15.0" Round Culvert n=0.013 L=80.0' S=0.0107 '/' Outflow=0.00 cfs 0.000 af

Pond 7P: PROPOSED CB 13 Peak Elev=215.34' Inflow=2.03 cfs 0.148 af
15.0" Round Culvert n=0.013 L=199.4' S=0.0100 '/' Outflow=2.03 cfs 0.148 af

Pond 10P: POCKET POND Peak Elev=213.90' Storage=11,860 cf Inflow=8.66 cfs 0.692 af
Primary=3.84 cfs 0.692 af Secondary=0.00 cfs 0.000 af Outflow=3.84 cfs 0.692 af

Pond 11P: EX CB 11 Peak Elev=215.56' Inflow=5.52 cfs 0.454 af
15.0" Round Culvert n=0.013 L=59.5' S=0.0045 '/' Outflow=5.52 cfs 0.454 af

Pond 12P: EX CB 12 Peak Elev=215.56' Inflow=0.01 cfs 0.001 af
12.0" Round Culvert n=0.013 L=111.0' S=0.0095 '/' Outflow=0.01 cfs 0.001 af

Link 1L: SOUTHERLY WETLAND Inflow=19.79 cfs 1.953 af
Primary=19.79 cfs 1.953 af

Total Runoff Area = 6.548 ac Runoff Volume = 1.953 af Average Runoff Depth = 3.58"
41.91% Pervious = 2.744 ac 58.09% Impervious = 3.803 ac

Summary for Subcatchment 1S: SUBCATCHMENT AREA 1S

Runoff = 8.12 cfs @ 12.09 hrs, Volume= 0.577 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.69"

Area (sf)	CN	Description
24,949	98	Paved parking, HSG A
11,159	98	Paved parking, HSG C
12,685	39	>75% Grass cover, Good, HSG A
12,256	74	>75% Grass cover, Good, HSG C
7,475	30	Woods, Good, HSG A
28,186	70	Woods, Good, HSG C
1,525	98	Roofs, HSG C
1,605	98	Roofs, HSG A
99,840	75	Weighted Average
60,602		60.70% Pervious Area
39,238		39.30% Impervious Area

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

Summary for Subcatchment 2B: SUBCATCHMENT AREA 2B

Runoff = 0.01 cfs @ 12.08 hrs, Volume= 0.001 af, Depth= 5.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.69"

Area (sf)	CN	Description
97	98	Paved parking, HSG C
97		100.00% Impervious Area

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

Summary for Subcatchment 2C: Overland Flow to EX CB

Runoff = 5.50 cfs @ 12.11 hrs, Volume= 0.453 af, Depth= 4.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.69"

Area (sf)	CN	Description
34,562	98	Paved parking, HSG C
4,800	98	Roofs, HSG C
3,746	74	>75% Grass cover, Good, HSG C
5,490	70	Woods, Good, HSG C
48,598	93	Weighted Average
9,236		19.00% Pervious Area
39,362		81.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	34	0.0580	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.97"
0.8	16	0.3125	0.34		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.97"
1.4	287	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.3	337	Total			

Summary for Subcatchment 3S: SUBCATCHMENT AREA 3S

Runoff = 3.05 cfs @ 12.09 hrs, Volume= 0.223 af, Depth= 2.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.69"

	Area (sf)	CN	Description
*	24,983	98	Paved parking
	27,071	39	>75% Grass cover, Good, HSG A
	2,670	30	Woods, Good, HSG A
	54,724	65	Weighted Average
	29,741		54.35% Pervious Area
	24,983		45.65% Impervious Area

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

Summary for Subcatchment 4S: SUBCATCHMENT AREA 4S

Runoff = 3.11 cfs @ 12.08 hrs, Volume= 0.254 af, Depth= 5.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.69"

	Area (sf)	CN	Description
*	24,332	98	Paved parking
	24,332		100.00% Impervious Area

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

Summary for Subcatchment 5S: SUBCATCHMENT AREA 5S

Runoff = 2.86 cfs @ 12.09 hrs, Volume= 0.207 af, Depth= 4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.69"

Area (sf)	CN	Description
4,999	98	Paved parking, HSG C
16,381	98	Paved parking, HSG A
2,338	39	>75% Grass cover, Good, HSG A
2,634	30	Woods, Good, HSG A
26,352	86	Weighted Average
4,972		18.87% Pervious Area
21,380		81.13% Impervious Area

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

Summary for Subcatchment 7A: SUBCATCHMENT AREA 7A

Runoff = 0.91 cfs @ 12.09 hrs, Volume= 0.065 af, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.69"

Area (sf)	CN	Description
6,369	74	>75% Grass cover, Good, HSG C
2,762	98	Paved parking, HSG C
289	70	Woods, Good, HSG C
9,420	81	Weighted Average
6,658		70.68% Pervious Area
2,762		29.32% Impervious Area

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

Summary for Subcatchment 7B: SUBCATCHMENT AREA 7B

Runoff = 0.31 cfs @ 12.08 hrs, Volume= 0.025 af, Depth= 5.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.69"

	Area (sf)	CN	Description
*	2,430	98	Paved parking
	2,430		100.00% Impervious Area

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

Summary for Subcatchment 8S: Flow to Relocated CB

Runoff = 0.00 cfs @ 12.47 hrs, Volume= 0.000 af, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.69"

Area (sf)	CN	Description
608	30	Woods, Good, HSG A
31	39	>75% Grass cover, Good, HSG A
54	98	Paved parking, HSG C
693	36	Weighted Average
639		92.21% Pervious Area
54		7.79% Impervious Area

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

Summary for Subcatchment 9S: Flow from Garage

Runoff = 2.03 cfs @ 12.09 hrs, Volume= 0.147 af, Depth= 4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=5.69"

