

**LOWER BAY ROAD
RECONSTRUCTION
SANBORNTON, NH
DRAINAGE REPORT**

October 27, 2017

NHDOT Project No: 29744

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LOWER BAY ROAD REHABILITATION
SANBORNTON, NH
STORMWATER MANAGEMENT REPORT

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INTRODUCTION

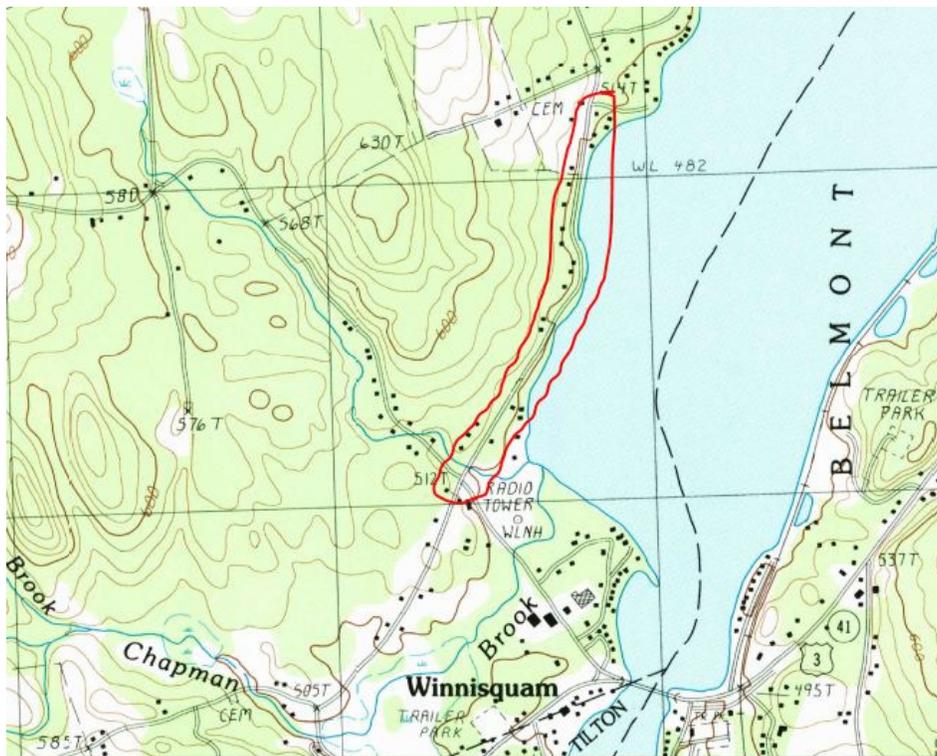
This project 'Site' location is the Lower Bay Road corridor between the intersection of Bay Road, and ending approximately 60 feet south of the Upper Smith Road intersection, as indicated on Figure 1 'Project Location Map'. It encompasses the entire width of the Lower Bay Road right-of-way, and extends beyond the right-of-way with existing and/or proposed easements, within the project limits. The existing right-of-way is variable in width, however is generally 33' wide in most locations.

The Site is currently occupied by a paved roadway varying between 20-23 feet in width, gravel shoulders varying between 0-3 feet in width, utilities which include overhead electric and telecommunications, and piped stormwater and sewer utilities. The remainder of the right-of-way contains roadside drainage swales, grassed and wooded side slopes, and private features within or outside the limits of the right-of-way.

The Town of Sanbornton proposes to improve Lower Bay Road by replacing the gravel bases and pavements, construct trench drains, underdrains, and replace and augment the existing drainage system with culverts of adequate size. The Engineering Study Report detailed the proposed improvements and existing conditions of the site in greater detail.

These drainage computations were prepared for the design of the storm drainage system, to mitigate the effects of runoff patterns for the 25-year peak 24-hour storm.

PROJECT LOCATION MAP



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DRAINAGE CONDITIONS

The existing site as indicated above is occupied by a typical rural roadway corridor with pavements, grassed and wooded side-slopes, and utilities. The upper portions of the tributary areas contain rural residential development generally being adjacent to Lower Bay Road, and are primarily virgin woodlands and/or meadows.

Onsite and/or in close proximity of the site, environmental resources consist of three jurisdictional wetlands, as indicated on the project drawings. Additionally to the east of the project is Lake Winnisquam, which is listed as a NH Protected Shoreland.

Soils within the overall drainage patterns have been overlaid on the project by the available USDA NRCS Soils Maps, as shown on the watershed maps, and as listed below:

Table 1- Natural Resource Conservation Service (NRCS) Soils

SOIL CODE	SOIL NAME	HYDROLOGIC SOIL GROUP
47B	Henniker Fine Sandy Loam, Very Stony	C
166C	Canterbury Fine Sandy Loam	C
459B/C	Metacomet Fine Sandy Loam, Very Stony	C
480B/C/D	Millsite-Woodstock-Henniker Complex, Very Stony	B
647B	Pillsbury Fine Sandy Loam, Very Stony	D
649A	Peachham Mucky Peat, Very Stony	D

The watershed was analyzed to determine points of discharge, and points of interest to be analyzed for culvert inlets, swales, trench drains, and other proposed hydraulic components. The overall watershed was broken up into 21 distinct sub-catchments or tributary areas. Each tributary area was analyzed for the types of covers (ie pavement, grass, woods, etc.) and a corresponding hydrologic soil group was assigned to the covers, from the NRCS Soils Map. A composite CN number was calculated for each area. Additionally each sub-catchment was analyzed for the time of concentration for the longest flow path in terms of time, in compliance with TR-55 methodology.

Below is a summary of each discharge or analysis point, the corresponding sub-catchment(s) nodes which flow to the point, the overall tributary area, composite CN, peak rate of runoff, and volume generation for each tributary area.

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SUMMARY OF ANALYSIS POINTS – 25-YEAR STORM EVENT

Analysis Point	HydroCad Sub-catchment Nodes	Tributary Area (Acres)	Composite CN	Runoff (cfs)	Volume (Acre-Feet)
1	1/1A/1B	3.92	57	1.91	0.313
2	2	4.89	60	3.21	0.470
3	3/4	21.82	56	10.64	1.812
5	5/6	14.18	57	7.53	1.181
7	7/8	3.68	60	2.41	0.354
9	9/10	2.79	61	2.08	0.291
11	11	1.75	61	1.30	0.177
13	12/13	21.22	61	13.01	2.113
14	14	0.17	71	0.23	0.028
15	15/15A	15.48	70	14.37	2.378
16	16	41.30	67	26.84	5.486
17	17	12.82	70	14.76	1.974
18	18	9.34	67	7.35	1.254

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PROPOSED DRAINAGE CONDITIONS

The proposed conditions are characterized by the addition of drainage improvements, which include trench drains, underdrains, and increased culvert sizes. Trench drains were designed along the westerly side of Lower Bay Road to intercept both surface runoff and subsurface ground water tables, and direct them to existing points of discharge. Culverts have been replaced and increased in size to accommodate 25-year flows.

