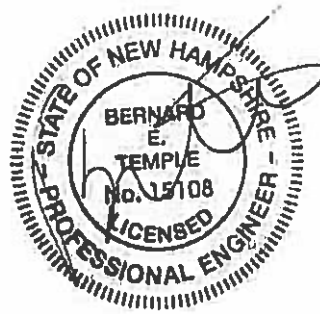


DRAINAGE REPORT

A CONDOMINIUM SUBDIVISION PLAN

Tax Map 102 Lots 34 & 35
Hopkinton, NH

June 16, 2021



Prepared For:

Baystone Properties LLC.
126 Barton Corner Road
Hopkinton NH 03229

Prepared By:

Bernie Temple, P.E.
Po Box 7,
Gilmanton I W, NH 03837
Phone: 603-630-1008

Commercial Site Plan
Map RO3 Lots 11 & 12
Farmington NH

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Commercial Site Plan
Map RO3 Lots 11 & 12
Farmington NH

Introduction

This proposed project is located on Map 102, Lots 34 & 35 of the Hopkinton NH tax maps. The two parcels will be combined to provide a .91-acre lot with frontage along Cedar Street. It is located in the VR-1 Village Residential district of Hopkinton. The project consists of the construction of a 2- 5500sf-6-unit condominium buildings with associated utilities and site improvements. Drainage from the developed area will be routed through one underground infiltration system, with roof drains directed to infiltration trenches on each side of the building. The site will be provided with municipal sewer and water.

Existing Conditions

The property is .91 acres as noted above and currently has a garage building on the lot as well as out buildings attached to the existing home. The lot has been subdivided to provide the .91 acres, the garage and out buildings will be razed providing buildable area. The site is moderately sloped with drainage flowing from South to North and ending up in the Cedar Street drainage closed drainage system. There site is primarily grass with small isolated areas of woods. The NRCS web soils maps indicate that the one soil is present and is classified as a 613A Croghan Loamy Fine Sand This soil complex is a well-drained class "A" soil.

Proposed development

As noted above the project consists of the construction of a 2- 5500sf-6-unit condominium buildings with associated utilities and site improvements. The site has been designed with open drainage sheeting the site to a closed drainage system within the parking lot. The drainage will be directed to three deep sump catch basins for sediment removal and to one oil water separator catch basin number 3 before entering an underground infiltration system. The exterior roof systems will be directed to two infiltration trenches on each side of the building. There is no change proposed to the existing drainage patterns. Most of the site is designed to drain to the one underground system which will outlet toward the Cedar Street closed drainage system. Because of the favorable soil conditions, the infiltration trenches and underground system is designed to retain peak stormwater flows and to infiltrate the water quality volume into the underlying soils. The onsite soils are provided from the most recent NRCS Webb Soil Survey 613A Croghan Loamy Fine Sand This soil complex is a well-drained class "A" soil. The infiltration rate for the soil as shown SSSNNE special publication No. 5 Ksat values for NH soils is 20 inches per hour this rate is then used at 50% or 10 inches per hour for design purposes. The drainage system is designed to mitigate any increase in stormwater runoff as a result from the site development per local regulations.

Commercial Site Plan
Map RO3 Lots 11 & 12
Farmington NH

Design methodology

The drainage analysis in this study was completed using HydroCad Version 10.1, a stormwater modeling program utilizing TR-20 and TR-55 methodology. This program performs both the hydrologic computations for determination of runoff flows, and the hydraulic calculations for pipe, ditch, and pond design. Calculations were performed for 10,25 and checked for flooding for the 50-year return frequency storms in accordance with Town regulations. Rainfall information is provided from the most recent Extreme Precipitation Tables provided from the Northeast Regional Climate Center. The following design parameters were used:

Rainfall distribution: Type III
AMC: 2
Extreme Precipitation Estimates
2-year storm rainfall: 2.80 inches
10-year storm rainfall: 4.08 inches
25-year storm rainfall: 5.06 inches
50-year storm rainfall: 5.96 inches

Design analysis

The drainage improvements designed for the proposed project have been designed to conform to Municipal requirements. The proposed underground drainage system is designed to mitigate peak runoff rates such that post-development flows are equal to or less than pre-development flows. The design analysis therefore includes outputs for the 10,25 and checked for the 50-year event.

The drainage calculations are included in the appendix of this report. Peak runoff rates of the pre-development and post-development runoff rates are summarized in the following table:

Storm event / Sub-basin	Pre-development (cfs)	Phase 1 Post-development (cfs)
<u>10-year</u>		
1S/1L	.19	.15
<u>25-year</u>		
1S/1L	.65	.19

Commercial Site Plan
Map RO3 Lots 11 & 12
Farmington NH

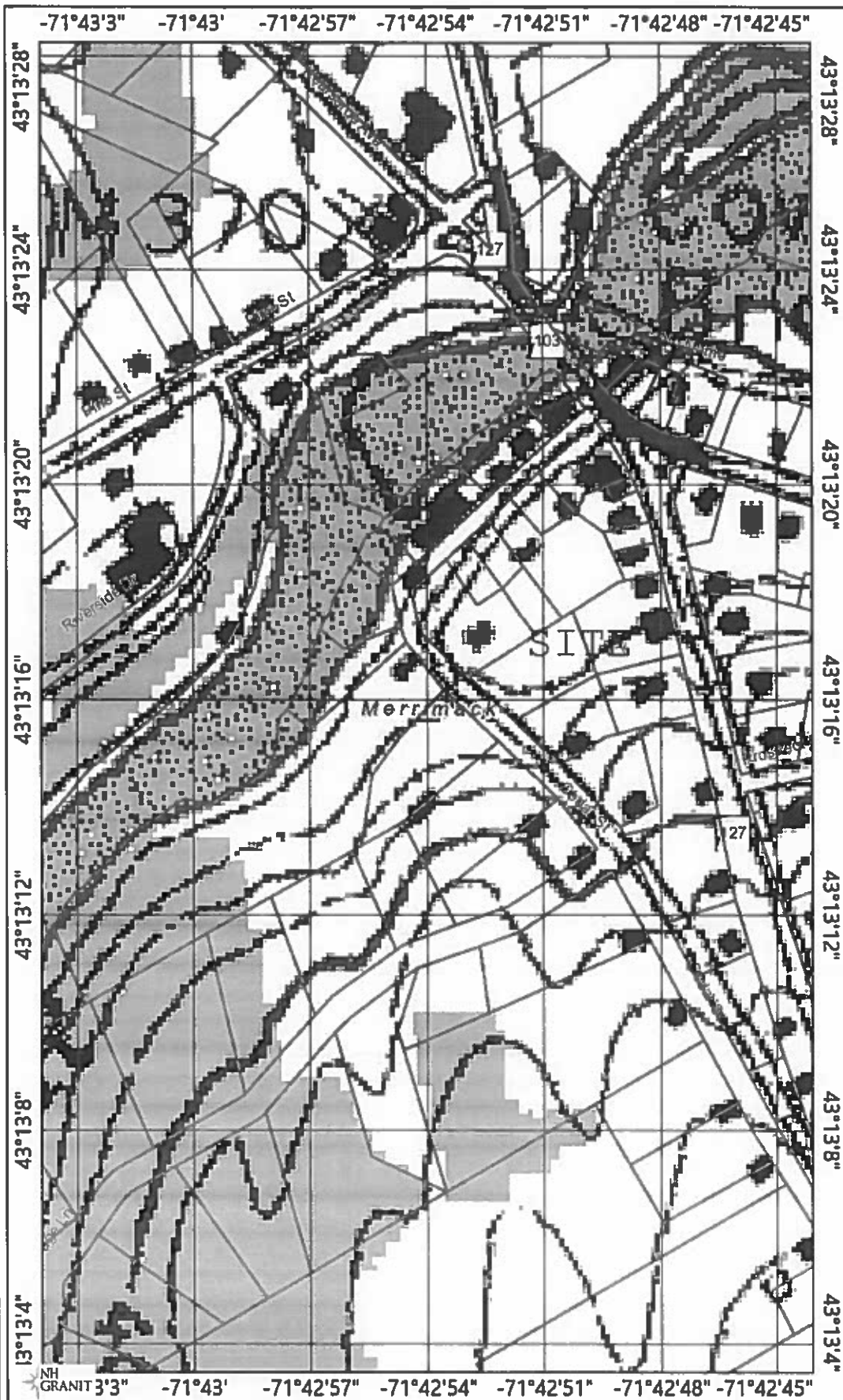
50-year		
1S/1L	1.40	.66

The calculations show that there is a decrease in peak runoff rates for the storm events analyzed. Therefore, there will be no effect on downstream drainage patterns.

Commercial Site Plan
Map RO3 Lots 11 & 12
Farmington NH

USGS

Map by NH GRANIT



Legend

- Parcels
 - Parcel Polygons
 - Attributes for Additional Lines
- State
- County
- City/Town

Map Scale

1: 3,247

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Map Generated: 6/16/2021



Notes



**Commercial Site Plan
Map RO3 Lots 11 & 12
Farmington NH**

AERIAL PHOTO



103

Highland Ave

Highland Ave

Highland Ave

Prospect St

Sunoco Gas Station

Contoocook Auto Clinic

Union House Oddities
Antique store

Prospect St

127

Maple St

127

Magic Secret Garden
Florist

Tooky Village
Barber Shop

The if everyday
Cafe & Pub

Taberout

Contoocook United
Methodist Church

Cedar St

Contoocook River

Cedar St

Cedar St

Cedar St

Contoocook River

Contoocook River

Commercial Site Plan
Map RO3 Lots 11 & 12
Farmington NH

WEBB SOIL SURVEY



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Merrimack and Belknap Counties, New Hampshire



May 21, 2021

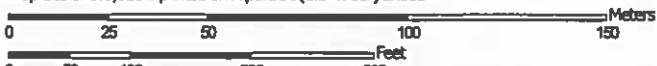
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:1,820 if printed on A portrait (8.5" x 11") sheet.