Area (sf)	CN	Description
2,250	98	Paved parking, HSG C
8,372	98	Roofs, HSG C
2,585	74	>75% Grass cover, Good, HSG C
4,364	70	Woods, Good, HSG C
386	98	Paved parking, HSG A
239	39	>75% Grass cover, Good, HSG A
508	30	Woods, Good, HSG A
28	98	Roofs, HSG A
18,732	86	Weighted Average
7,696		41.08% Pervious Area
11,036		58.92% Impervious Area

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

Summary for Pond 1P: EX. CB 1

[58] Hint: Peaked 42.77' above defined flood level

Inflow Area = 0.605 ac, 81.13% Impervious, Inflow Depth = 4.12" for 25-YR event
Inflow = 2.86 cfs @ 12.09 hrs, Volume= 0.207 af
Outflow = 2.86 cfs @ 12.09 hrs, Volume= 0.207 af, Atten= 0%, Lag= 0.0 min
Primary = 2.86 cfs @ 12.09 hrs, Volume= 0.207 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 254.72' @ 12.08 hrs
Flood Elev= 211.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	208.10'	**8.0" Round Culvert** L= 110.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 208.10' / 207.78' S= 0.0029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=2.85 cfs @ 12.09 hrs HW=254.54' TW=246.82' (Dynamic Tailwater)
↑**1=Culvert** (Outlet Controls 2.85 cfs @ 8.18 fps)

Summary for Pond 2P: EX. CB 2

[58] Hint: Peaked 37.48' above defined flood level

Inflow Area = 1.164 ac, 90.19% Impervious, Inflow Depth = 4.76" for 25-YR event
Inflow = 5.97 cfs @ 12.08 hrs, Volume= 0.461 af
Outflow = 5.97 cfs @ 12.08 hrs, Volume= 0.461 af, Atten= 0%, Lag= 0.0 min
Primary = 5.97 cfs @ 12.08 hrs, Volume= 0.461 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 246.98' @ 12.08 hrs
Flood Elev= 209.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	207.58'	**8.0" Round Culvert** L= 142.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 207.58' / 204.71' S= 0.0202 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=5.96 cfs @ 12.08 hrs HW=246.83' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 5.96 cfs @ 17.08 fps)

Summary for Pond 3P: EX. CULVERT

[58] Hint: Peaked 0.39' above defined flood level

Inflow Area =	1.256 ac,	45.65% Impervious,	Inflow Depth =	2.13" for 25-YR event
Inflow =	3.05 cfs @	12.09 hrs, Volume=	0.223 af	
Outflow =	3.05 cfs @	12.09 hrs, Volume=	0.223 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.05 cfs @	12.09 hrs, Volume=	0.223 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 206.39' @ 12.09 hrs
Flood Elev= 206.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	204.45'	**10.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 204.45' / 204.05' S= 0.0100 '/' Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 0.55 sf

Primary OutFlow Max=3.04 cfs @ 12.09 hrs HW=206.38' TW=0.00' (Dynamic Tailwater)
1=Culvert (Barrel Controls 3.04 cfs @ 5.58 fps)

Summary for Pond 6P: EX CB

Inflow Area =	0.016 ac,	7.79% Impervious,	Inflow Depth =	0.23" for 25-YR event
Inflow =	0.00 cfs @	12.47 hrs, Volume=	0.000 af	
Outflow =	0.00 cfs @	12.47 hrs, Volume=	0.000 af,	Atten= 0%, Lag= 0.0 min
Primary =	0.00 cfs @	12.47 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 215.62' @ 12.46 hrs
Flood Elev= 219.85'

Device	Routing	Invert	Outlet Devices
#1	Primary	215.60'	**15.0" Round Culvert** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 215.60' / 214.74' S= 0.0107 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.00 cfs @ 12.47 hrs HW=215.62' TW=215.00' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.00 cfs @ 0.38 fps)

Summary for Pond 7P: PROPOSED CB 13

Inflow Area =	0.446 ac,	57.09% Impervious,	Inflow Depth =	3.98" for 25-YR event
Inflow =	2.03 cfs @	12.09 hrs, Volume=	0.148 af	
Outflow =	2.03 cfs @	12.09 hrs, Volume=	0.148 af,	Atten= 0%, Lag= 0.0 min
Primary =	2.03 cfs @	12.09 hrs, Volume=	0.148 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 215.34' @ 12.09 hrs
Flood Elev= 217.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	214.64'	**15.0" Round Culvert** L= 199.4' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.64' / 212.65' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.03 cfs @ 12.09 hrs HW=215.34' TW=213.19' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 2.03 cfs @ 2.85 fps)

Summary for Pond 10P: POCKET POND

Inflow Area = 1.836 ac, 69.70% Impervious, Inflow Depth = 4.53" for 25-YR event
Inflow = 8.66 cfs @ 12.10 hrs, Volume= 0.692 af
Outflow = 3.84 cfs @ 12.32 hrs, Volume= 0.692 af, Atten= 56%, Lag= 13.0 min
Primary = 3.84 cfs @ 12.32 hrs, Volume= 0.692 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Starting Elev= 210.20' Surf.Area= 1,556 sf Storage= 2,996 cf
Peak Elev= 213.90' @ 12.32 hrs Surf.Area= 3,291 sf Storage= 11,860 cf (8,863 cf above start)
Flood Elev= 215.00' Surf.Area= 3,890 sf Storage= 15,824 cf (12,827 cf above start)

Plug-Flow detention time= 148.8 min calculated for 0.623 af (90% of inflow)
Center-of-Mass det. time= 67.8 min (851.7 - 783.9)

Volume	Invert	Avail.Storage	Storage Description
#1	207.00'	15,824 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
207.00	373	0	0
208.00	693	533	533
210.00	1,468	2,161	2,694
212.00	2,351	3,819	6,513
214.00	3,343	5,694	12,207
215.00	3,890	3,617	15,824

Device	Routing	Invert	Outlet Devices
#1	Primary	210.20'	**24.0" Round Culvert** L= 260.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 210.20' / 204.99' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	210.20'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	212.20'	**7.0" W x 12.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	213.90'	**48.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	214.50'	**10.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66
2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=3.84 cfs @ 12.32 hrs HW=213.90' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 3.84 cfs of 24.83 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.79 cfs @ 9.04 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 3.05 cfs @ 5.22 fps)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=210.20' TW=0.00' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 11P: EX CB 11