Because of limited space (real estate) within the roadway corridor, our ability to design specific pollutant removal systems (to comply with Env-Wq 1507.03) has been restricted. None-the-less, we believe that the trench drains will act as filter to remove sediments and pollutants prior to discharging towards environmental resources.

The project design will act to recharge groundwater (to comply with Env-Wq 1507.04). The trench drains and attached leaching basins will recharge groundwater, depending on the time of year and ambient groundwater table elevations.

Once again, because of the limited space (real estate) within the roadway corridor, our ability to design specific systems to control peak runoff (to comply with Env-Wq 1507.06) has been restricted. Given the large size of Lake Winnisquam, the proposed increases in flows are negligible, and would have no effect, as follows: The net increase in impervious coverage from the proposed improvements is estimated at 2,308 sf. This translates to a volumetric runoff increase of 350 cf for a 10-year storm event. Given that Lake Winnisquam has an area of 4,214 acres at normal pool, the impact to the elevation of the Lake equates to a net zero.

The project has been designed for all culverts and trench drains to adequately convey flows for the 25-year, 24 hour peak flow rates.

Below is a summary of each hydraulic component of the project (ie trench drain, culvert, swale, etc.) with corresponding information relative to its performance.

SUMMARY OF HYDRAULIC COMPONENTS – 25-YEAR STORM EVENT

Analysis Point	HydroCad Subcatchment Node	Component Type	Component Size/ Outlet Pipe Size	Peak Flow (cfs)	Velocity (fps)	Outlet Pipe Crown Elevation (ft)	Peak Elevation/ Depth of Flow (ft)	Failure Elevation (ft)
1	0	V-Swale Sta 6+94-5+75	1.5'D	0.30	1.64	~	0.24	1.50
1	1R	Trench Drain Sta 6+95-3+61	12"	1.49	5.72	~	0.37	1.00
1	1	Catch Basin CB102	15"	0.28	1.66	505.78	504.77	508.80
1	1A	Drainage Manhole DMH101	15"	0.28	1.50	501.60	502.77	504.90
1	1B	Leaching Basin LB130	15"	1.52	1.23	501.15	502.77	504.80
1	1C	Trapezoidal Swale Sta 3+69-3+50	2'Dx2'W	1.91	2.54	~	0.31	2.00
2	2	Trench Drain Sta 6+98-9+72	12"	3.21	6.58	~	0.60	1.00
2	2P	Leaching Basin LB103	18"	3.21	3.13	503.17	502.52	505.60
2	2A	Trapezoidal Swale	2'Dx2'W	3.21	3.59	~	0.34	2.00
2	2B	Trapezoidal Swale	2'Dx2'W	3.21	4.69	~	0.27	2.00
2	2C	18" Culvert	18"	3.21	3.13	495.00	494.35	495.00
3	3R	Trench Drain Sta 9+78-14+27	15"	5.95	6.70	~	0.85	1.25
3	4R	Trench Drain Sta 15+72-14+32	15"	4.69	4.60	~	0.97	1.25
3	3A	Leaching Basin LB105	24"	10.64	3.30	497.30	497.51	499.70

Analysis Point	HydroCad Subcatchment Node	Component Type	Component Size/ Outlet Pipe Size	Peak Flow (cfs)	Velocity (fps)	Outlet Pipe Crown Elevation (ft)	Peak Elevation/ Depth of Flow (ft)	Failure Elevation (ft)
3	3B	Drainage Manhole DMH106	24"	10.64	4.34	497.10	497.03	500.40
3	3C	Drainage Manhole DMH106	24"	10.64	4.80	496.60	496.37	500.90
5	5R	Trench Drain Sta 15+76-20+47	12"	2.97	7.32	~	0.51	1.00
5	6R	Trench Drain Sta 23+45-20+51	15"	4.63	5.42	~	0.82	1.25'
5	5P	Leaching Basin LB108	18"	7.53	4.26	485.30	485.33	489.00
7	7R	Trench Drain Sta 23+49-25+58	12"	1.61	5.11	~	0.42	1.00
7	8R	Trench Drain Sta 27+04-25+62	12"	0.80	3.14	~	0.36	1.00
7	7P	Leaching Basin LB110	18"	2.41	2.88	486.00	485.22	488.80
9	9R	Trench Drain Sta 27+08-28+36	12"	0.91	3.47	~	0.37	1.00
9	10R	Trench Drain Sta 28+40-29+20	12"	1.18	3.29	~	0.46	1.00
9	9P	Leaching Basin LB111	18"	2.08	2.77	485.60	484.76	488.10
11	11R	Trench Drain Sta 29+24-30+20	12"	1.30	3.28	~	0.50	1.00
11	11P	Leaching Basin LB133	15"	1.30	2.52	485.07	484.37	487.90
13	12R	Trench Drain Sta 30+27-31+18	12"	1.97	5.17	~	0.49	1.00
13	13R	Trench Drain Sta 34+81-31+22	21"	11.50	6.72	~	1.17	1.75

13	13P	Leaching Basin LB115	24"	13.01	4.49	485.70	485.44	487.20
Analysis Point	HydroCad Subcatchment Node	Component Type	Component Size/ Outlet Pipe Size	Peak Flow (cfs)	Velocity (fps)	Outlet Pipe Crown Elevation (ft)	Peak Elevation/ Depth of Flow (ft)	Failure Elevation (ft)
14	14R	Trench Drain Sta 34+85-35+18	12"	0.23	2.08	~	0.20	1.00
14	14P	Leaching Basin LB117	15"	0.23	1.60	486.80	485.77	489.80
15	15R	Trench Drain Sta 35+24-36+58	15"	8.90	7.89	~	1.09	1.25
15	15B	Trench Drain Sta 37+18-36+64	18"	7.12	5.58	~	1.02	1.50
15	15P	Leaching Basin LB119	30"	14.37	4.91	485.70	485.12	487.50
16	16R	Trapezoidal Swale Sta 38+35-37+37	2'Dx2'W	26.86	5.78	~	0.96	2.00
16	16A	30" Culvert HW122	30"	26.84	5.43	489.85	487.35	487.50
16	16B	Drainage Manhole DMH121	30"	26.84	5.74	485.55	486.07	488.20
17	17R	Trench Drain Sta 43+85-38+38	18"	14.78	11.39	~	1.03	1.50
17	17P	Leaching Basin LB123	24"	14.76	4.74	486.15	486.09	488.40
18	18R	Trench Drain Sta 45+89-43+92	15"	7.36	7.68	~	0.91	1.25
18	18P	Leaching Basin LB125	18"	7.35	4.16	503.05	503.04	504.70

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CONCLUSION

This analysis demonstrates that the project will:

- Pollutant removal will increase with the addition of trench drains, and deep sump drainage structures, over the existing scenario.
- There will be no adverse effects to downstream points of discharge, as the increase in volumetric and peak flow rates of runoff are negligible, and Lake Winnisquam is large mass waterbody.
- It is expected that the trench drains and leaching basins will decrease volumetric and peak rates of runoff, at certain times of the year, depending on water table elevation.
- The closed drainage system will effectively convey peak rates of runoff for the 25-year, 24 hour storm event.