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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
459C	Metacomet fine sandy loam, 8 to 15 percent slopes, very stony	1.9	26.1%
613A	Croghan loamy fine sand, 0 to 8 percent slopes, wooded	5.5	73.9%
Totals for Area of Interest		7.4	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the

Custom Soil Resource Report

development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Merrimack and Belknap Counties, New Hampshire

459C—Metacomet fine sandy loam, 8 to 15 percent slopes, very stony

Map Unit Setting

National map unit symbol: 9dpq
Elevation: 250 to 2,940 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days
Farmland classification: Farmland of local importance

Map Unit Composition

Metacomet and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Metacomet

Setting

Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Basal melt-out till derived from granite, gneiss, or schist

Typical profile

Oe - 0 to 1 inches: slightly decomposed plant material
H1 - 1 to 9 inches: fine sandy loam
H2 - 9 to 34 inches: fine sandy loam
H3 - 34 to 65 inches: sandy loam

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 36 inches to densic material
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Pillsbury

Percent of map unit: 4 percent
Landform: Ground moraines
Down-slope shape: Linear

Custom Soil Resource Report

Across-slope shape: Convex
Hydric soil rating: Yes

Chichester

Percent of map unit: 4 percent
Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Skerry

Percent of map unit: 3 percent
Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Henniker

Percent of map unit: 3 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Peacham

Percent of map unit: 3 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Gilmanton

Percent of map unit: 3 percent
Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

613A—Croghan loamy fine sand, 0 to 8 percent slopes, wooded

Map Unit Setting

National map unit symbol: 2wqp0
Elevation: 150 to 2,300 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Croghan and similar soils: 85 percent
Minor components: 15 percent

Custom Soil Resource Report

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Croghan

Setting

Landform: Marine terraces, outwash deltas
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Sandy glaciofluvial deposits

Typical profile

Oa - 0 to 4 inches: highly decomposed plant material
E - 4 to 6 inches: loamy fine sand
Bs - 6 to 17 inches: loamy fine sand
BC - 17 to 30 inches: fine sand
C - 30 to 65 inches: sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(1.42 to 14.17 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Colton

Percent of map unit: 5 percent
Landform: Marine terraces, outwash deltas
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Adams

Percent of map unit: 5 percent
Landform: Marine terraces, outwash deltas
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Custom Soil Resource Report

Naumburg

Percent of map unit: 3 percent

Landform: Marine terraces, outwash deltas

Landform position (two-dimensional): Foothlope, toeslope

Landform position (three-dimensional): Base slope

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

Nicholville

Percent of map unit: 2 percent

Landform: Marine terraces, outwash deltas

Landform position (two-dimensional): Backslope, foothlope

Landform position (three-dimensional): Side slope, base slope

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

Custom Soil Resource Report

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Custom Soil Resource Report
Map—Hydrologic Soil Group



Map Scale: 1:1,820 if printed on A portrait (8.5" x 11") sheet.

0 25 50 100 150 Meters

0 50 100 200 300 Feet

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

MAP LEGEND

- Area of Interest (AOI)
 - Area of Interest (AOI)
- Soils
 - Soil Rating Polygons
 - A
 - A/D
 - B
 - B/D
 - C
 - C/D
 - D
 - Not rated or not available
 - Soil Rating Lines
 - A
 - A/D
 - B
 - B/D
 - C
 - C/D
 - D
 - Not rated or not available
 - Soil Rating Points
 - A
 - A/D
 - B
 - B/D
- 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 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:
 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: Merrimack and Belknap Counties, New Hampshire
 Survey Area Data: Version 25, May 29, 2020

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

Date(s) aerial images were photographed: May 31, 2019--Aug 29, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

Imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Custom Soil Resource Report

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
459C	Metacomet fine sandy loam, 8 to 15 percent slopes, very stony	C	1.9	26.1%
613A	Croghan loamy fine sand, 0 to 8 percent slopes, wooded	A	5.5	73.9%
Totals for Area of Interest			7.4	100.0%

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Commercial Site Plan
Map RO3 Lots 11 & 12
Farmington NH

EXTREME PRECIPITATION TABLE

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	71.714 degrees West
Latitude	43.220 degrees North
Elevation	0 feet
Date/Time	Fri, 21 May 2021 06:58:17 -0400

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.26	0.40	0.50	0.65	0.82	1.03	1yr	0.70	0.98	1.19	1.49	1.88	2.37	2.55	1yr	2.09	2.45	2.90	3.60	4.12	1yr
2yr	0.31	0.48	0.60	0.79	0.99	1.25	2yr	0.86	1.15	1.44	1.80	2.25	2.80	3.13	2yr	2.48	3.01	3.50	4.18	4.77	2yr
5yr	0.37	0.58	0.72	0.97	1.24	1.57	5yr	1.07	1.44	1.82	2.26	2.81	3.47	3.96	5yr	3.07	3.81	4.40	5.18	5.87	5yr
10yr	0.42	0.66	0.83	1.13	1.47	1.87	10yr	1.27	1.71	2.17	2.70	3.33	4.08	4.73	10yr	3.61	4.55	5.24	6.09	6.87	10yr
25yr	0.50	0.79	1.00	1.38	1.83	2.36	25yr	1.58	2.15	2.74	3.40	4.17	5.06	6.00	25yr	4.47	5.77	6.61	7.56	8.47	25yr
50yr	0.56	0.91	1.16	1.62	2.18	2.81	50yr	1.88	2.56	3.27	4.05	4.94	5.96	7.18	50yr	5.27	6.91	7.88	8.90	9.91	50yr
100yr	0.64	1.04	1.34	1.89	2.58	3.35	100yr	2.23	3.04	3.90	4.83	5.86	7.02	8.60	100yr	6.21	8.27	9.39	10.49	11.61	100yr
200yr	0.74	1.20	1.55	2.22	3.06	3.99	200yr	2.64	3.63	4.65	5.74	6.94	8.27	10.31	200yr	7.32	9.91	11.21	12.37	13.60	200yr
500yr	0.88	1.45	1.89	2.74	3.84	5.03	500yr	3.31	4.57	5.87	7.22	8.70	10.30	13.10	500yr	9.12	12.60	14.16	15.39	16.79	500yr

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.24	0.37	0.45	0.60	0.74	0.90	1yr	0.64	0.88	0.98	1.29	1.57	1.91	2.32	1yr	1.69	2.23	2.59	3.13	3.61	1yr
2yr	0.30	0.47	0.58	0.78	0.96	1.15	2yr	0.83	1.12	1.31	1.73	2.22	2.70	3.00	2yr	2.39	2.89	3.35	4.00	4.61	2yr
5yr	0.34	0.52	0.65	0.89	1.13	1.35	5yr	0.98	1.32	1.54	2.00	2.57	3.17	3.60	5yr	2.81	3.46	3.95	4.74	5.43	5yr
10yr	0.37	0.58	0.71	1.00	1.29	1.51	10yr	1.11	1.48	1.73	2.24	2.86	3.55	4.12	10yr	3.14	3.97	4.47	5.34	6.08	10yr
25yr	0.42	0.65	0.80	1.15	1.51	1.76	25yr	1.30	1.72	2.03	2.59	3.29	4.14	4.92	25yr	3.66	4.73	5.25	6.29	7.10	25yr
50yr	0.47	0.71	0.89	1.27	1.71	1.97	50yr	1.48	1.92	2.28	2.91	3.67	4.65	5.62	50yr	4.12	5.40	5.92	7.12	7.60	50yr
100yr	0.51	0.78	0.97	1.41	1.93	2.19	100yr	1.67	2.14	2.56	3.27	4.10	5.24	6.42	100yr	4.64	6.17	6.69	8.07	8.44	100yr
200yr	0.57	0.85	1.08	1.56	2.18	2.44	200yr	1.88	2.39	2.87	3.68	4.59	5.89	7.34	200yr	5.21	7.06	7.55	9.18	9.34	200yr
500yr	0.65	0.96	1.24	1.80	2.56	2.81	500yr	2.21	2.75	3.37	4.33	5.34	6.87	8.77	500yr	6.08	8.43	8.80	10.90	10.66	500yr

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.29	0.45	0.55	0.74	0.91	1.11	1yr	0.78	1.08	1.21	1.60	1.97	2.58	2.82	1yr	2.29	2.71	3.24	3.99	4.52	1yr
2yr	0.33	0.51	0.63	0.85	1.05	1.25	2yr	0.91	1.22	1.42	1.84	2.36	2.93	3.29	2yr	2.60	3.16	3.67	4.37	5.02	2yr
5yr	0.41	0.64	0.79	1.08	1.38	1.61	5yr	1.19	1.57	1.81	2.32	2.94	3.80	4.35	5yr	3.36	4.19	4.90	5.61	6.36	5yr
10yr	0.50	0.76	0.95	1.32	1.71	1.96	10yr	1.47	1.92	2.19	2.77	3.49	4.68	5.42	10yr	4.15	5.22	6.12	6.81	7.67	10yr
25yr	0.64	0.97	1.20	1.72	2.26	2.56	25yr	1.95	2.50	2.84	3.49	4.37	6.12	7.25	25yr	5.42	6.97	8.22	8.79	9.85	25yr
50yr	0.77	1.17	1.45	2.09	2.81	3.14	50yr	2.43	3.07	3.46	4.17	5.19	7.51	9.04	50yr	6.64	8.70	10.27	10.66	12.39	50yr
100yr	0.93	1.41	1.76	2.54	3.49	3.85	100yr	3.01	3.77	4.21	4.97	6.15	9.22	11.29	100yr	8.16	10.86	12.81	12.95	15.12	100yr
200yr	1.13	1.69	2.15	3.11	4.34	4.73	200yr	3.74	4.62	5.13	5.92	7.31	11.32	14.09	200yr	10.02	13.55	16.04	15.71	18.46	200yr
500yr	1.46	2.18	2.80	4.07	5.79	6.21	500yr	5.00	6.07	6.67	7.48	9.18	14.89	18.92	500yr	13.17	18.19	21.61	20.28	24.05	500yr

**Commercial Site Plan
Map RO3 Lots 11 & 12
Farmington NH**

BMP Worksheets



INFILTRATION PRACTICE CRITERIA (Env-Wq 1508.06)

ADS SYSTEM

Enter the type of infiltration practice (e.g., basin, trench) and the node name in the drainage analysis, if applicable.