Inflow Area = 1.118 ac, 81.03% Impervious, Inflow Depth = 4.88" for 25-YR event
Inflow = 5.52 cfs @ 12.11 hrs, Volume= 0.454 af
Outflow = 5.52 cfs @ 12.11 hrs, Volume= 0.454 af, Atten= 0%, Lag= 0.0 min
Primary = 5.52 cfs @ 12.11 hrs, Volume= 0.454 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 215.56' @ 12.11 hrs
Flood Elev= 217.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	213.67'	**15.0" Round Culvert** L= 59.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.67' / 213.40' S= 0.0045 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=5.51 cfs @ 12.11 hrs HW=215.55' TW=213.38' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 5.51 cfs @ 4.49 fps)

Summary for Pond 12P: EX CB 12

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=590)

Inflow Area = 0.002 ac,100.00% Impervious, Inflow Depth = 5.45" for 25-YR event
Inflow = 0.01 cfs @ 12.08 hrs, Volume= 0.001 af
Outflow = 0.01 cfs @ 12.08 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min
Primary = 0.01 cfs @ 12.08 hrs, Volume= 0.001 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 215.56' @ 12.11 hrs
Flood Elev= 219.03'

Device	Routing	Invert	Outlet Devices
#1	Primary	214.72'	**12.0" Round Culvert** L= 111.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.72' / 213.67' S= 0.0095 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.01 cfs @ 12.08 hrs HW=215.46' TW=215.46' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.01 cfs @ 0.03 fps)

Summary for Link 1L: SOUTHERLY WETLAND

Inflow Area = 6.548 ac, 58.09% Impervious, Inflow Depth = 3.58" for 25-YR event
Inflow = 19.79 cfs @ 12.09 hrs, Volume= 1.953 af
Primary = 19.79 cfs @ 12.09 hrs, Volume= 1.953 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

APPENDIX

*OPERATION AND MAINTENANCE REPORT
*PRE DEVELOPMENT DRAINAGE AREA PLAN
*POST DEVELOPMENT DRAINAGE AREA PLAN

STORMWATER

OPERATION & MAINTENANCE PLAN

Miara Transportation
12 Bockes Road
Hudson, New Hampshire

Map 136; Lot 1

October 19, 2016

KNA KEACH-NORDSTROM ASSOCIATES, INC.

TABLE OF CONTENTS:

I. General

Introduction

The project owner or their assigned heirs will maintain the stormwater treatment facilities after construction is completed. The owner of the project is Joseph A. Miara Jr., Trustee – Granite Realty Trust, 12 Bockes Road, Hudson, New Hampshire 03051.

The subject property is referenced on Map 136 as Lot 1 in Hudson, New Hampshire. Any transfer of responsibility for inspection and maintenance activities or transfer of ownership shall be documented to the Town of Hudson in writing. The contract documents will require the contractor to designate a person responsible for maintenance of the sedimentation control features during construction. Long-term operation and maintenance for the stormwater management facilities are presented below.

Maintenance will be performed as described unless and until the system is formally accepted by a municipality or quasi-municipal district, or is placed under the jurisdiction of a legally created association that will be responsible for the maintenance of the system.

Post Construction:

The following standards will be met after construction is complete:

Documentation:

A maintenance log will be kept summarizing inspections, maintenance, and any corrective actions taken. The log will include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. If a maintenance task requires the clean out of any sediments or debris, the location where the sediment and debris was disposed after removal will be indicated. The log will be made accessible to Hudson staff and a copy provided upon request.

Maintenance Requirements

Pocket Pond:

- Systems should be inspected at least twice annually, and following any rainfall event exceeding 2.5 inches in a 24-hour period, with maintenance or rehabilitation conducted as warranted by such inspection.
- System embankments should be mowed periodically to maintain grass cover and any other vegetation found on the embankment should be removed at each inspection.
- Trash and debris found within the pond or in the outlet structure should be removed at each inspection.
- Removal of accumulated sediment
- Inspection and repair of embankments, inlet and outlet structures, and appurtenances

Sediment Forebay:

- Forebays help reduce the sediment load to downstream BMP's, and will therefore require more frequent cleaning.
- Systems should be inspected at least annually.
- Conduct periodic mowing of embankments (generally two times per year) to control growth of woody vegetation.
- Trash and debris should be removed at each inspection.
- Accumulated sediment should be removed as warranted by such inspection.
- Install and maintain a staff gage or other measuring device, to indicate depth of sediment accumulation and level at which clean-out is required.

Conveyance Swale:

- Grassed channels should be inspected periodically (at least annually) for sediment accumulation, erosion, and condition of surface lining (vegetation or riprap). Repairs, including stone or vegetation replacement, as warranted by such inspection.
- Remove sediment and debris annually, or more frequently as warranted by such inspection.
- Mow vegetated channels based on frequency specified by design. Mowing at least once per year is required to control establishment of woody vegetation. It is recommended to cut grass no shorter than 4 inches.

Catch Basins and Closed Drainage Network:

- Catch basins may require frequent maintenance. This may require several cleanings of the sumps each year. At a minimum, it is recommended that catch basins be inspected at least twice annually.
- Sediment should be removed when it approaches half of the sump depth.

- If floating hydrocarbons are observed during an inspection, the material should be removed immediately by skimming, absorbent materials, or other methods and disposed in conformance with the applicable state and federal regulations.

Outlet Protection:

- Inspect the outlet protection annually for damage and deterioration. Repair damages immediately.

General:

- If any invasive species begin to grow in the stormwater management practices the species shall be disposed of in an appropriate manner that will not allow the pest to survive or spread. The disposal of such species shall be witnessed or approved by a state inspector. Methods for disposal may include, but not be limited to:
    - Encapsulating the plant(s) in plastic bags and disposing of the plant material in one of the following ways:
        - Trash pickup;
        - Discarding;
        - Open burning;
        - Incineration; or
        - Burial of infested nursery.