Based on the results of this analysis we expect that the improvements associated with the project will improve water quality over the existing scenario, and will not adversely affect any downstream properties or receiving waters.

METHODOLOGY

The storm water runoff was calculated using the TR 20 methodology, using Hydro CAD version 8.00 software. This program performs both the hydrologic calculations for determining the amount of runoff, and the hydraulic calculations for designing the proper size of pipe, channel or basin.

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APPENDICES

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NRCS SOILS REPORT



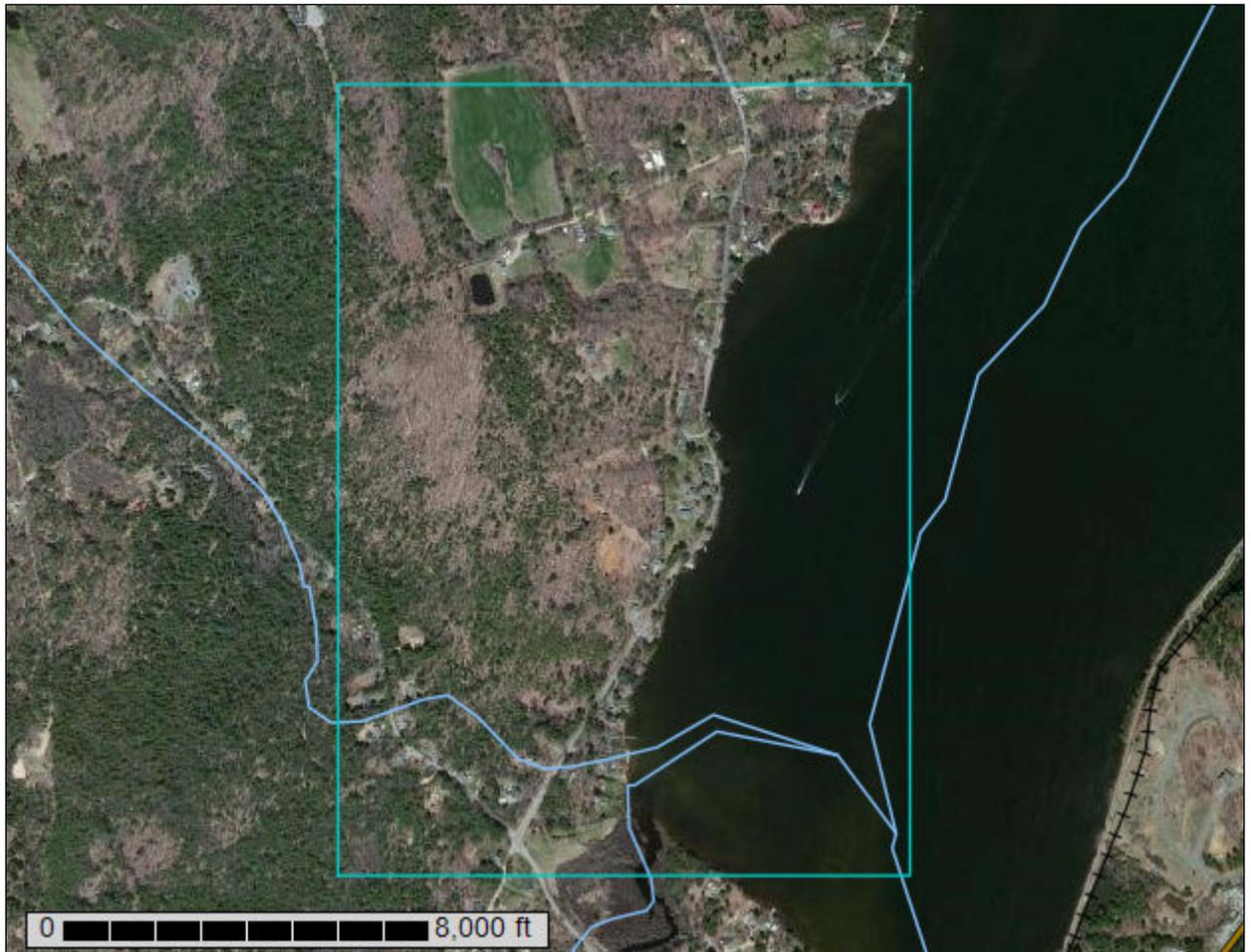
United States
Department of
Agriculture

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



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

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scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

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: 1:8,460 if printed on A portrait (8.5" x 11") sheet.



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 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 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 21, Sep 15, 2016

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—May 1, 2011

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.

Map Unit Legend

Merrimack and Belknap Counties, New Hampshire (NH609)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
35A	Champlain loamy fine sand, 0 to 3 percent slopes	0.9	0.2%
47B	Henniker fine sandy loam, 3 to 8 percent slopes, very stony	5.1	1.4%
166C	Canterbury fine sandy loam, 8 to 15 percent slopes	20.5	5.5%
459B	Metacomet fine sandy loam, 3 to 8 percent slopes, very stony	23.1	6.2%
459C	Metacomet fine sandy loam, 8 to 15 percent slopes, very stony	28.1	7.5%
480B	Millsite-Woodstock-Henniker complex, 3 to 8 percent slopes, very stony	20.9	5.6%
480C	Millsite-Woodstock-Henniker complex, 8 to 15 percent slopes, very stony	107.1	28.5%
480D	Millsite-Woodstock-Henniker complex, 15 to 25 percent slopes, very stony	19.9	5.3%
647B	Pillsbury fine sandy loam, 0 to 8 percent slopes, very stony	9.5	2.5%
649A	Peacham mucky peat, 0 to 8 percent slopes, very stony	11.7	3.1%
894A	Meadowsedge peat, 0 to 1 percent slopes	6.4	1.7%
W	Water	122.0	32.5%
Totals for Area of Interest		375.3	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

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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 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.