		Have you reviewed Env-Wq 1508.06(a) to ensure that infiltration is allowed?	← yes
0.41	ac	A = Area draining to the practice	
0.41	ac	A _i = Impervious area draining to the practice	
1.00	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.95	unitless	R _v = Runoff coefficient = 0.05 + (0.9 x I)	
0.39	ac-in	WQV = 1" x R _v x A	
1,414	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
353	cf	25% x WQV (check calc for sediment forebay volume)	
deep sump hooded cb Method of pretreatment? (not required for clean or roof runoff)			
	cf	V _{SED} = Sediment forebay volume, if used for pretreatment	≥ 25%WQV
1,516	cf	V = Volume ¹ (attach a stage-storage table)	≥ WQV
2,000	sf	A _{SA} = Surface area of the bottom of the pond	
10.00	iph	K _{sat} _{DESIGN} = Design infiltration rate ²	
0.8	hours	T _{DRAIN} = Drain time = V / (A _{SA} * I _{DESIGN})	< 72-hrs
362.30	feet	E _{BTM} = Elevation of the bottom of the basin	
359.50	feet	E _{SHWT} = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
359.00	feet	E _{ROCK} = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
2.80	feet	D _{SHWT} = Separation from SHWT	≥ * ³
3.3	feet	D _{ROCK} = Separation from bedrock	≥ * ³
	ft	D _{amend} = Depth of amended soil, if applicable due high infiltration rate	≥ 24"
	ft	D _T = Depth of trench, if trench proposed	4 - 10 ft
	Yes/No	If a trench or underground system is proposed, has observation well been provided?	← yes
		If a trench is proposed, does material meet Env-Wq 1508.06(k)(2) requirements. ⁴	← yes
	Yes/No	If a basin is proposed, Is the perimeter curvilinear, and basin floor flat?	← yes
	:1	If a basin is proposed, pond side slopes.	≥3:1
363.29	ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
364.14	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
366.00	ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
	YES	10 peak elevation ≤ Elevation of the top of the trench? ⁵	← yes
	YES	If a basin is proposed, 50-year peak elevation ≤ Elevation of berm?	← yes

1. Volume below the lowest invert of the outlet structure and excludes forebay volume
2. K_{sat}_{DESIGN} includes a factor of safety. See Env-Wq 1504.14 for requirements for determining the infiltr. rate
3. 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.
4. Clean, washed well graded diameter of 1.5 to 3 inches above the in-situ soil.
5. If 50-year peak elevation exceeds top of trench, the overflow must be routed in HydroCAD as secondary discharge.

Designer's Notes: _____

Stage-Discharge for Pond 12P: ug storage for roof

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
362.30	0.00	0.00	0.00	364.95	4.15	0.47	3.69
362.35	0.46	0.46	0.00	365.00	4.25	0.47	3.78
362.40	0.46	0.46	0.00	365.05	4.34	0.47	3.88
362.45	0.46	0.46	0.00	365.10	4.43	0.47	3.97
362.50	0.47	0.47	0.00	365.15	4.52	0.47	4.06
362.55	0.47	0.47	0.00	365.20	4.61	0.47	4.14
362.60	0.47	0.47	0.00	365.25	4.69	0.47	4.23
362.65	0.47	0.47	0.00	365.30	4.78	0.47	4.31
362.70	0.47	0.47	0.00	365.35	4.86	0.47	4.39
362.75	0.47	0.47	0.00	365.40	4.94	0.47	4.47
362.80	0.47	0.47	0.00	365.45	5.02	0.47	4.55
362.85	0.47	0.47	0.00	365.50	5.10	0.47	4.63
362.90	0.47	0.47	0.00	365.55	5.17	0.47	4.71
362.95	0.47	0.47	0.00	365.60	5.25	0.47	4.78
363.00	0.47	0.47	0.00	365.65	5.32	0.47	4.86
363.05	0.47	0.47	0.00	365.70	5.40	0.47	4.93
363.10	0.47	0.47	0.00	365.75	5.47	0.47	5.00
363.15	0.47	0.47	0.00	365.80	5.54	0.47	5.07
363.20	0.47	0.47	0.00	365.85	5.61	0.47	5.14
363.25	0.47	0.47	0.00	365.90	5.68	0.47	5.21
363.30	0.47	0.47	0.00	365.95	5.75	0.47	5.28
363.35	0.47	0.47	0.00	366.00	5.81	0.47	5.35
363.40	0.47	0.47	0.00	366.05	5.88	0.47	5.41
363.45	0.47	0.47	0.00	366.10	5.95	0.47	5.48
363.50	0.47	0.47	0.00	366.15	6.01	0.47	5.55
363.55	0.47	0.47	0.00	366.20	6.08	0.47	5.61
363.60	0.47	0.47	0.00	366.25	6.14	0.47	5.67
363.65	0.47	0.47	0.00	366.30	6.20	0.47	5.74
363.70	0.47	0.47	0.00	366.35	6.26	0.47	5.80
363.75	0.47	0.47	0.00	366.40	6.32	0.47	5.86
363.80	0.47	0.47	0.00	366.45	6.39	0.47	5.92
363.85	0.47	0.47	0.00	366.50	6.45	0.47	5.98
363.90	0.47	0.47	0.00				
363.95	0.47	0.47	0.00				
364.00	0.47	0.47	0.00				
364.05	0.58	0.47	0.11				
364.10	0.79	0.47	0.32				
364.15	1.06	0.47	0.60				
364.20	1.38	0.47	0.92				
364.25	1.75	0.47	1.28				
364.30	2.15	0.47	1.69				
364.35	2.59	0.47	2.13				
364.40	2.86	0.47	2.39				
364.45	3.00	0.47	2.54				
364.50	3.14	0.47	2.67				
364.55	3.27	0.47	2.80				
364.60	3.40	0.47	2.93				
364.65	3.51	0.47	3.05				
364.70	3.63	0.47	3.16				
364.75	3.74	0.47	3.28				
364.80	3.85	0.47	3.38				
364.85	3.95	0.47	3.49				
364.90	4.05	0.47	3.59				

Baystone Properties, LLC
49 & 71 Cedar Street
Contoocook, NH
Date: 5-15-21

Test Pit #1

0-12" Topsoil
 10 YR 3/3 – Dark Brown

12-28" Sand
 Granular/Friable
 7.5 YR 5/6 – Strong Brown

28-40" Sand
 Granular/Loose
 2.5 Y 5/6 – Light Olive Brown

ESHWT = 28"
Roots to 28"
No ledge observed
Water observed @40"
Perc Rate 2 min./inch

Test Pit #2

0-12" Topsoil
 10 YR 3/3 – Dark Brown

12-30" Sand
 Granular/Friable
 7.5 YR 5/6 – Strong Brown

30-72" Loamy Sand
 Granular/Firm
 2.5 YR 5/6 - Light Olive Brown

ESHWT = 30"
Roots to 30"
No ledge observed
Water observed @72"
Perc Rate 2 min./inch

Commercial Site Plan
Map RO3 Lots 11 & 12
Farmington NH

Rip-rap apron calculations

RIPRAP CALCULATIONS

DESIGN STORM: 25 YEARS

DATE: 06/16/21 REVISED:

PROJECT NAME: SITE PLAN

LOCATION: HOPKINTON NH

JOB NO.

VARIABLES:

- Q = DISCHARGE FROM OUTLET
- Do = PIPE DIAMETER
- Tw = TAIL WATER
- La = LENGTH OF RIPRAP
- Wi = WIDTH OF RIPRAP AT OUTLET
- We = WIDTH OF RIPRAP DOWNSTREAM FROM OUTLET
- d50 = RIPRAP SIZE

EQUATIONS:

FOR $Tw < 1/2 Do$

FOR $Tw \geq 1/2 Do$

$$La = (1.8Q/Do^{1.5}) + 7Do$$

$$Wi = 3Do$$

$$We = Do + La$$

$$d50 = (0.02Q^{1.33})/(Tw)(Do)$$

$$La = (3Q)/(Do^{1.5})$$

$$Wi = 3Do$$

$$We = Do + 0.4La$$

$$d50 = (0.02Q^{1.33})/(Tw)(Do)$$

OUTLET	Q CFS	Do FEET	Tw FEET	La FEET	Wi FEET	We FEET	d50 INCHES
FES 1	0.51	1.00	0.10	7.92	3.00	8.92	0.98
			0.20	#DIV/0!	0.00	#DIV/0!	#DIV/0!
			0.10	#DIV/0!	0.00	#DIV/0!	#DIV/0!