II. Supporting Documents

Annual Inspection and Maintenance Reporting Form
for
Miara Transportation
Hudson, New Hampshire

Date: _____

To: **Joseph A. Miara Jr., Trustee – Granite Realty Trust**

Re: **Certification of Inspection and Maintenance; Submittal of Forms**

Property Name: _____

Property Address: _____

Contact Name: _____

Contact Phone #: _____

Contact Email Address: _____

I verify that the required stormwater facility inspections and required maintenance have been completed in accordance with the Operation & Maintenance Plan associated with the above referenced property.

The required Long-Term Inspection & Maintenance Plan Checklist is attached to this form.

_____ _____

Name of Party Responsible for Inspection & Maintenance

Property Owner

_____ _____

Authorized Signature

Signature

Long-Term Inspection & Maintenance Plan Checklist
Miara Transportation – Hudson, NH

Current Owner Name:	Date:
Business Address:	Inspector:
Weather:	
Date of Last Rainfall:	Amount: Inches:

Best Management Practice

Pocket Pond

Reason for Inspection: Spring ☐ Fall/Yearly ☐ After Major Storm ☐

Maintenance Required? Yes ☐ No ☐
Corrective Action Needed & Notes:

Sideslopes & berms need repair? Yes ☐ No ☐
Clean inlet & outlet structures? Yes ☐ No ☐

Sediment Forebay

Reason for Inspection: Spring ☐ Fall/Yearly ☐ After Major Storm ☐

Maintenance Required? Yes ☐ No ☐
Corrective Action Needed & Notes:

Conveyance Swale

Reason for Inspection: Spring ☐ Fall/Yearly ☐ After Major Storm ☐

Maintenance Required? Yes ☐ No ☐
Corrective Action Needed & Notes:

Sideslopes & berms need repair? Yes ☐ No ☐

Catch Basins & Closed Drainage Network

Reason for Inspection: Spring ☐ Fall/Yearly ☐ After Major Storm ☐

Maintenance Required? Yes ☐ No ☐
Corrective Action Needed & Notes:

Outlet Protection	Reason for Inspection		
	Spring ☐	Fall/Yearly ☐	After Major Storm ☐
Maintenance Required? Yes ☐ No ☐ Corrective Action Needed & Notes:			

General	Reason for Inspection		
	Spring ☐	Fall/Yearly ☐	After Major Storm ☐
Maintenance Required? Yes ☐ No ☐ Corrective Action Needed & Notes:			

Long-Term Inspection & Maintenance Log
Miara Transportation – Hudson, NH

Date	Inspection (Yes or No)	Maintenance (Yes or No)	List BMPs Inspected and/or Provide Comments	Inspected By:

III. Control of Invasive Plants

Invasive plants are introduced, alien, or non-native plants, which have been moved by people from their native habitat to a new area. Some Exotic plants are imported for human use such as landscaping, erosion control, or food crops. They also can arrive as "hitchhikers" among shipments of other plants, seeds, packing materials, or fresh produce. Some exotic plants become invasive and cause harm by:

- becoming weedy and overgrown;
- killing established shade trees;
- obstructing pipes and drainage systems;
- forming dense beds in water;
- lowering water levels in lakes, streams, and wetlands;
- destroying natural communities;
- promoting erosion on stream banks and hillsides; and
- resisting control except by hazardous chemical.

During maintenance activities, check for the presence of invasive plants and suitably remove according to the methods provided in the table below. The following table, based on the "Control of Invasive Plants" published by the New Hampshire Department of Agriculture, describes the most common invasive plants in this region and proper methods of disposal.

Name	Description	Invasive Qualities	Control Methods
Invasive Trees			
Norway Maple	- Large leaves - Will exude milky white sap when leaves are broken - Leaves turn color in Late October (fall foliage is yellow)	- Suppresses growth of grass, garden plants, and forest understory -Wind-borne seeds can germinate and grow in deep shade	- Pull seedlings and small or shallow-rooted plants when soil is moist. Dig out plants, including the root systems. Use a forked spade or weed wrench. - Cut down the tree. Grind out the stump, or clip off re-growth. - Girdle[1] - Frill[2] - Cut stem/ cut stump with glyphosate. Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.* - Foliar spray with glyphosate [3]* (mid-October to early November).
Tree of Heaven	- Long compound leaves with 11-25 lance shaped leaflets - Smell like peanut butter or burnt coffee when crushed	- Tough, can grow in poor conditions - Produces large quantities of wind-borne seeds - Grows rapidly - Secretes a toxin that kills other plants - Cannot be removed by mechanical means alone	- Pull seedlings when soil is moist. - Frill[2] (no more than 1" gap between cuts). Use Garlon 3a herbicide. - Cut stem/ cut stump with Garlon 3a. Follow label directions for cut stump application. Clip off sucker sprouts or paint with Garlon 3a.* - Foliar spray[3]* (on regrowth) - Paint bottom 12" of bark with Garlon 4 Ultra (February/March). Use maximum strength specified on label for all herbicide applications.
Invasive Shrubs			
Autumn Olive	- Formerly recommended for erosion control and wildlife value	- Highly invasive, diminishes the overall quality of wildlife habitat	- Pull seedlings and small or shallow-rooted plants when soil is moist. Dig out larger plants, including the root systems. Use a forked spade or weed wrench for trees or shrubs (up to 4" diameter trunks). - Cut down the tree. Grind out the stump, or clip off re-growth. - Cut stem/ cut stump with glyphosate. Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.* - Bury stump - Do not mow