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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

35A—Champlain loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9dn9
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

Champlain and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Champlain

Setting

Landform: Terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy outwash derived mainly from granite, gneiss and schist

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
H1 - 1 to 6 inches: loamy fine sand
H2 - 6 to 22 inches: loamy fine sand
H3 - 22 to 65 inches: loamy fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Croghan

Percent of map unit: 10 percent
Landform: Terraces
Down-slope shape: Linear
Across-slope shape: Linear

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Hydric soil rating: No

Boscawen

Percent of map unit: 5 percent

Landform: Terraces

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

Naumburg

Percent of map unit: 5 percent

Landform: Depressions

Down-slope shape: Linear

Across-slope shape: Convex

Hydric soil rating: Yes

Adams

Percent of map unit: 3 percent

Landform: Outwash terraces

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

Groveton

Percent of map unit: 2 percent

Landform: Terraces

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

47B—Henniker fine sandy loam, 3 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 9dnm

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

Henniker and similar soils: 75 percent

Minor components: 25 percent

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

Description of Henniker

Setting

Landform: Hills

Down-slope shape: Linear

Across-slope shape: Linear

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Parent material: Basal melt-out till derived from granite, gneiss, or schist

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material

H1 - 1 to 4 inches: fine sandy loam

H2 - 4 to 34 inches: fine sandy loam

H3 - 34 to 65 inches: fine sandy loam

Properties and qualities

Slope: 3 to 8 percent

Percent of area covered with surface fragments: 1.6 percent

Depth to restrictive feature: 20 to 39 inches to densic material

Natural drainage class: 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 38 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Low (about 4.2 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: 5 percent

Landform: Ground moraines

Down-slope shape: Linear

Across-slope shape: Convex

Hydric soil rating: Yes

Canterbury

Percent of map unit: 5 percent

Landform: Drumlins

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

Becket

Percent of map unit: 5 percent

Landform: Hills

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

Metacomet

Percent of map unit: 5 percent

Landform: Hillslopes

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

Millsite

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

Chichester

Percent of map unit: 2 percent
Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

166C—Canterbury fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9dnq
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 statewide importance

Map Unit Composition

Canterbury and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canterbury

Setting

Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Lodgement till derived from granite, gneiss, or schist

Typical profile

Oe - 0 to 2 inches: slightly decomposed plant material
H1 - 2 to 6 inches: fine sandy loam
H2 - 6 to 28 inches: fine sandy loam
H3 - 28 to 65 inches: fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Natural drainage class: 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)

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Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Metacomet

Percent of map unit: 5 percent
Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Gilmanton

Percent of map unit: 5 percent
Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Henniker

Percent of map unit: 5 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Chichester

Percent of map unit: 5 percent
Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Metacomet

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

Marlow

Percent of map unit: 2 percent
Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

459B—Metacomet fine sandy loam, 3 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 9dpr
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: 75 percent
Minor components: 25 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: 3 to 8 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 36 inches to densic material
Natural 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 storage in profile: 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: 5 percent
Landform: Ground moraines
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: Yes

Moosilauke

Percent of map unit: 5 percent
Landform: Ground moraines
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: Yes

Henniker

Percent of map unit: 5 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

Skerry

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

Chichester

Percent of map unit: 2 percent
Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Gilmanton

Percent of map unit: 2 percent
Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

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
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 36 inches to densic material
Natural 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 storage in profile: 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

Chichester

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

Pillsbury

Percent of map unit: 4 percent
Landform: Ground moraines
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: Yes

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

Gilmanton

Percent of map unit: 3 percent
Landform: Hillslopes
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

**480B—Millsite-Woodstock-Henniker complex, 3 to 8 percent slopes,
very stony**

Map Unit Setting

National map unit symbol: 9dpy
Elevation: 200 to 2,940 feet
Mean annual precipitation: 40 to 50 inches

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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

Millsite and similar soils: 35 percent
Woodstock and similar soils: 20 percent
Henniker and similar soils: 20 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Millsite

Setting

Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Till

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
H1 - 1 to 3 inches: very fine sandy loam
H2 - 3 to 13 inches: very fine sandy loam
H3 - 13 to 24 inches: gravelly very fine sandy loam
H4 - 24 to 28 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.8 inches)

Interpretive groups

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

Description of Woodstock

Setting

Landform: — error in exists on —
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Till derived from granite and gneiss

Typical profile

Oe - 0 to 0 inches: slightly decomposed plant material
H1 - 0 to 2 inches: fine sandy loam

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H2 - 2 to 11 inches: fine sandy loam

H3 - 11 to 15 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent

Percent of area covered with surface fragments: 1.6 percent

Depth to restrictive feature: 10 to 20 inches to lithic bedrock

Natural drainage class: Somewhat excessively drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: D

Hydric soil rating: No

Description of Henniker

Setting

Landform: Hills

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Basal melt-out till derived from granite, gneiss, or schist

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material

H1 - 1 to 4 inches: fine sandy loam

H2 - 4 to 34 inches: fine sandy loam

H3 - 34 to 65 inches: fine sandy loam

Properties and qualities

Slope: 3 to 8 percent

Percent of area covered with surface fragments: 1.6 percent

Depth to restrictive feature: 20 to 39 inches to densic material

Natural drainage class: 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 38 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Moosilauke

Percent of map unit: 5 percent
Landform: Ground moraines
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: Yes

Canterbury

Percent of map unit: 5 percent
Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Metacomet

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

Searsport

Percent of map unit: 2 percent
Landform: Outwash terraces
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Tunbridge

Percent of map unit: 2 percent
Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Lyman

Percent of map unit: 2 percent
Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Rock outcrop

Percent of map unit: 2 percent
Hydric soil rating: Unranked

Becket

Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Chichester

Percent of map unit: 2 percent
Landform: Hillslopes

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Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

480C—Millsite-Woodstock-Henniker complex, 8 to 15 percent slopes, very stony

Map Unit Setting

National map unit symbol: 9dpx
Elevation: 200 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

Millsite and similar soils: 35 percent
Woodstock and similar soils: 20 percent
Henniker and similar soils: 20 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Millsite

Setting

Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Till

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
H1 - 1 to 3 inches: very fine sandy loam
H2 - 3 to 13 inches: very fine sandy loam
H3 - 13 to 24 inches: gravelly very fine sandy loam
H4 - 24 to 28 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

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Available water storage in profile: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: B

Hydric soil rating: No

Description of Woodstock

Setting

Landform: — error in exists on —

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Till derived from granite and gneiss

Typical profile

Oe - 0 to 0 inches: slightly decomposed plant material

H1 - 0 to 2 inches: fine sandy loam

H2 - 2 to 11 inches: fine sandy loam

H3 - 11 to 15 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent

Percent of area covered with surface fragments: 1.6 percent

Depth to restrictive feature: 10 to 20 inches to lithic bedrock

Natural drainage class: Somewhat excessively drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: D

Hydric soil rating: No

Description of Henniker

Setting

Landform: Hills

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Basal melt-out till derived from granite, gneiss, or schist

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material

H1 - 1 to 4 inches: fine sandy loam

H2 - 4 to 34 inches: fine sandy loam

H3 - 34 to 65 inches: fine sandy loam

Properties and qualities

Slope: 8 to 15 percent

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Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Natural drainage class: 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 38 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