Commercial Site Plan
Map RO3 Lots 11 & 12
Farmington NH

Pre-Drainage analysis output
Pre-development 10, 25, 50-year



EXISTING



PRE

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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.295	39	>75% Grass cover, Good, HSG A (1S)
0.184	98	Paved parking, HSG A (1S)
0.096	98	Roofs, HSG A (1S)
0.167	30	Woods, Good, HSG A (1S)
1.742	48	TOTAL AREA

PRE

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Page 3

Soil Listing (all nodes)

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

PRE

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Type III 24-hr 10-YR Rainfall=4.08"

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Summary for Subcatchment 1S: EXISTING

Runoff = 0.19 cfs @ 12.36 hrs, Volume= 0.035 af, Depth> 0.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.08"

Area (sf)	CN	Description
4,185	98	Roofs, HSG A
4,530	98	Paved parking, HSG A
7,270	30	Woods, Good, HSG A
56,423	39	>75% Grass cover, Good, HSG A
3,468	98	Paved parking, HSG A
75,876	48	Weighted Average
63,693		83.94% Pervious Area
12,183		16.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	40	0.0600	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 2.80"
3.3	400	0.0850	2.04		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.5	440	Total			

PRE

Type III 24-hr 25-YR Rainfall=5.06"

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Summary for Subcatchment 1S: EXISTING

Runoff = 0.65 cfs @ 12.16 hrs, Volume= 0.077 af, Depth> 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.06"

Area (sf)	CN	Description
4,185	98	Roofs, HSG A
4,530	98	Paved parking, HSG A
7,270	30	Woods, Good, HSG A
56,423	39	>75% Grass cover, Good, HSG A
3,468	98	Paved parking, HSG A
75,876	48	Weighted Average
63,693		83.94% Pervious Area
12,183		16.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	40	0.0600	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 2.80"
3.3	400	0.0850	2.04		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.5	440	Total			

PRE

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Type III 24-hr 50-YR Rainfall=5.96"

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Page 6

Summary for Subcatchment 1S: EXISTING

Runoff = 1.40 cfs @ 12.12 hrs, Volume= 0.126 af, Depth> 0.87"

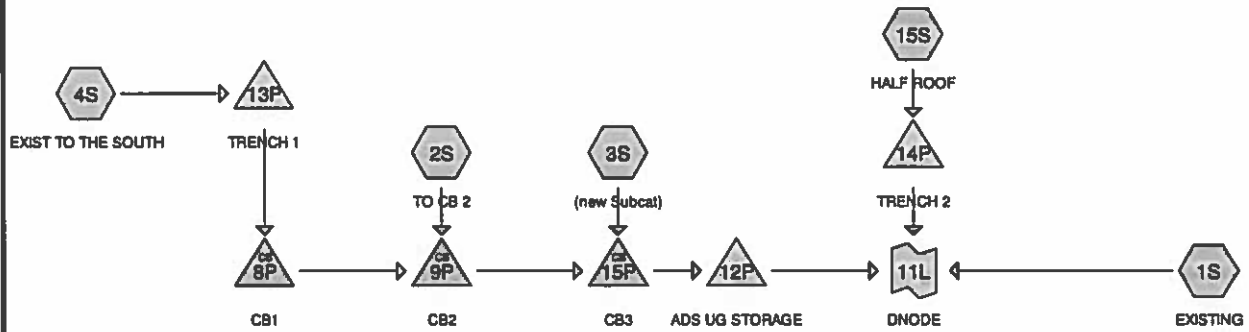
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YR Rainfall=5.96"

Area (sf)	CN	Description
4,185	98	Roofs, HSG A
4,530	98	Paved parking, HSG A
7,270	30	Woods, Good, HSG A
56,423	39	>75% Grass cover, Good, HSG A
3,468	98	Paved parking, HSG A
75,876	48	Weighted Average
63,693		83.94% Pervious Area
12,183		16.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	40	0.0600	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 2.80"
3.3	400	0.0850	2.04		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.5	440	Total			

**Commercial Site Plan
Map RO3 Lots 11 & 12
Farmington NH**

**Post-Drainage analysis output
Post development 10, 25, 50-year**



Routing Diagram for POST
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POST

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
42,200	39	>75% Grass cover, Good, HSG A (1S, 4S, 15S)
4,149	98	Paved parking, HSG A (1S, 4S, 15S)
25,164	98	Roofs, HSG A (1S, 2S, 3S, 4S, 15S)
4,363	30	Woods, Good, HSG A (1S, 4S)
75,876	61	TOTAL AREA

POST

Prepared by HP

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Page 3

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
75,876	HSG A	1S, 2S, 3S, 4S, 15S
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
75,876		TOTAL AREA

POST

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Type III 24-hr 10-YR Rainfall=4.08"

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Summary for Subcatchment 1S: EXISTING

Runoff = 0.15 cfs @ 12.09 hrs, Volume= 557 cf, Depth> 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.08"

Area (sf)	CN	Description
1,385	98	Roofs, HSG A
340	98	Paved parking, HSG A
2,591	30	Woods, Good, HSG A
14,087	39	>75% Grass cover, Good, HSG A
18,403		Weighted Average
16,678	38	90.63% Pervious Area
1,725	98	9.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0550	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 2.90"
0.7	183	0.0900	4.50		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
4.6	233	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 2S: TO CB 2

Runoff = 0.79 cfs @ 12.09 hrs, Volume= 2,640 cf, Depth> 3.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.08"

Area (sf)	CN	Description
8,850	98	Roofs, HSG A
8,850	98	100.00% Impervious Area

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

Summary for Subcatchment 3S: (new Subcat)

Runoff = 0.80 cfs @ 12.09 hrs, Volume= 2,678 cf, Depth> 3.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.08"

POST

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Type III 24-hr 10-YR Rainfall=4.08"

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Area (sf)	CN	Description
8,979	98	Roofs, HSG A
8,979	98	100.00% Impervious Area

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

Summary for Subcatchment 4S: EXIST TO THE SOUTH

Runoff = 0.56 cfs @ 12.09 hrs, Volume= 1,935 cf, Depth> 0.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.08"

Area (sf)	CN	Description
22,564	39	>75% Grass cover, Good, HSG A
3,468	98	Paved parking, HSG A
1,772	30	Woods, Good, HSG A
2,790	98	Roofs, HSG A
30,594		Weighted Average
24,336	38	79.55% Pervious Area
6,258	98	20.45% Impervious Area

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

Summary for Subcatchment 15S: HALF ROOF

Runoff = 0.31 cfs @ 12.09 hrs, Volume= 1,061 cf, Depth> 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR Rainfall=4.08"

Area (sf)	CN	Description
5,549	39	>75% Grass cover, Good, HSG A
3,160	98	Roofs, HSG A
341	98	Paved parking, HSG A
9,050		Weighted Average
5,549	39	61.31% Pervious Area
3,501	98	38.69% Impervious Area

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

POST

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Type III 24-hr 10-YR Rainfall=4.08"

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Summary for Pond 8P: CB1

Inflow Area = 30,594 sf, 20.45% Impervious, Inflow Depth = 0.00" for 10-YR event
 Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
 Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 363.22' @ 12.69 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	363.04'	12.0" Round Culvert L= 51.0' Ke= 0.500 Inlet / Outlet Invert= 363.04' / 362.79' S= 0.0049 ' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=363.04' TW=362.75' (Dynamic Tailwater)
 ↑1=Culvert (Controls 0.00 cfs)

Summary for Pond 9P: CB2

Inflow Area = 39,444 sf, 38.30% Impervious, Inflow Depth > 0.80" for 10-YR event
 Inflow = 0.79 cfs @ 12.09 hrs, Volume= 2,640 cf
 Outflow = 0.79 cfs @ 12.09 hrs, Volume= 2,640 cf, Atten= 0%, Lag= 0.0 min
 Primary = 0.79 cfs @ 12.09 hrs, Volume= 2,640 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 363.46' @ 12.12 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	362.69'	12.0" Round Culvert L= 38.0' Ke= 0.500 Inlet / Outlet Invert= 362.69' / 362.50' S= 0.0050 ' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.53 cfs @ 12.09 hrs HW=363.42' TW=363.36' (Dynamic Tailwater)
 ↑1=Culvert (Outlet Controls 0.53 cfs @ 1.21 fps)

Summary for Pond 12P: ADS UG STORAGE

Inflow Area = 48,423 sf, 49.74% Impervious, Inflow Depth > 1.32" for 10-YR event
 Inflow = 1.59 cfs @ 12.09 hrs, Volume= 5,318 cf
 Outflow = 0.47 cfs @ 12.00 hrs, Volume= 5,321 cf, Atten= 71%, Lag= 0.0 min
 Discarded = 0.47 cfs @ 12.00 hrs, Volume= 5,321 cf
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 363.29' @ 12.41 hrs Surf.Area= 2,013 sf Storage= 915 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 9.0 min (745.4 - 736.5)

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Type III 24-hr 10-YR Rainfall=4.08"

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Volume	Invert	Avail.Storage	Storage Description
#1	362.30'	1,669 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 4,400 cf Overall - 228 cf Embedded = 4,172 cf x 40.0% Voids
#2	362.50'	228 cf	12.0" Round Pipe Storage Inside #1 L= 290.0'
#3	362.50'	50 cf	4.00'D x 4.00'H Vertical Cone/Cylinder
		1,947 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
362.30	2,000	0	0
364.50	2,000	4,400	4,400