Invasive Shrubs (continued)			
Multiflora Rose	- Formerly recommended for erosion control, hedges, and wildlife habitat - Covered in white flowers in June - Very hard, curved thorns - Fringed edge to leaf stalk	- Huge shrub that chokes out all other vegetation - Too dense for most birds to nest in - Grows up trees like a vine in Shade	- Pull seedlings and small or shallow-rooted plants when soil is moist. Dig out larger plants, including the root systems (at least 6" from the crown and 6" down). Use a forked spade or weed wrench for trees or shrubs. - Controlled burning[4] (on extensive infestations) - Cut stem/ cut stump with glyphosate. Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.* - Foliar spray[3]* (mix Rodeo with extra sticker-spreader, or use Roundup Sure Shot Foam on small plants) - Herbicide may be applied in winter when other plants are dormant.
Bush Honeysuckles	- Includes Belle, Amur, Morrow's, and Tatarian Honeysuckle	- Creates dense shade reducing plant diversity and eliminating nest sites in forest interior spaces	- Deadhead to prevent spread of seeds (on ornamentals). Cut off seeds or fruits before they ripen. Bag and burn, or send to a landfill. - Pull seedlings and small or shallow-rooted plants when soil is moist. Dig out larger plants, including the root systems. Use a forked spade or weed wrench for trees or shrubs. - Mow or cutting at least 4 times a season to deplete plants' store of nutrients and carbohydrates, reduce seed formation, and kill or minimize spread of plants. If necessary, repeat each year (on shady sites only, brush cut in early spring and fall). - Controlled burning[4] (during growing season) - Cut down the tree. Grind out the stump, or clip off re-growth. - Cut stem/ cut stump with Glyphosate (late in the growing season). Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.*

Invasive Shrubs (continued)			
Blunt-Leaved Privet	- Medium sized shrub - Simple, oblong, dark green leaves 1-2" in length - Fragrant white flowers (spring) - Blackish-purple fruit (late summer)	- Toxic to mammals - Loss of valuable habitat	- Pull seedlings and small or shallow-rooted plants when soil is moist. Dig out larger plants, including the root systems. Use a forked spade or weed wrench for trees or shrubs. - Cut down the tree. Grind out the stump, or clip off re-growth. - Cut stem/ cut stump with Glyphosate. Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.* - Trim off all flowers - Do not cut back or mow
Burning Bush, Winged Euonymus	- Wide, corky wings on the Branches - Brilliant red autumn leaves - Fruit	- High seed production	- Pull seedlings and small or shallow-rooted plants when soil is moist. Dig out larger plants, including the root systems. Use a forked spade or weed wrench for trees or shrubs. - Cut down the tree. Grind out the stump, or clip off re-growth. - Cut stem/ cut stump with Glyphosate. Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.* - Trim off all flowers
Japanese Barberry	- Spiny deciduous shrub - Small leaves	- Very dense, displaces native plants - Can change chemistry of soil	- Pull seedlings and small or shallow-rooted plants when soil is moist. Dig out larger plants, including the root systems. Use a forked spade or weed wrench for trees or shrubs. - Cut down the tree. Grind out the stump, or clip off re-growth. - Cut stem/ cut stump with Glyphosate. Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.* - Trim off all flowers

Invasive Woody Vines			
Japanese Honeysuckle	- Gold and White flowers - Heavy scent and sweet nectar in June	- Shade shrubs and young trees of the forest understory, eventually killing them, and changing the open structure of the forest into a dense tangle - Rampant grower - Spirals around trees, often strangling them	- Pull seedlings and small or shallow-rooted plants when soil is moist. Dig out larger plants, including the root systems. Use a forked spade or weed wrench for trees or shrubs. - Mow or cutting at least 4 times a season to deplete plants' store of nutrients and carbohydrates, reduce seed formation, and kill or minimize spread of plants. If necessary, repeat each year. - Cut stem/ cut stump with Glyphosate. Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.* - Foliar spray[3]* (fall or early spring when native vegetation is dormant) Plan to re-treat repeatedly
Oriental Bittersweet	- Bright orange seed capsules in clusters all along the stem - Flowers	- Shade shrubs and young trees of the forest understory, eventually killing them, and changing the open structure of the forest into a dense tangle	- Pull seedlings and small or shallow-rooted plants when soil is moist. Dig out larger plants, including the root systems. Use a forked spade or weed wrench for trees or shrubs. - Keep ornamental plants cut back, remove all fruits as soon as they open, and bag or burn fruits. - Cut stem/ cut stump with Garlon 3a. Follow label directions for cut stump application. Clip off sucker sprouts or paint with Garlon 3a.*
Japanese Knotweed, Mexican Bamboo	- The stems have knotty joints, similar to bamboo - Grows 6-10' tall - Large, pointed oval or triangular leaves	- Shade shrubs and young trees of the forest understory, eventually killing them, and changing the open structure of the forest into a dense tangle - Can grow in shade	- Cut stem/ cut stump with Glyphosate (at least 3 times each during growing season). Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.* - Foliar spray[3]* - Treat with Rodeo - In gardens, heavy mulch or dense shade may kill it.

Invasive Herbaceous Plants			
Garlic Mustard	- White-flowered biennial - Rough scalloped leaves (kidney, heart, or arrow shaped) - Garlic smell, mustard taste when its leaves are crushed	- Shade shrubs and young trees of the forest understory, eventually killing them, and changing the open structure of the forest into a dense tangle - Rampant grower - Spirals around trees, often strangling them	- Pull seedlings and small or shallow-rooted plants when soil is moist (before it flowers in spring). Dig out larger plants, including the crown and root systems. Use a forked spade or weed wrench for trees or shrubs. Tamp down soil afterwards. - Deadhead to prevent spread of seeds. Cut off seeds or fruits before they ripen. Bag and burn or send to a landfill. - Foliar spray[3]* (may be appropriate in some settings)
Japanese Stilt Grass	- Lime green color - Line of silvery hairs down the middle of the 2-3" long blade	- Tolerates sun or dense shade -Quickly invades areas left bare or disturbed by tilling or flooding - Builds a large seed bank in the soil	- Pull seedlings and small or shallow-rooted plants when soil is moist (pulled easily in early to mid-summer).Dig out larger plants, including root systems. Use a forked spade or weed wrench for trees or shrubs. Be sure to pull before it goes to seed. If seeds have formed, bag and burn or send to a landfill. - Mow or cutting at least 4 times a season to deplete plants' store of nutrients and carbohydrates, reduce seed formation, and kill or minimize spread of plants. If necessary, repeat each year. Mowing weekly or when it has just begun to flower may prevent it from setting seed. - Foliar spray[3]* (use glyphosate or herbicidal soap on large infestations. - Use a corn-based pre-emergence herbicide on annual weeds (spring). This product is also an organic fertilizer, i.e., it can stimulate growth of existing plants, including weeds, so it is appropriate for lawns and gardens but may not be appropriate in woodlands.