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

Minor Components

Canterbury

Percent of map unit: 5 percent
Landform: Drumlins
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Moosilauke

Percent of map unit: 5 percent
Landform: Ground moraines
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: Yes

Metacomet

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

Chichester

Percent of map unit: 2 percent
Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Rock outcrop

Percent of map unit: 2 percent
Hydric soil rating: Unranked

Becket

Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Lyman

Percent of map unit: 2 percent
Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Searsport

Percent of map unit: 2 percent
Landform: Outwash terraces
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Tunbridge

Percent of map unit: 2 percent
Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

480D—Millsite-Woodstock-Henniker complex, 15 to 25 percent slopes, very stony

Map Unit Setting

National map unit symbol: 9dpw
Elevation: 200 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: Not prime farmland

Map Unit Composition

Millsite and similar soils: 35 percent
Woodstock and similar soils: 20 percent
Henniker and similar soils: 20 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Millsite

Setting

Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Till

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Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
H1 - 1 to 3 inches: very fine sandy loam
H2 - 3 to 13 inches: very fine sandy loam
H3 - 13 to 24 inches: gravelly very fine sandy loam
H4 - 24 to 28 inches: bedrock

Properties and qualities

Slope: 15 to 25 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.8 inches)

Interpretive groups

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

Description of Woodstock

Setting

Landform: — error in exists on —
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Till derived from granite and gneiss

Typical profile

Oe - 0 to 0 inches: slightly decomposed plant material
H1 - 0 to 2 inches: fine sandy loam
H2 - 2 to 11 inches: fine sandy loam
H3 - 11 to 15 inches: bedrock

Properties and qualities

Slope: 15 to 25 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s

Custom Soil Resource Report

Hydrologic Soil Group: D
Hydric soil rating: No

Description of Henniker

Setting

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

Typical profile

O_i - 0 to 1 inches: slightly decomposed plant material
H₁ - 1 to 4 inches: fine sandy loam
H₂ - 4 to 34 inches: fine sandy loam
H₃ - 34 to 65 inches: fine sandy loam

Properties and qualities

Slope: 15 to 25 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (K_{sat}): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 18 to 38 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

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

Minor Components

Canterbury

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

Chichester

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

Rock outcrop

Percent of map unit: 4 percent
Hydric soil rating: Unranked

Metacomet

Percent of map unit: 4 percent

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Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Moosilauke

Percent of map unit: 3 percent
Landform: Ground moraines
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: Yes

Lyman

Percent of map unit: 2 percent
Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Becket

Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Tunbridge

Percent of map unit: 2 percent
Landform: Hillslopes
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

647B—Pillsbury fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2ty6x
Elevation: 360 to 2,070 feet
Mean annual precipitation: 31 to 95 inches
Mean annual air temperature: 27 to 52 degrees F
Frost-free period: 90 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Pillsbury, very stony, and similar soils: 79 percent
Minor components: 21 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pillsbury, Very Stony

Setting

Landform: Hills, mountains

Landform position (two-dimensional): Toeslope, footslope

Landform position (three-dimensional): Mountainbase, base slope, interfluve

Down-slope shape: Concave

Across-slope shape: Concave

Parent material: Loamy lodgment till derived from gneiss and/or loamy lodgment till derived from mica schist and/or loamy lodgment till derived from granite

Typical profile

Oe - 0 to 1 inches: mucky peat

A - 1 to 6 inches: fine sandy loam

Bg1 - 6 to 13 inches: cobbly fine sandy loam

Bg2 - 13 to 23 inches: cobbly fine sandy loam

Cd - 23 to 65 inches: cobbly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent

Percent of area covered with surface fragments: 1.1 percent

Depth to restrictive feature: 21 to 43 inches to densic material

Natural drainage class: Poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)

Depth to water table: About 0 to 12 inches

Frequency of flooding: None

Frequency of ponding: None

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: D

Hydric soil rating: Yes

Minor Components

Peru, very stony

Percent of map unit: 9 percent

Landform: Hills, mountains

Landform position (two-dimensional): Backslope, footslope

Landform position (three-dimensional): Mountainbase, interfluve, base slope

Microfeatures of landform position: Rises, rises

Down-slope shape: Convex

Across-slope shape: Linear, convex

Hydric soil rating: No

Peacham, very stony

Percent of map unit: 5 percent

Landform: Hills, mountains

Landform position (two-dimensional): Toeslope, footslope

Landform position (three-dimensional): Mountainbase, base slope, interfluve

Microfeatures of landform position: Closed depressions, closed depressions

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Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Wonsqueak

Percent of map unit: 4 percent
Landform: Hills, mountains
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Mountainbase, base slope, interfluvium
Microfeatures of landform position: Closed depressions, closed depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Lyman, very stony

Percent of map unit: 3 percent
Landform: Hills, mountains
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Mountainbase, interfluvium, base slope
Microfeatures of landform position: Rises, rises
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

649A—Peacham mucky peat, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2ty6t
Elevation: 430 to 1,970 feet
Mean annual precipitation: 31 to 95 inches
Mean annual air temperature: 27 to 52 degrees F
Frost-free period: 70 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Peacham, very stony, and similar soils: 78 percent
Minor components: 22 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Peacham, Very Stony

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Mountainbase, interfluvium, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Organic material over loamy lodgment till derived from schist and/or loamy lodgment till derived from granite and gneiss and/or loamy lodgment till derived from phyllite

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Typical profile

Oe - 0 to 2 inches: mucky peat
Oa - 2 to 10 inches: muck
Bg - 10 to 15 inches: fine sandy loam
Cdg1 - 15 to 31 inches: fine sandy loam
Cdg2 - 31 to 65 inches: sandy loam

Properties and qualities

Slope: 0 to 8 percent
Percent of area covered with surface fragments: 1.1 percent
Depth to restrictive feature: 12 to 35 inches to densic material
Natural drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Hydric soil rating: Yes

Minor Components

Cabot, very stony

Percent of map unit: 11 percent
Landform: Hills, mountains
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Mountainbase, interfluvium, base slope
Microfeatures of landform position: Rises, rises
Down-slope shape: Concave, convex
Across-slope shape: Concave, convex
Hydric soil rating: Yes

Wonsqueak

Percent of map unit: 8 percent
Landform: Hills, mountains
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Mountainbase, interfluvium, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Bucksport

Percent of map unit: 2 percent
Landform: Hills, mountains
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Mountainbase, interfluvium, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Searsport

Percent of map unit: 1 percent
Landform: Hills, mountains
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Mountainbase, interfluve, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

894A—Meadowsedge peat, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 21xtq
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: Not prime farmland