Device	Routing	Invert	Outlet Devices
#1	Discarded	362.30'	10.000 in/hr Exfiltration over Surface area
#2	Device 3	364.00'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	362.40'	12.0" Round Culvert L= 16.0' Ke= 0.500 Inlet / Outlet Invert= 362.40' / 362.24' S= 0.0100 ' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.47 cfs @ 12.00 hrs HW=362.50' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.47 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=362.30' TW=0.00' (Dynamic Tailwater)

↑3=Culvert (Controls 0.00 cfs)

↑2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond 13P: TRENCH 1

Inflow Area = 30,594 sf, 20.45% Impervious, Inflow Depth > 0.76" for 10-YR event
 Inflow = 0.56 cfs @ 12.09 hrs, Volume= 1,935 cf
 Outflow = 0.18 cfs @ 12.66 hrs, Volume= 1,941 cf, Atten= 68%, Lag= 34.1 min
 Discarded = 0.18 cfs @ 12.66 hrs, Volume= 1,941 cf
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

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

Peak Elev= 367.92' @ 12.38 hrs Surf.Area= 772 sf Storage= 312 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 7.7 min (753.7 - 746.0)

Volume	Invert	Avail.Storage	Storage Description
#1	367.00'	780 cf	5.00'W x 130.00'L x 3.00'H PrismaToid 1,950 cf Overall x 40.0% Voids
#2	367.25'	102 cf	12.0" Round Pipe Storage L= 130.0'
		882 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	367.00'	10.000 in/hr Exfiltration over Surface area
#2	Primary	369.50'	4.0' long x 4.0' breadth Broad-Crested Rectangular Weir

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Type III 24-hr 10-YR Rainfall=4.08"

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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			

Discarded OutFlow Max=0.18 cfs @ 12.66 hrs HW=367.75' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=367.00' TW=363.04' (Dynamic Tailwater)

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

Summary for Pond 14P: TRENCH 2

Inflow Area = 9,050 sf, 38.69% Impervious, Inflow Depth > 1.41" for 10-YR event
 Inflow = 0.31 cfs @ 12.09 hrs, Volume= 1,061 cf
 Outflow = 0.14 cfs @ 12.28 hrs, Volume= 1,062 cf, Atten= 57%, Lag= 11.4 min
 Discarded = 0.14 cfs @ 12.28 hrs, Volume= 1,062 cf
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 362.52' @ 12.28 hrs Surf.Area= 586 sf Storage= 120 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 3.7 min (744.4 - 740.7)

Volume	Invert	Avail.Storage	Storage Description
#1	362.00'	384 cf	4.00'W x 120.00'L x 2.00'H Prismaoid 960 cf Overall x 40.0% Voids
#2	362.25'	94 cf	12.0" Round Pipe Storage L= 120.0'
		478 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	362.00'	10.000 in/hr Exfiltration over Surface area
#2	Primary	363.50'	4.0' 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

Discarded OutFlow Max=0.14 cfs @ 12.28 hrs HW=362.52' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=362.00' TW=0.00' (Dynamic Tailwater)

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

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Type III 24-hr 10-YR Rainfall=4.08"

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Summary for Pond 15P: CB3

Inflow Area = 48,423 sf, 49.74% Impervious, Inflow Depth > 1.32" for 10-YR event
 Inflow = 1.59 cfs @ 12.09 hrs, Volume= 5,318 cf
 Outflow = 1.59 cfs @ 12.09 hrs, Volume= 5,318 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.59 cfs @ 12.09 hrs, Volume= 5,318 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 363.38' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	362.50'	12.0" Round Culvert L= 7.0' Ke= 0.500 Inlet / Outlet Invert= 362.50' / 362.50' S= 0.0000 ' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=1.55 cfs @ 12.09 hrs HW=363.36' TW=362.80' (Dynamic Tailwater)
 ↑1=Culvert (Barrel Controls 1.55 cfs @ 2.88 fps)

Summary for Link 11L: DNODE

Inflow Area = 75,876 sf, 38.63% Impervious, Inflow Depth > 0.09" for 10-YR event
 Inflow = 0.15 cfs @ 12.09 hrs, Volume= 557 cf
 Primary = 0.15 cfs @ 12.09 hrs, Volume= 557 cf, Atten= 0%, Lag= 0.0 min

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

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Type III 24-hr 25-YR Rainfall=5.06"

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Summary for Subcatchment 1S: EXISTING

Runoff = 0.19 cfs @ 12.09 hrs, Volume= 841 cf, Depth> 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.06"

Area (sf)	CN	Description
1,385	98	Roofs, HSG A
340	98	Paved parking, HSG A
2,591	30	Woods, Good, HSG A
14,087	39	>75% Grass cover, Good, HSG A
18,403		Weighted Average
16,678	38	90.63% Pervious Area
1,725	98	9.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0550	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 2.90"
0.7	183	0.0900	4.50		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
4.6	233	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 2S: TO CB 2

Runoff = 0.98 cfs @ 12.09 hrs, Volume= 3,299 cf, Depth> 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.06"

Area (sf)	CN	Description
8,850	98	Roofs, HSG A
8,850	98	100.00% Impervious Area

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

Summary for Subcatchment 3S: (new Subcat)

Runoff = 1.00 cfs @ 12.09 hrs, Volume= 3,347 cf, Depth> 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.06"

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Type III 24-hr 25-YR Rainfall=5.06"

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Area (sf)	CN	Description
8,979	98	Roofs, HSG A
8,979	98	100.00% Impervious Area

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

Summary for Subcatchment 4S: EXIST TO THE SOUTH

Runoff = 0.69 cfs @ 12.09 hrs, Volume= 2,650 cf, Depth> 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.06"

Area (sf)	CN	Description
22,564	39	>75% Grass cover, Good, HSG A
3,468	98	Paved parking, HSG A
1,772	30	Woods, Good, HSG A
2,790	98	Roofs, HSG A
30,594		Weighted Average
24,336	38	79.55% Pervious Area
6,258	98	20.45% Impervious Area

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

Summary for Subcatchment 15S: HALF ROOF

Runoff = 0.39 cfs @ 12.09 hrs, Volume= 1,383 cf, Depth> 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR Rainfall=5.06"

Area (sf)	CN	Description
5,549	39	>75% Grass cover, Good, HSG A
3,160	98	Roofs, HSG A
341	98	Paved parking, HSG A
9,050		Weighted Average
5,549	39	61.31% Pervious Area
3,501	98	38.69% Impervious Area

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

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Type III 24-hr 25-YR Rainfall=5.06"

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Summary for Pond 8P: CB1

Inflow Area = 30,594 sf, 20.45% Impervious, Inflow Depth = 0.00" for 25-YR event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 363.33' @ 13.18 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	363.04'	12.0" Round Culvert L= 51.0' Ke= 0.500 Inlet / Outlet Invert= 363.04' / 362.79' S= 0.0049 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=363.04' TW=362.76' (Dynamic Tailwater)
↑1=Culvert (Controls 0.00 cfs)

Summary for Pond 9P: CB2

Inflow Area = 39,444 sf, 38.30% Impervious, Inflow Depth > 1.00" for 25-YR event
Inflow = 0.98 cfs @ 12.09 hrs, Volume= 3,299 cf
Outflow = 0.98 cfs @ 12.09 hrs, Volume= 3,299 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.98 cfs @ 12.09 hrs, Volume= 3,299 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 363.90' @ 12.56 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	362.69'	12.0" Round Culvert L= 38.0' Ke= 0.500 Inlet / Outlet Invert= 362.69' / 362.50' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.60 cfs @ 12.09 hrs HW=363.54' TW=363.49' (Dynamic Tailwater)
↑1=Culvert (Outlet Controls 0.60 cfs @ 1.14 fps)

Summary for Pond 12P: ADS UG STORAGE

Inflow Area = 48,423 sf, 49.74% Impervious, Inflow Depth > 1.65" for 25-YR event
Inflow = 1.98 cfs @ 12.09 hrs, Volume= 6,646 cf
Outflow = 0.47 cfs @ 11.95 hrs, Volume= 6,670 cf, Atten= 76%, Lag= 0.0 min
Discarded = 0.47 cfs @ 11.95 hrs, Volume= 6,670 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 363.89' @ 12.47 hrs Surf.Area= 2,013 sf Storage= 1,423 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 15.1 min (750.1 - 735.0)

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Type III 24-hr 25-YR Rainfall=5.06"

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Volume	Invert	Avail.Storage	Storage Description
#1	362.30'	1,669 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 4,400 cf Overall - 228 cf Embedded = 4,172 cf x 40.0% Voids
#2	362.50'	228 cf	12.0" Round Pipe Storage Inside #1 L= 290.0'
#3	362.50'	50 cf	4.00'D x 4.00'H Vertical Cone/Cylinder
		1,947 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
362.30	2,000	0	0
364.50	2,000	4,400	4,400

Device	Routing	Invert	Outlet Devices
#1	Discarded	362.30'	10.000 in/hr Exfiltration over Surface area
#2	Device 3	364.00'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	362.40'	12.0" Round Culvert L= 16.0' Ke= 0.500 Inlet / Outlet Invert= 362.40' / 362.24' S= 0.0100 ' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.47 cfs @ 11.95 hrs HW=362.54' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.47 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=362.30' TW=0.00' (Dynamic Tailwater)