Invasive Herbaceous Plants (continued)			
Mile-A-Minute Vine, Devil's Tail Tearthumb	- Triangular leaves - Barbed stems - Turquoise berries	- Rapid growth - Quickly covers and shades out herbaceous plants	- Pull seedlings and small or shallow-rooted plants when soil is moist (pulled easily in early to mid-summer).Dig out larger plants, including root systems. Use a forked spade or weed wrench for trees or shrubs. Be sure to pull before it goes to seed. If seeds have formed, bag and burn or send to a landfill. - Mow or cutting at least 4 times a season to deplete plants' store of nutrients and carbohydrates, reduce seed formation, and kill or minimize spread of plants. If necessary, repeat each year. Mowing weekly or when it has just begun to flower may prevent it from setting seed. - Foliar spray[3]* (use glyphosate or herbicidal soap on large infestations. - Use a corn-based pre-emergence herbicide on annual weeds (spring). This product is also an organic fertilizer, i.e., it can stimulate growth of existing plants, including weeds, so it is appropriate for lawns and gardens but may not be appropriate in woodlands.
Spotted Knapweed	- Thistle-like flowers	- Dense, crowds out native species	- Do not pull unless the plant is young and the ground is very soft. The root will break and produce several new plants. - Wear sturdy gloves - Deadhead to prevent spread of seeds. Cut off seeds or fruits before they ripen. Bag and burn, or send to a landfill. - In lawns, spot treat with broad-leaf weed killer. Good lawn care practices (test soil; use lime and fertilizer only when soil test shows a need; mow high and frequently; leave clippings on lawn) reduce weed infestations. - Cut stem/ cut stump with Glyphosate. Follow label directions for cut stump application. Clip off sucker sprouts or paint with glyphosate.* - Foliar spray[3]*

[1]Girdle: Cut through the bark and growing layer all around the trunk, about 6" above the ground. Girdling is most effective in spring (when the sap is rising) & middle-late summer (when the tree is sending food to the roots). Clip off sucker sprouts.

[2]Frill: Using a machete, hatchet, or similar device, hack scars (several holes in larger trees) downward into the growing layer, and squirt in glyphosate (or triclopyr if specified in table). Follow label directions for injection and frill applications. This is most effective from middle to late summer. Clip off any sucker sprouts or treat with glyphosate.

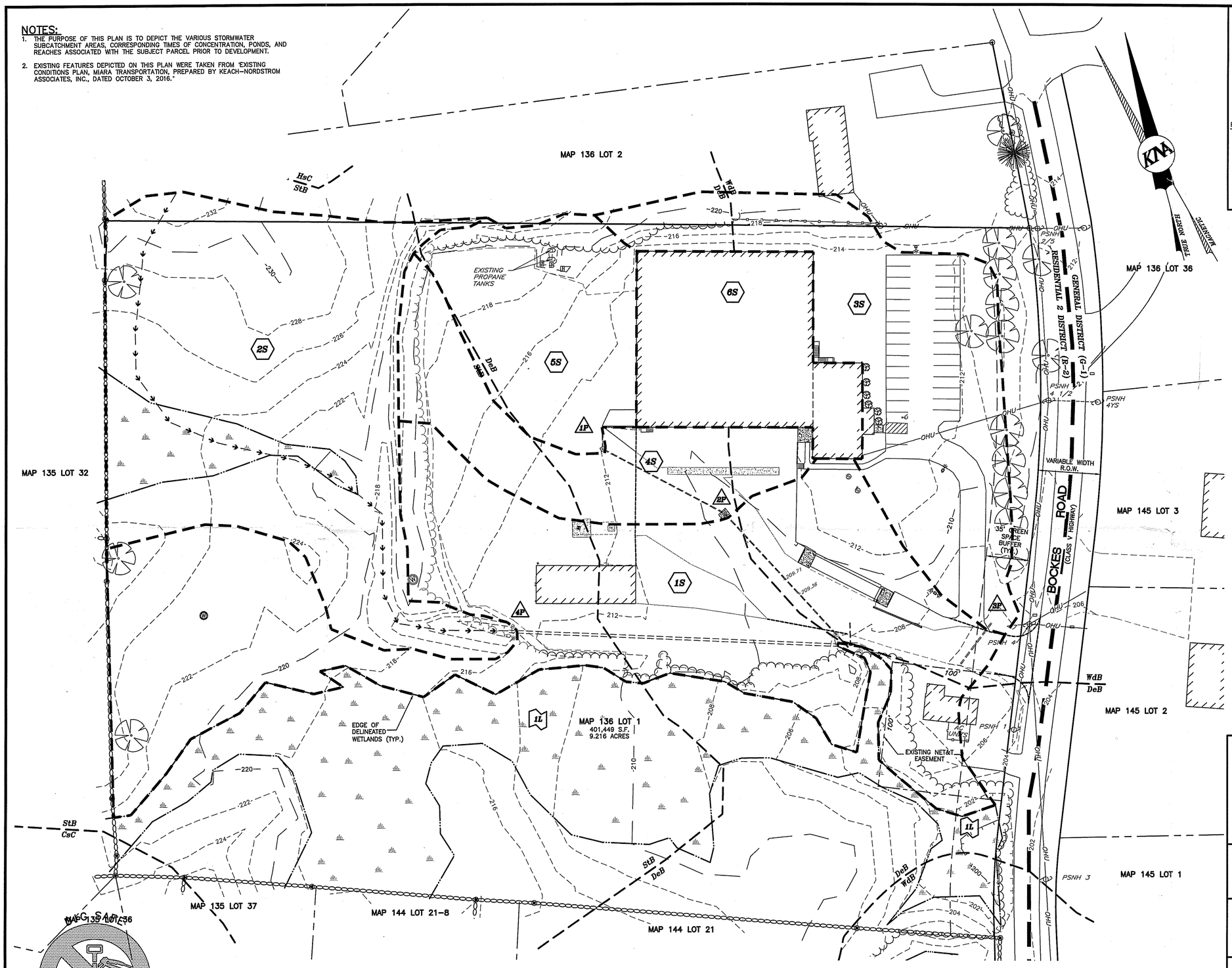
[3]Foliar Spray: Use a backpack or garden sprayer or mist blower, following label directions. Avoid overspray and/or dripping onto non-target plants, because glyphosate kills most plants except moss. If it rolls off waxy or grass-like foliage, use additional sticker-spreader. Deciduous trees, shrubs, and perennials move nutrients down to the roots in late summer. Glyphosate is particularly effective at this time and when plants have just gone out of flowering. Several invasive species retain their foliage after native plants have lost theirs, and resume growth earlier in spring than most natives. This allows you to treat them without harming the natives. However, the plant must be actively growing for the herbicide to work. Retreatments may be necessary the following year if suckering occurs or the plant hasn't been entirely killed.