Map Unit Composition

Meadowsedge and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Meadowsedge

Setting

Landform: Bogs
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Organics

Typical profile

Oi - 0 to 4 inches: mucky peat
Oe - 4 to 65 inches: moderately decomposed plant material

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 6.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 20.9 inches)

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Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7w

Hydrologic Soil Group: A/D

Hydric soil rating: Yes

Minor Components

Chocorua

Percent of map unit: 11 percent

Landform: Bogs

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Meadowsedge, ponded

Percent of map unit: 5 percent

Landform: Bogs

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Peacham

Percent of map unit: 4 percent

Landform: Depressions

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Searsport

Percent of map unit: 3 percent

Landform: Outwash terraces

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Medomak

Percent of map unit: 2 percent

Landform: Flood plains

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

W—Water

Map Unit Setting

National map unit symbol: wm74

Elevation: 200 to 2,610 feet

Farmland classification: Not prime farmland

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Map Unit Composition

Water: 100 percent

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

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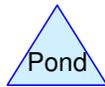
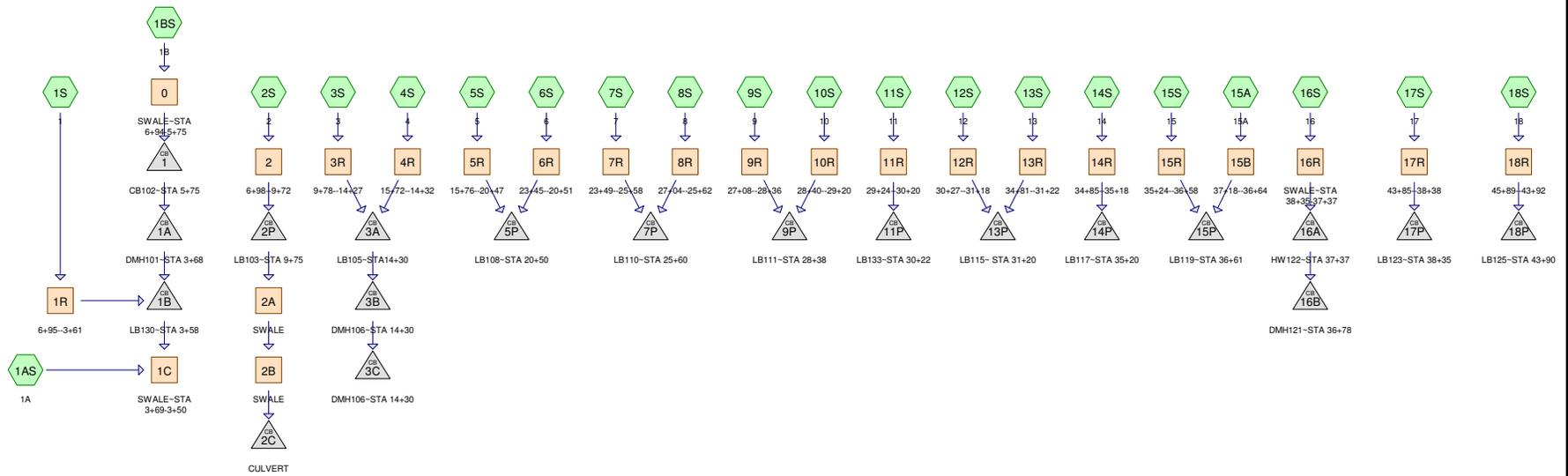
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LOWER BAY ROAD REHABILITATION
SANBORNTON, NH
STORMWATER MANAGEMENT REPORT

DRAINAGE ANALYSIS



Drainage Diagram for 167006 Lower Bay Road
 Prepared by Holden Engineering & Surveying, Inc. 10/30/2017
 HydroCAD® 8.00 s/n 000804 © 2006 HydroCAD Software Solutions LLC

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1AS: 1A	Runoff Area=0.756 ac	Runoff Depth>0.97"
Flow Length=599'	Tc=42.5 min	CN=57
	Runoff=0.40 cfs	0.061 af
Subcatchment 1BS: 1B	Runoff Area=0.069 ac	Runoff Depth>3.08"
	Tc=0.0 min	CN=84
	Runoff=0.30 cfs	0.018 af
Subcatchment 1S: 1	Runoff Area=3.093 ac	Runoff Depth>0.91"
Flow Length=1,340'	Tc=43.1 min	CN=56
	Runoff=1.49 cfs	0.235 af
Subcatchment 2S: 2	Runoff Area=4.894 ac	Runoff Depth>1.15"
Flow Length=1,270'	Tc=41.9 min	CN=60
	Runoff=3.21 cfs	0.470 af
Subcatchment 3S: 3	Runoff Area=11.098 ac	Runoff Depth>1.08"
Flow Length=2,100'	Tc=53.0 min	CN=59
	Runoff=5.95 cfs	1.003 af
Subcatchment 4S: 4	Runoff Area=10.725 ac	Runoff Depth>0.91"
Flow Length=1,962'	Tc=50.9 min	CN=56
	Runoff=4.69 cfs	0.811 af
Subcatchment 5S: 5	Runoff Area=4.204 ac	Runoff Depth>1.22"
Flow Length=853'	Tc=41.1 min	CN=61
	Runoff=2.97 cfs	0.427 af
Subcatchment 6S: 6	Runoff Area=9.973 ac	Runoff Depth>0.91"
Flow Length=1,410'	Tc=45.8 min	CN=56
	Runoff=4.63 cfs	0.756 af
Subcatchment 7S: 7	Runoff Area=2.491 ac	Runoff Depth>1.15"
Flow Length=1,168'	Tc=43.0 min	CN=60
	Runoff=1.61 cfs	0.239 af
Subcatchment 8S: 8	Runoff Area=1.193 ac	Runoff Depth>1.15"
Flow Length=870'	Tc=40.4 min	CN=60
	Runoff=0.80 cfs	0.115 af
Subcatchment 9S: 9	Runoff Area=1.370 ac	Runoff Depth>1.15"
Flow Length=840'	Tc=41.1 min	CN=60
	Runoff=0.91 cfs	0.132 af
Subcatchment 10S: 10	Runoff Area=1.416 ac	Runoff Depth>1.35"
Flow Length=1,014'	Tc=38.0 min	CN=63
	Runoff=1.18 cfs	0.159 af
Subcatchment 11S: 11	Runoff Area=1.746 ac	Runoff Depth>1.22"
Flow Length=928'	Tc=37.2 min	CN=61
	Runoff=1.30 cfs	0.178 af
Subcatchment 12S: 12	Runoff Area=2.815 ac	Runoff Depth>1.10"
Flow Length=962'	Tc=32.2 min	CN=59
	Runoff=1.97 cfs	0.257 af
Subcatchment 13S: 13	Runoff Area=18.400 ac	Runoff Depth>1.21"
Flow Length=1,953'	Tc=51.3 min	CN=61
	Runoff=11.50 cfs	1.857 af