↑3=Culvert (Controls 0.00 cfs)

↑2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond 13P: TRENCH 1

Inflow Area = 30,594 sf, 20.45% Impervious, Inflow Depth > 1.04" for 25-YR event
 Inflow = 0.69 cfs @ 12.09 hrs, Volume= 2,650 cf
 Outflow = 0.18 cfs @ 13.50 hrs, Volume= 2,654 cf, Atten= 74%, Lag= 84.7 min
 Discarded = 0.18 cfs @ 13.50 hrs, Volume= 2,654 cf
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 368.63' @ 12.53 hrs Surf.Area= 650 sf Storage= 526 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 16.3 min (774.1 - 757.8)

Volume	Invert	Avail.Storage	Storage Description
#1	367.00'	780 cf	5.00'W x 130.00'L x 3.00'H Prismaold 1,950 cf Overall x 40.0% Voids
#2	367.25'	102 cf	12.0" Round Pipe Storage L= 130.0'
		882 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	367.00'	10.000 in/hr Exfiltration over Surface area
#2	Primary	369.50'	4.0' long x 4.0' breadth Broad-Crested Rectangular Weir

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Type III 24-hr 25-YR Rainfall=5.06"

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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			

Discarded OutFlow Max=0.18 cfs @ 13.50 hrs HW=367.75' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=367.00' TW=363.04' (Dynamic Tailwater)
 ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 14P: TRENCH 2

Inflow Area = 9,050 sf, 38.69% Impervious, Inflow Depth > 1.83" for 25-YR event
 Inflow = 0.39 cfs @ 12.09 hrs, Volume= 1,383 cf
 Outflow = 0.14 cfs @ 12.44 hrs, Volume= 1,385 cf, Atten= 64%, Lag= 21.0 min
 Discarded = 0.14 cfs @ 12.44 hrs, Volume= 1,385 cf
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 362.77' @ 12.35 hrs Surf.Area= 600 sf Storage= 197 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 6.3 min (752.0 - 745.8)

Volume	Invert	Avail.Storage	Storage Description
#1	362.00'	384 cf	4.00'W x 120.00'L x 2.00'H Prismatic 960 cf Overall x 40.0% Voids
#2	362.25'	94 cf	12.0" Round Pipe Storage L= 120.0'
		478 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	362.00'	10.000 in/hr Exfiltration over Surface area
#2	Primary	363.50'	4.0' 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

Discarded OutFlow Max=0.14 cfs @ 12.44 hrs HW=362.75' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=362.00' TW=0.00' (Dynamic Tailwater)
 ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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Type III 24-hr 25-YR Rainfall=5.06"

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Summary for Pond 15P: CB3

Inflow Area = 48,423 sf, 49.74% Impervious, Inflow Depth > 1.65" for 25-YR event
 Inflow = 1.98 cfs @ 12.09 hrs, Volume= 6,646 cf
 Outflow = 1.98 cfs @ 12.09 hrs, Volume= 6,646 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.98 cfs @ 12.09 hrs, Volume= 6,646 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 363.90' @ 12.51 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	362.50'	12.0" Round Culvert L= 7.0' Ke= 0.500 Inlet / Outlet Invert= 362.50' / 362.50' S= 0.0000 ' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=1.93 cfs @ 12.09 hrs HW=363.49' TW=363.06' (Dynamic Tailwater)
 ↑1=Culvert (Barrel Controls 1.93 cfs @ 3.08 fps)

Summary for Link 11L: DNODE

Inflow Area = 75,876 sf, 38.63% Impervious, Inflow Depth > 0.13" for 25-YR event
 Inflow = 0.19 cfs @ 12.09 hrs, Volume= 841 cf
 Primary = 0.19 cfs @ 12.09 hrs, Volume= 841 cf, Atten= 0%, Lag= 0.0 min

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

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Type III 24-hr 50-YR Rainfall=5.96"

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Summary for Subcatchment 1S: EXISTING

Runoff = 0.23 cfs @ 12.10 hrs, Volume= 1,196 cf, Depth> 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YR Rainfall=5.96"

Area (sf)	CN	Description
1,385	98	Roofs, HSG A
340	98	Paved parking, HSG A
2,591	30	Woods, Good, HSG A
14,087	39	>75% Grass cover, Good, HSG A
18,403		Weighted Average
16,678	38	90.63% Pervious Area
1,725	98	9.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0550	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 2.90"
0.7	183	0.0900	4.50		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
4.6	233	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 2S: TO CB 2

Runoff = 1.16 cfs @ 12.09 hrs, Volume= 3,903 cf, Depth> 5.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YR Rainfall=5.96"

Area (sf)	CN	Description
8,850	98	Roofs, HSG A
8,850	98	100.00% Impervious Area

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

Summary for Subcatchment 3S: (new Subcat)

Runoff = 1.18 cfs @ 12.09 hrs, Volume= 3,960 cf, Depth> 5.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YR Rainfall=5.96"

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Type III 24-hr 50-YR Rainfall=5.96"

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Area (sf)	CN	Description
8,979	98	Roofs, HSG A
8,979	98	100.00% Impervious Area

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

Summary for Subcatchment 4S: EXIST TO THE SOUTH

Runoff = 0.83 cfs @ 12.09 hrs, Volume= 3,449 cf, Depth> 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YR Rainfall=5.96"

Area (sf)	CN	Description
22,564	39	>75% Grass cover, Good, HSG A
3,468	98	Paved parking, HSG A
1,772	30	Woods, Good, HSG A
2,790	98	Roofs, HSG A
30,594		Weighted Average
24,336	38	79.55% Pervious Area
6,258	98	20.45% Impervious Area

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

Summary for Subcatchment 15S: HALF ROOF

Runoff = 0.46 cfs @ 12.09 hrs, Volume= 1,712 cf, Depth> 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-YR Rainfall=5.96"

Area (sf)	CN	Description
5,549	39	>75% Grass cover, Good, HSG A
3,160	98	Roofs, HSG A
341	98	Paved parking, HSG A
9,050		Weighted Average
5,549	39	61.31% Pervious Area
3,501	98	38.69% Impervious Area

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

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Type III 24-hr 50-YR Rainfall=5.96"

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Summary for Pond 8P: CB1

Inflow Area = 30,594 sf, 20.45% Impervious, Inflow Depth = 0.02" for 50-YR event
Inflow = 0.12 cfs @ 12.48 hrs, Volume= 60 cf
Outflow = 0.12 cfs @ 12.48 hrs, Volume= 60 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.12 cfs @ 12.48 hrs, Volume= 60 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 364.19' @ 12.45 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	363.04'	12.0" Round Culvert L= 51.0' Ke= 0.500 Inlet / Outlet Invert= 363.04' / 362.79' S= 0.0049 ' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.53 cfs @ 12.48 hrs HW=364.18' TW=364.15' (Dynamic Tailwater)
↑1=Culvert (Outlet Controls 0.53 cfs @ 0.74 fps)

Summary for Pond 9P: CB2

Inflow Area = 39,444 sf, 38.30% Impervious, Inflow Depth > 1.21" for 50-YR event
Inflow = 1.16 cfs @ 12.09 hrs, Volume= 3,963 cf
Outflow = 1.16 cfs @ 12.09 hrs, Volume= 3,963 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.16 cfs @ 12.09 hrs, Volume= 3,963 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 364.19' @ 12.38 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	362.69'	12.0" Round Culvert L= 38.0' Ke= 0.500 Inlet / Outlet Invert= 362.69' / 362.50' S= 0.0050 ' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=0.63 cfs @ 12.09 hrs HW=363.65' TW=363.60' (Dynamic Tailwater)
↑1=Culvert (Outlet Controls 0.63 cfs @ 1.04 fps)

Summary for Pond 12P: ADS UG STORAGE

Inflow Area = 48,423 sf, 49.74% Impervious, Inflow Depth > 1.96" for 50-YR event
Inflow = 2.33 cfs @ 12.09 hrs, Volume= 7,923 cf
Outflow = 0.98 cfs @ 12.31 hrs, Volume= 7,939 cf, Atten= 58%, Lag= 13.2 min
Discarded = 0.47 cfs @ 11.90 hrs, Volume= 7,520 cf
Primary = 0.51 cfs @ 12.31 hrs, Volume= 419 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 364.14' @ 12.31 hrs Surf.Area= 2,013 sf Storage= 1,626 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 16.5 min (750.9 - 734.3)

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Type III 24-hr 50-YR Rainfall=5.96"

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Volume	Invert	Avail.Storage	Storage Description
#1	362.30'	1,669 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 4,400 cf Overall - 228 cf Embedded = 4,172 cf x 40.0% Voids
#2	362.50'	228 cf	12.0" Round Pipe Storage Inside #1 L= 290.0'
#3	362.50'	50 cf	4.00'D x 4.00'H Vertical Cone/Cylinder
		1,947 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
362.30	2,000	0	0
364.50	2,000	4,400	4,400

Device	Routing	Invert	Outlet Devices
#1	Discarded	362.30'	10.000 in/hr Exfiltration over Surface area
#2	Device 3	364.00'	12.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Primary	362.40'	12.0" Round Culvert L= 16.0' Ke= 0.500 Inlet / Outlet Invert= 362.40' / 362.24' S= 0.0100 ' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.47 cfs @ 11.90 hrs HW=362.55' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.47 cfs)

Primary OutFlow Max=0.50 cfs @ 12.31 hrs HW=364.13' TW=0.00' (Dynamic Tailwater)

↑3=Culvert (Passes 0.50 cfs of 4.20 cfs potential flow)