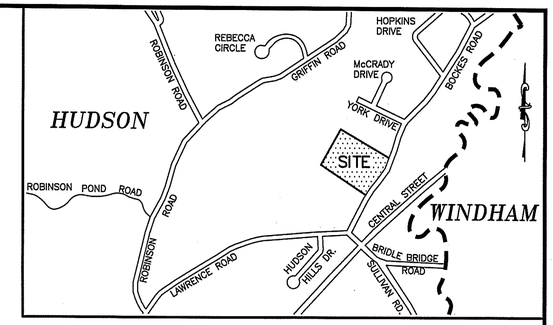
[4]Controlled Burning: Burning during the spring (repeated over several years) will allow native vegetation to compete more effectively with the invasive species. This requires a permit. Spot treatment with glyphosate in late fall can be used to make this method more effective

*Herbicides: It is highly recommended that small populations try to be controlled using non-chemical methods where feasible. However, for large infestations, and for a few plants herbicide use is essential. Apply herbicides carefully to avoid non-target plants, glyphosate is the least environmentally damaging herbicide in most cases. Add food coloring for visibility, and a soap-based sticker such as Cide-Kick. Glyphosate is ineffective on some plants; for these, triclopyr or Garlon 3a may be indicated. When using herbicides read the entire label and observe all precautions listed, including proper disposal. If in doubt, call your local Cooperative Extension Service.

NOTES:

1. THE PURPOSE OF THIS PLAN IS TO DEPICT THE VARIOUS STORMWATER SUBCATCHMENT AREAS, CORRESPONDING TIMES OF CONCENTRATION, PONDS, AND REACHES ASSOCIATED WITH THE SUBJECT PARCEL PRIOR TO DEVELOPMENT.
2. EXISTING FEATURES DEPICTED ON THIS PLAN WERE TAKEN FROM 'EXISTING CONDITIONS PLAN, MIARA TRANSPORTATION, PREPARED BY KEACH–NORDSTROM ASSOCIATES, INC., DATED OCTOBER 3, 2016.'





LOCUS PLAN
SCALE: 1"=1,000'

DRAINAGE LEGEND:

THE LEGEND BELOW REFLECTS THE HYDROCAD MODEL USED FOR DRAINAGE CALCULATIONS.

- SCS SOIL LINES
- WdA — DENOTES SOIL TYPE
- P — DENOTES POND
- S — DENOTES SUBCATCHMENT AREA
- R — DENOTES REACH
- L — DENOTES POINT OF INTEREST
- LIMIT OF SUBCATCHMENT AREA
- TIME OF CONCENTRATION

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

SCS SOILS LEGEND

BoA	BOROHEMISTS, NEARLY LEVEL
WdA	WINDSOR LOAMY SAND, 0 TO 3% SLOPES
WdD	WINDSOR LOAMY SAND, 15 TO 35% SLOPES

PRE DEVELOPMENT DRAINAGE AREAS PLAN

MIARA TRANSPORTATION

MAP 136 LOT 1
12 BOCKES ROAD
HUDSON, NEW HAMPSHIRE
HILLSBOROUGH COUNTY

OWNER OF RECORD:	APPLICANT:
JOSEPH A. MIARA JR., TRUSTEE GRANITE REALTY TRUST 12 BOCKES ROAD HUDSON, NH 03051 H.C.R.D. BK. 8410 PG. 2473	JOSEPH A. MIARA JR., TRUSTEE GRANITE REALTY TRUST 12 BOCKES ROAD HUDSON, NH 03051

KEACH–NORDSTROM ASSOCIATES, INC.
Civil Engineering Land Surveying Landscape Architecture
10 Commerce Park North, Suite 3B, Bedford, NH 03110 Phone (603) 627-2881