Subcatchment 14S: 14	Runoff Area=0.173 ac	Runoff Depth>1.93"
Flow Length=300'	Slope=0.0830 '/'	Tc=31.3 min CN=71
	Runoff=0.23 cfs	0.028 af
Subcatchment 15A: 15A	Runoff Area=6.083 ac	Runoff Depth>2.07"
Flow Length=2,003'	Tc=49.0 min	CN=73
	Runoff=7.12 cfs	1.052 af
Subcatchment 15S: 15	Runoff Area=9.403 ac	Runoff Depth>1.69"
Flow Length=1,980'	Tc=48.4 min	CN=68
	Runoff=8.90 cfs	1.327 af
Subcatchment 16S: 16	Runoff Area=41.304 ac	Runoff Depth>1.59"
Flow Length=2,618'	Tc=82.7 min	CN=67
	Runoff=26.86 cfs	5.488 af
Subcatchment 17S: 17	Runoff Area=12.823 ac	Runoff Depth>1.85"
Flow Length=1,397'	Tc=39.8 min	CN=70
	Runoff=14.78 cfs	1.976 af
Subcatchment 18S: 18	Runoff Area=9.340 ac	Runoff Depth>1.61"
Flow Length=1,560'	Tc=61.2 min	CN=67
	Runoff=7.36 cfs	1.254 af
Reach 0: SWALE~STA 6+94-5+75	Avg. Depth=0.24'	Max Vel=1.64 fps
n=0.022	L=119.0'	S=0.0109 '/'
	Capacity=37.84 cfs	Outflow=0.28 cfs
		0.018 af
Reach 1C: SWALE~STA 3+69-3+50	Avg. Depth=0.31'	Max Vel=2.54 fps
n=0.040	L=142.5'	S=0.0309 '/'
	Capacity=68.96 cfs	Outflow=1.91 cfs
		0.313 af
Reach 1R: 6+95--3+61	Avg. Depth=0.37'	Max Vel=5.72 fps
D=12.0"	n=0.013	L=333.0'
	S=0.0214 '/'	Capacity=5.21 cfs
		Outflow=1.48 cfs
		0.235 af
Reach 2: 6+98--9+72	Avg. Depth=0.60'	Max Vel=6.58 fps
D=12.0"	n=0.013	L=274.0'
	S=0.0184 '/'	Capacity=4.83 cfs
		Outflow=3.21 cfs
		0.470 af
Reach 2A: SWALE	Avg. Depth=0.34'	Max Vel=3.59 fps
n=0.040	L=100.0'	S=0.0575 '/'
	Capacity=25.85 cfs	Outflow=3.21 cfs
		0.470 af
Reach 2B: SWALE	Avg. Depth=0.27'	Max Vel=4.69 fps
n=0.040	L=12.0'	S=0.1250 '/'
	Capacity=38.12 cfs	Outflow=3.21 cfs
		0.470 af
Reach 3R: 9+78--14+27	Avg. Depth=0.85'	Max Vel=6.70 fps
D=15.0"	n=0.013	L=450.0'
	S=0.0131 '/'	Capacity=7.39 cfs
		Outflow=5.95 cfs
		1.003 af
Reach 4R: 15+72--14+32	Avg. Depth=0.97'	Max Vel=4.60 fps
D=15.0"	n=0.013	L=139.0'
	S=0.0059 '/'	Capacity=4.96 cfs
		Outflow=4.69 cfs
		0.811 af
Reach 5R: 15+76--20+47	Avg. Depth=0.51'	Max Vel=7.32 fps
D=12.0"	n=0.013	L=471.0'
	S=0.0255 '/'	Capacity=5.69 cfs
		Outflow=2.97 cfs
		0.427 af
Reach 6R: 23+45--20+51	Avg. Depth=0.82'	Max Vel=5.42 fps
D=15.0"	n=0.013	L=292.0'
	S=0.0087 '/'	Capacity=6.04 cfs
		Outflow=4.63 cfs
		0.756 af

Reach 7R: 23+49--25+58	Avg. Depth=0.42' Max Vel=5.11 fps Inflow=1.61 cfs 0.239 af D=12.0" n=0.013 L=206.0' S=0.0148 '/' Capacity=4.34 cfs Outflow=1.61 cfs 0.239 af
Reach 8R: 27+04--25+62	Avg. Depth=0.36' Max Vel=3.14 fps Inflow=0.80 cfs 0.115 af D=12.0" n=0.013 L=142.0' S=0.0065 '/' Capacity=2.88 cfs Outflow=0.80 cfs 0.115 af
Reach 9R: 27+08--28+36	Avg. Depth=0.37' Max Vel=3.47 fps Inflow=0.91 cfs 0.132 af D=12.0" n=0.013 L=124.0' S=0.0078 '/' Capacity=3.15 cfs Outflow=0.91 cfs 0.132 af
Reach 10R: 28+40--29+20	Avg. Depth=0.46' Max Vel=3.29 fps Inflow=1.18 cfs 0.159 af D=12.0" n=0.013 L=80.0' S=0.0056 '/' Capacity=2.67 cfs Outflow=1.18 cfs 0.159 af
Reach 11R: 29+24--30+20	Avg. Depth=0.50' Max Vel=3.28 fps Inflow=1.30 cfs 0.178 af D=12.0" n=0.013 L=104.0' S=0.0052 '/' Capacity=2.57 cfs Outflow=1.30 cfs 0.177 af
Reach 12R: 30+27--31+18	Avg. Depth=0.49' Max Vel=5.17 fps Inflow=1.97 cfs 0.257 af D=12.0" n=0.013 L=94.0' S=0.0133 '/' Capacity=4.11 cfs Outflow=1.97 cfs 0.257 af
Reach 13R: 34+81--31+22	Avg. Depth=1.17' Max Vel=6.72 fps Inflow=11.50 cfs 1.857 af D=21.0" n=0.013 L=360.0' S=0.0085 '/' Capacity=14.58 cfs Outflow=11.50 cfs 1.855 af
Reach 14R: 34+85--35+18	Avg. Depth=0.20' Max Vel=2.08 fps Inflow=0.23 cfs 0.028 af D=12.0" n=0.013 L=32.5' S=0.0055 '/' Capacity=2.65 cfs Outflow=0.23 cfs 0.028 af
Reach 15B: 37+18--36+64	Avg. Depth=1.02' Max Vel=5.58 fps Inflow=7.12 cfs 1.052 af D=18.0" n=0.013 L=56.0' S=0.0071 '/' Capacity=8.88 cfs Outflow=7.11 cfs 1.051 af
Reach 15R: 35+24--36+58	Avg. Depth=1.09' Max Vel=7.89 fps Inflow=8.90 cfs 1.327 af D=15.0" n=0.013 L=137.0' S=0.0173 '/' Capacity=8.50 cfs Outflow=8.91 cfs 1.327 af
Reach 16R: SWALE~STA 38+35-37+37	Avg. Depth=0.96' Max Vel=5.78 fps Inflow=26.86 cfs 5.488 af n=0.040 L=98.0' S=0.0505 '/' Capacity=141.23 cfs Outflow=26.84 cfs 5.486 af
Reach 17R: 43+85--38+38	Avg. Depth=1.03' Max Vel=11.39 fps Inflow=14.78 cfs 1.976 af D=18.0" n=0.013 L=550.0' S=0.0295 '/' Capacity=18.06 cfs Outflow=14.76 cfs 1.974 af
Reach 18R: 45+89--43+92	Avg. Depth=0.91' Max Vel=7.68 fps Inflow=7.36 cfs 1.254 af D=15.0" n=0.013 L=194.0' S=0.0167 '/' Capacity=8.35 cfs Outflow=7.35 cfs 1.254 af
Pond 1: CB102~STA 5+75	Peak Elev=504.77' Inflow=0.28 cfs 0.018 af 15.0" x 203.0' Culvert Outflow=0.28 cfs 0.018 af
Pond 1A: DMH101~STA 3+68	Peak Elev=502.77' Inflow=0.28 cfs 0.018 af 15.0" x 30.0' Culvert Outflow=0.29 cfs 0.018 af
Pond 1B: LB130~STA 3+58	Peak Elev=502.77' Inflow=1.52 cfs 0.252 af 15.0" x 29.0' Culvert Outflow=1.52 cfs 0.252 af