↑2=Orifice/Grate (Weir Controls 0.50 cfs @ 1.20 fps)

Summary for Pond 13P: TRENCH 1

Inflow Area = 30,594 sf, 20.45% Impervious, Inflow Depth > 1.35" for 50-YR event
 Inflow = 0.83 cfs @ 12.09 hrs, Volume= 3,449 cf
 Outflow = 0.27 cfs @ 12.48 hrs, Volume= 3,449 cf, Atten= 67%, Lag= 23.4 min
 Discarded = 0.18 cfs @ 12.04 hrs, Volume= 3,390 cf
 Primary = 0.12 cfs @ 12.48 hrs, Volume= 60 cf

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

Peak Elev= 369.55' @ 12.48 hrs Surf.Area= 650 sf Storage= 766 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 28.4 min (794.2 - 765.8)

Volume	Invert	Avail.Storage	Storage Description
#1	367.00'	780 cf	5.00'W x 130.00'L x 3.00'H Prismatic 1,950 cf Overall x 40.0% Voids
#2	367.25'	102 cf	12.0" Round Pipe Storage L= 130.0'
		882 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	367.00'	10.000 in/hr Exfiltration over Surface area
#2	Primary	369.50'	4.0' long x 4.0' breadth Broad-Crested Rectangular Weir

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Type III 24-hr 50-YR Rainfall=5.96"

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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			

Discarded OutFlow Max=0.18 cfs @ 12.04 hrs HW=367.72' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=0.11 cfs @ 12.48 hrs HW=369.55' TW=364.18' (Dynamic Tailwater)
 ↑2=Broad-Crested Rectangular Weir (Weir Controls 0.11 cfs @ 0.54 fps)

Summary for Pond 14P: TRENCH 2

Inflow Area = 9,050 sf, 38.69% Impervious, Inflow Depth > 2.27" for 50-YR event
 Inflow = 0.46 cfs @ 12.09 hrs, Volume= 1,712 cf
 Outflow = 0.14 cfs @ 12.96 hrs, Volume= 1,715 cf, Atten= 70%, Lag= 52.3 min
 Discarded = 0.14 cfs @ 12.96 hrs, Volume= 1,715 cf
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 363.13' @ 12.47 hrs Surf.Area= 558 sf Storage= 305 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 10.9 min (760.5 - 749.6)

Volume	Invert	Avail.Storage	Storage Description
#1	362.00'	384 cf	4.00'W x 120.00'L x 2.00'H Prismatic 960 cf Overall x 40.0% Voids
#2	362.25'	94 cf	12.0" Round Pipe Storage L= 120.0'
		478 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	362.00'	10.000 in/hr Exfiltration over Surface area
#2	Primary	363.50'	4.0' 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

Discarded OutFlow Max=0.14 cfs @ 12.96 hrs HW=362.75' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=362.00' TW=0.00' (Dynamic Tailwater)
 ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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Type III 24-hr 50-YR Rainfall=5.96"

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Summary for Pond 15P: CB3

Inflow Area = 48,423 sf, 49.74% Impervious, Inflow Depth > 1.96" for 50-YR event
 Inflow = 2.33 cfs @ 12.09 hrs, Volume= 7,923 cf
 Outflow = 2.33 cfs @ 12.09 hrs, Volume= 7,923 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.33 cfs @ 12.09 hrs, Volume= 7,923 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 364.18' @ 12.34 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	362.50'	12.0" Round Culvert L= 7.0' Ke= 0.500 Inlet / Outlet Invert= 362.50' / 362.50' S= 0.0000 ' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Primary OutFlow Max=2.06 cfs @ 12.09 hrs HW=363.60' TW=363.31' (Dynamic Tailwater)
 ↑1=Culvert (Inlet Controls 2.06 cfs @ 2.62 fps)

Summary for Link 11L: DNODE

Inflow Area = 75,876 sf, 38.63% Impervious, Inflow Depth > 0.26" for 50-YR event
 Inflow = 0.66 cfs @ 12.30 hrs, Volume= 1,615 cf
 Primary = 0.66 cfs @ 12.30 hrs, Volume= 1,615 cf, Atten= 0%, Lag= 0.0 min

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

Commercial Site Plan
Map RO3 Lots 11 & 12
Farmington NH

Operation and Maintenance

1.0 Intent of this Plan:

The intent of this plan is to insure that all drainage systems designed, constructed, and approved by the NH Department of Environmental Services Alteration of Terrain Bureau be properly maintained such that there is no detrimental effects, including obstructions, erosion, redirected flow patterns, or any other adverse condition caused by stormwater runoff.

2.0 Plan Coordinator and Responsibilities:

Plan Coordinator contact:
Baystone Properties LLC
126 Barton Corner Road
Hopkinton NH 03229

The Plan coordinator's duties include the following:

- Implement the Plan with the aid of support personnel;
- Oversee maintenance practices on the site;
- Conduct or provide for inspection and monitoring activities;
- Maintain records of maintenance activities; and
- Identify any deficiencies on the site and make sure they are corrected; and

To aid in the implementation of the plan, all personnel will ensure that all housekeeping and monitoring procedures are implemented and will ensure the integrity of the site drainage facilities.

3.0 Stormwater Management Controls

The following provides a list of recommendations and guidelines for managing the stormwater controls:

Landscaped Areas – Fertilizer Management

Function – Fertilizer management involves controlling the rate, timing and method of fertilizer application so that the nutrients are taken up by the plants thereby reducing the chance of polluting the surface and ground waters. Fertilizer management can be effective in reducing the amounts of phosphorus and nitrogen in runoff from landscaped areas, particularly lawns. Soil tests shall be conducted to determine fertilizer application rates.

Maintenance

- Have the soil tested by your landscaper or local Soil Conservation Service for nutrient requirements and follow the recommendations.
- Do not apply fertilizer to frozen ground.
- Clean up any fertilizer spills.
- Do not allow fertilizer to be broadcast into water bodies.

- When fertilizing a lawn, water thoroughly, but do not create a situation where water runs off the surface of the lawn.

Landscaped Areas – Litter Control

Function – Landscaped areas tend to filter debris and contaminants that may block drainage systems and pollute the surface and ground waters.

Maintenance

- Litter Control and lawn maintenance involves removing litter such as trash, leaves, lawn clippings, pet wastes, oil and chemicals from streets, parking lots, and lawns before materials are transported into surface waters.
- Litter control shall be implemented as part of the grounds maintenance program.

Deep Sump Catch basins & Drainage Pipes

Function – Culverts deep sump catch basin is to convey stormwater away from buildings, walkways, and parking areas and trap sediment within the deep sumps prior to entering the infiltration system.

Maintenance

Culverts and Deep Sump Catch basins shall be inspected semi-annually, or more often as needed, for accumulation of debris and structural integrity. Leaves and other debris shall be removed from the inlet and outlet and sumps to insure the functionality of drainage structures. Debris shall be disposed of on site where it will not concentrate back at the drainage structures or at a solid waste disposal facility.

- **Underground detention pond system.**

Step 1 Inspect inlet for sediment build up in manhole sump

- Check for standing water in system
- If sediment is at or above 3" clean out inlet manholes

De-Icing Chemical Use and Storage

Function – Salt and sand is used for de-icing of walkways, parking lots and drives. Care shall be taken to prevent the over-application of salt for melting ice. Care shall be used with sanding in order to minimize sediment build up in manholes.

Maintenance

- Proper storage of salt is critical. Salt is highly water-soluble. Contamination of wetlands and other sensitive areas can occur when salt is stored in open areas. Salt piles shall be covered at all times if not stored in a shed. Runoff from stockpiles shall be contained to keep the runoff from entering the drainage system.

**Inspection & Maintenance Plan
Baystone Properties LLC
Hopkinton, NH**

- When parking lots and walkways are free of snow and ice, they shall be swept clean. Disposal shall be in a solid waste disposal facility.

Grass Lined Conveyance Swales / Infiltration Ditches

Function – These swales promote sedimentation, filtration and infiltration of stormwater runoff.

Maintenance

- Periodically mow embankments (one to three times annually). Do not cut shorter than 4 inches.
- Inspect annually for erosion, sediment accumulation, vegetation loss and invasive species. Remove any accumulated sediment or debris.
- Repair any eroded areas, remove invasive species and dead vegetation, reseed as needed
- Ensure stone ditch if free of debris and sediment

4.0 Safety

Keep safety considerations at the forefront of inspection procedures at all times. Likely hazards should be anticipated and avoided. Never enter a confined space (outlet structure, manhole, etc) without proper training or equipment. A confined space should never be entered without at least one additional person present.

5.0 Inspection and Maintenance Procedures

Visual inspections of all areas of the site will be performed as needed throughout the year, but no less than once in the spring after snow melt-off, once in the fall, and after the end of a storm with rainfall amounts greater than one (1.0) inches. The inspection will be conducted by the Plan coordinator or designated personnel. The inspection will verify that the site drainage as shown on the plan is in good condition, and that there are no erosion problems developing on the slopes or the drainage systems. Any required repairs will be initiated as soon as possible.

6.0 Record Keeping

An Inspection and Maintenance Report will be prepared for each inspection performed throughout the year, but no less than once in the spring after snow melt-off, once in the fall. A copy of the report form to be completed is provided herein. Completed forms will be maintained at the facility, or with the Plan Coordinator.

All record keeping required by this I&M Plan shall be maintained by the responsible parties and made available upon request.

Should ownership of the property be transferred, the new owner(s) shall assume responsibility for this Plan.