PAUL CHISHOLM No. 15078 LICENSED PROFESSIONAL ENGINEER STATE OF NEW HAMPSHIRE

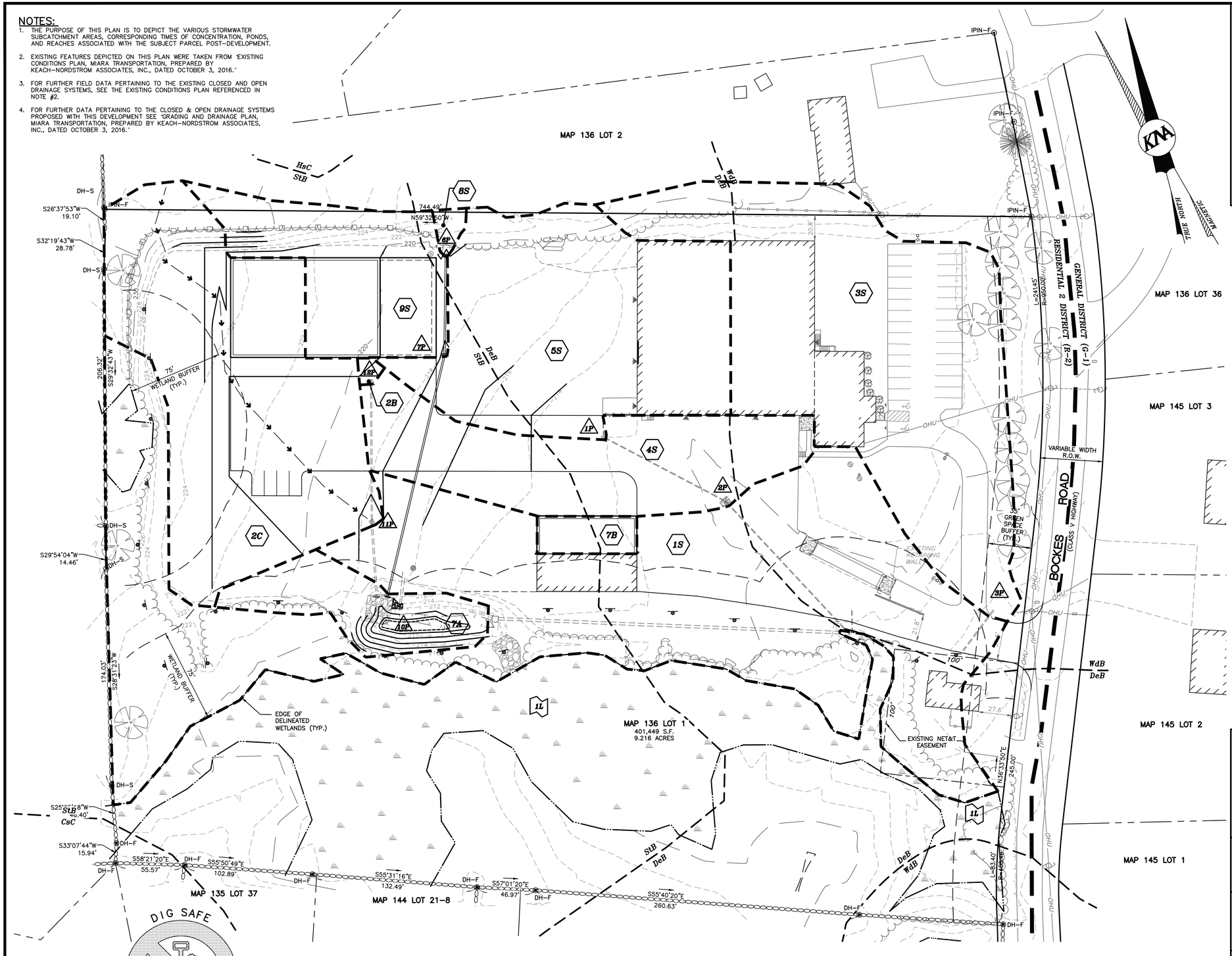
REVISIONS

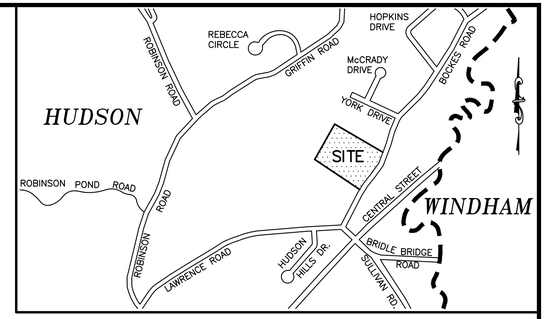
No.	DATE	DESCRIPTION	BY

DATE: OCTOBER 3, 2016 | SCALE: 1" = 40'
PROJECT NO: 16-0223-1 | SHEET 1 OF 2

NOTES:

1. THE PURPOSE OF THIS PLAN IS TO DEPICT THE VARIOUS STORMWATER SUBCATCHMENT AREAS, CORRESPONDING TIMES OF CONCENTRATION, PONDS, AND REACHES ASSOCIATED WITH THE SUBJECT PARCEL POST-DEVELOPMENT.
2. EXISTING FEATURES DEPICTED ON THIS PLAN WERE TAKEN FROM "EXISTING CONDITIONS PLAN, MIARA TRANSPORTATION, PREPARED BY KEACH-NORDSTROM ASSOCIATES, INC., DATED OCTOBER 3, 2016."
3. FOR FURTHER FIELD DATA PERTAINING TO THE EXISTING CLOSED AND OPEN DRAINAGE SYSTEMS, SEE THE EXISTING CONDITIONS PLAN REFERENCED IN NOTE #2.
4. FOR FURTHER DATA PERTAINING TO THE CLOSED & OPEN DRAINAGE SYSTEMS PROPOSED WITH THIS DEVELOPMENT SEE "GRADING AND DRAINAGE PLAN, MIARA TRANSPORTATION, PREPARED BY KEACH-NORDSTROM ASSOCIATES, INC., DATED OCTOBER 3, 2016."





LOCUS PLAN
SCALE: 1"=1,000'

DRAINAGE LEGEND:

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POST DEVELOPMENT DRAINAGE AREAS PLAN

MIARA TRANSPORTATION

MAP 136 LOT 1
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REVISIONS

No.	DATE	DESCRIPTION	BY
1	6-17-24	REV. PER CON. COM. COMMENTS	ACL
2	7-08-24	REV. PER CON. COM. COMMENTS	ACL
3	8-08-24	BUILDING RELOCATION	ACL

DATE: MAY 20, 2024 **SCALE:** 1" = 40'
PROJECT NO: 16-0223-1 **SHEET** 2 OF 2