**Inspection & Maintenance Plan
 Baystone Property LLC.
 Hopkinton, NH**

Inspection Report

General Information	
Facility Name:	Baystone Property
Location:	Hopkinton, NH
Date of Inspection	
Inspector's Name	

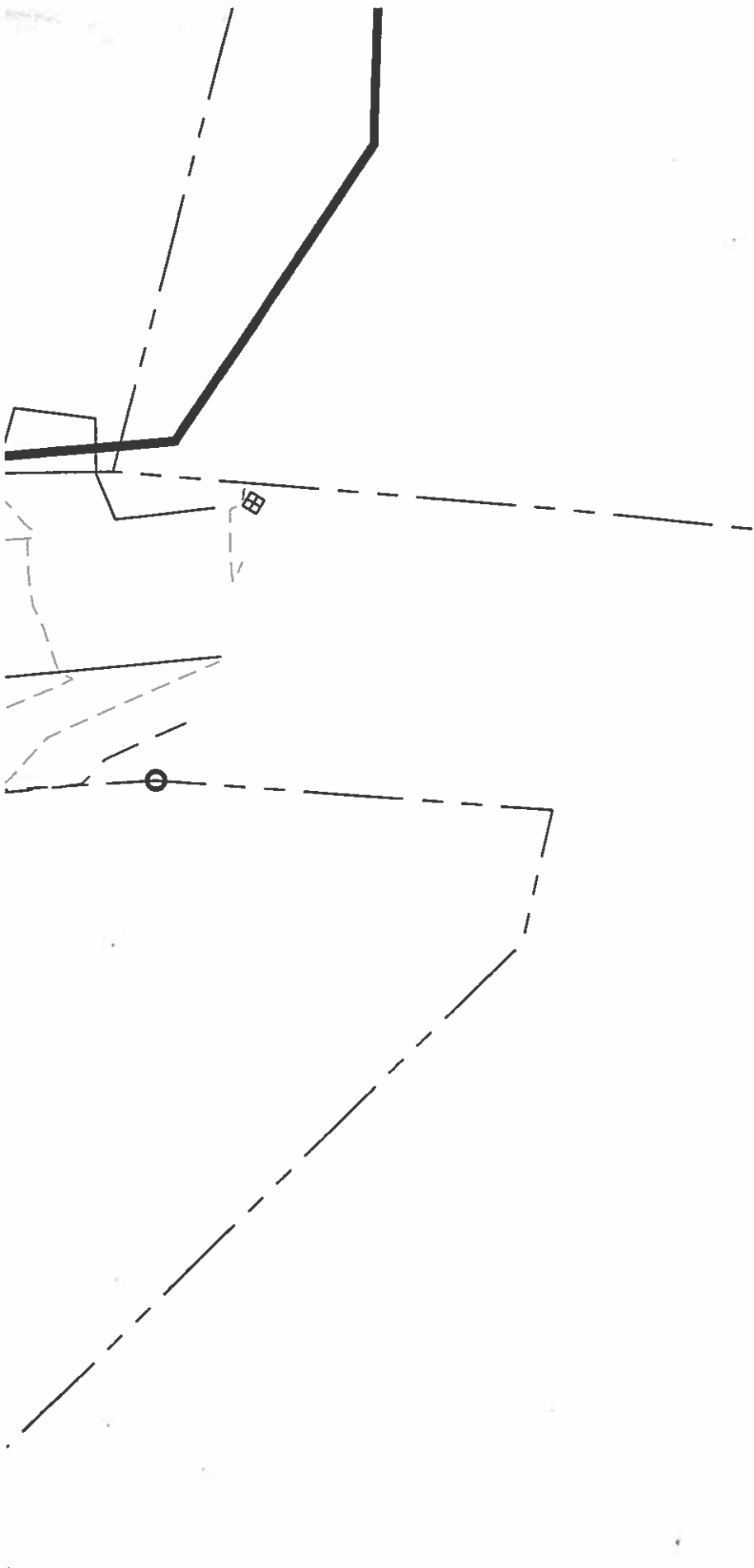
Overall Site Drainage Issues:

	Source	Adequate?	Maintenance Required?	Corrective Action needed and notes:
1	Are all slopes stable showing no signs of erosion?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2	Are ditches, swales, culverts, inlets, and outlets flowing freely?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3	Is there any sediment buildup in ditches, swales, or culverts?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4	Are catch basin sumps clean of sediment buildup?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5	Are detention basins functioning properly?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6.	Underground infiltration basins functioning properly?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7	Does the site drainage comply with the intent of the I&M Plan	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Describe any other issues requiring attention not described above:

Commercial Site Plan
Map RO3 Lots 11 & 12
Farmington NH

DRAINAGE AREA PLANS



ECP
SHT. 1 of 1

DATE: JUNE 18, 2021

JOB NO: 393.00

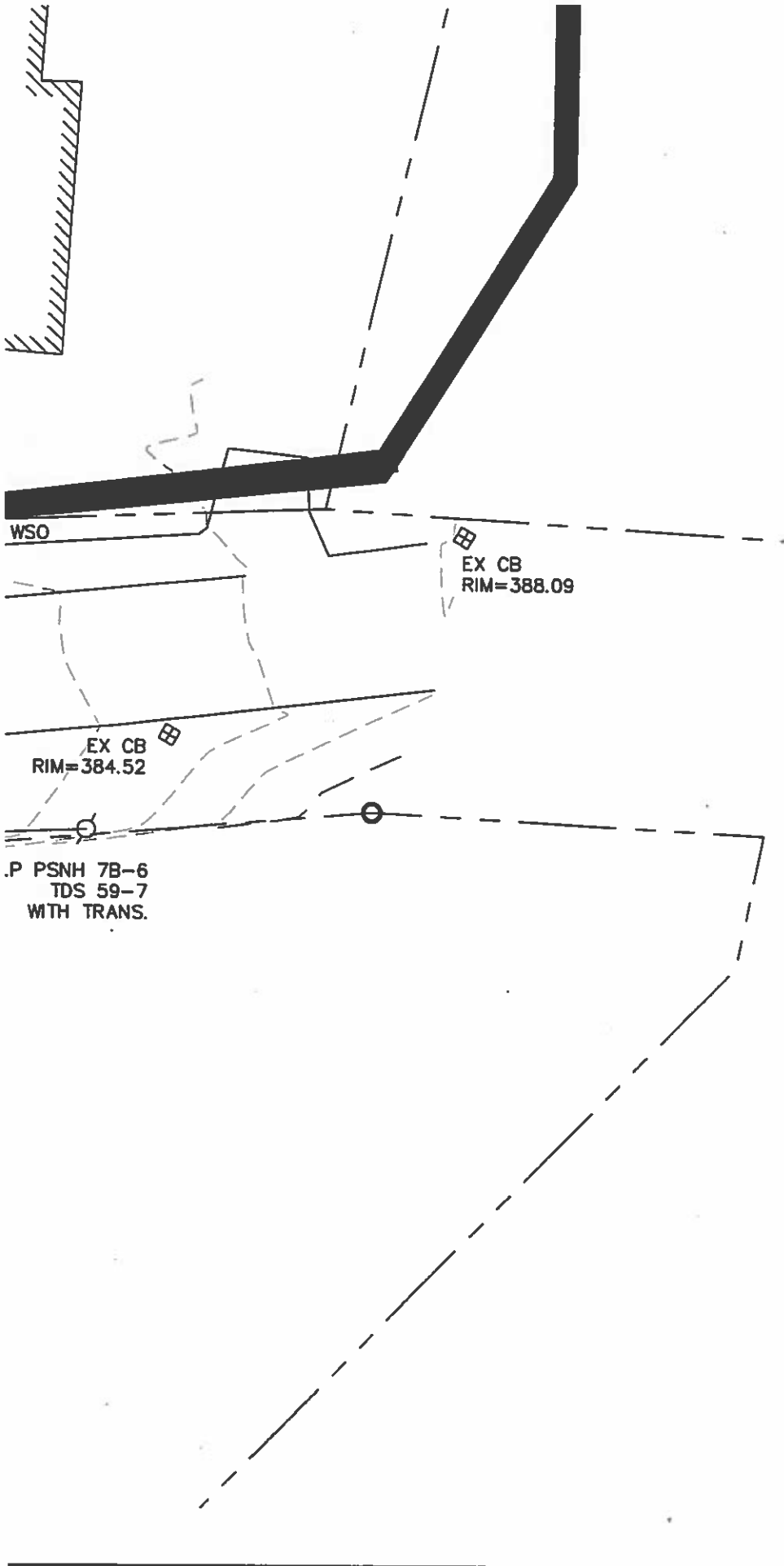
MERRIMACK CO.

POST DEVELOPMENT
DRAINAGE AREA PLAN
TAX MAP 102 LOT 35
CONDOMINIUM SUBDIVISION
71 CEDAR ST. HOPKINTON, (CONTOOCOOK) NH
OWNED BY
BAYSTONE PROPERTIES, LLC
162 BARTON CORNER ROAD, HOPKINTON, NH 03229
LOT 35 - BOOK 3691 PAGE 1784



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PREDEVELOPMENT DRAINAGE AREA PLAN
 TAX MAP 102 LOT 35
CONDOMINIUM SUBDIVISION
 71 CEDAR ST. HOPKINTON, (CONTOOCOOK) NH
 OWNED BY
BAYSTONE PROPERTIES, LLC
 162 BARTON CORNER ROAD, HOPKINTON, NH 03229
 LOT 35 - BOOK 3691 PAGE 1784

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