Pond 2C: CULVERT	Peak Elev=494.35' Inflow=3.21 cfs 0.470 af Outflow=3.21 cfs 0.470 af
Pond 2P: LB103~STA 9+75	Peak Elev=502.52' Inflow=3.21 cfs 0.470 af 18.0" x 36.0' Culvert Outflow=3.21 cfs 0.470 af
Pond 3A: LB105~STA14+30	Peak Elev=497.51' Inflow=10.64 cfs 1.812 af 24.0" x 16.0' Culvert Outflow=10.64 cfs 1.812 af
Pond 3B: DMH106~STA 14+30	Peak Elev=497.03' Inflow=10.64 cfs 1.812 af 24.0" x 76.0' Culvert Outflow=10.64 cfs 1.812 af
Pond 3C: DMH106~STA 14+30	Peak Elev=496.37' Inflow=10.64 cfs 1.812 af 24.0" x 28.5' Culvert Outflow=10.64 cfs 1.812 af
Pond 5P: LB108~STA 20+50	Peak Elev=485.33' Inflow=7.53 cfs 1.181 af 18.0" x 40.0' Culvert Outflow=7.53 cfs 1.181 af
Pond 7P: LB110~STA 25+60	Peak Elev=485.22' Inflow=2.41 cfs 0.354 af 18.0" x 33.5' Culvert Outflow=2.41 cfs 0.354 af
Pond 9P: LB111~STA 28+38	Peak Elev=484.76' Inflow=2.08 cfs 0.291 af 18.0" x 39.0' Culvert Outflow=2.08 cfs 0.291 af
Pond 11P: LB133~STA 30+22	Peak Elev=484.37' Inflow=1.30 cfs 0.177 af 15.0" x 41.0' Culvert Outflow=1.30 cfs 0.177 af
Pond 13P: LB115~ STA 31+20	Peak Elev=485.44' Inflow=13.01 cfs 2.113 af 24.0" x 35.0' Culvert Outflow=13.01 cfs 2.113 af
Pond 14P: LB117~STA 35+20	Peak Elev=485.77' Inflow=0.23 cfs 0.028 af 15.0" x 30.0' Culvert Outflow=0.23 cfs 0.028 af
Pond 15P: LB119~STA 36+61	Peak Elev=485.25' Inflow=16.02 cfs 2.378 af 30.0" x 38.5' Culvert Outflow=16.02 cfs 2.378 af
Pond 16A: HW122~STA 37+37	Peak Elev=487.35' Inflow=26.84 cfs 5.486 af 30.0" x 60.0' Culvert Outflow=26.84 cfs 5.486 af
Pond 16B: DMH121~STA 36+78	Peak Elev=486.07' Inflow=26.84 cfs 5.486 af 30.0" x 10.0' Culvert Outflow=26.84 cfs 5.486 af
Pond 17P: LB123~STA 38+35	Peak Elev=486.09' Inflow=14.76 cfs 1.974 af 24.0" x 32.5' Culvert Outflow=14.76 cfs 1.974 af
Pond 18P: LB125~STA 43+90	Peak Elev=503.04' Inflow=7.35 cfs 1.254 af 18.0" x 37.0' Culvert Outflow=7.35 cfs 1.254 af

Total Runoff Area = 153.369 ac Runoff Volume = 17.844 af Average Runoff Depth = 1.40"

J:\Drainage\

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Type III 24-hr 25-year Rainfall=5.00"

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96.78% Pervious Area = 148.435 ac 3.22% Impervious Area = 4.934 ac

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Subcatchment 1AS: 1A

Runoff = 0.40 cfs @ 12.68 hrs, Volume= 0.061 af, Depth> 0.97"

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

Area (ac)	CN	Description
0.037	98	Paved parking & roofs
0.719	55	Woods, Good, HSG B
0.756	57	Weighted Average
0.719		Pervious Area
0.037		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
38.6	300	0.0490	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"
3.9	299	0.0650	1.27		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
42.5	599	Total			

Subcatchment 1BS: 1B

Runoff = 0.30 cfs @ 12.00 hrs, Volume= 0.018 af, Depth> 3.08"

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

Area (ac)	CN	Description
0.035	98	Paved parking & roofs
0.034	69	50-75% Grass cover, Fair, HSG B
0.069	84	Weighted Average
0.034		Pervious Area
0.035		Impervious Area

Subcatchment 1S: 1

Runoff = 1.49 cfs @ 12.70 hrs, Volume= 0.235 af, Depth> 0.91"

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

Area (ac)	CN	Description
0.083	98	Paved parking & roofs
3.010	55	Woods, Good, HSG B
3.093	56	Weighted Average
3.010		Pervious Area
0.083		Impervious Area

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Type III 24-hr 25-year Rainfall=5.00"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.6	300	0.0810	0.16		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"
11.5	1,040	0.0910	1.51		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
43.1	1,340	Total			

Subcatchment 2S: 2

Runoff = 3.21 cfs @ 12.65 hrs, Volume= 0.470 af, Depth> 1.15"

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

Area (ac)	CN	Description
0.071	98	Paved roads w/curbs & sewers
2.000	65	2 acre lots, 12% imp, HSG B
2.823	55	Woods, Good, HSG B
4.894	60	Weighted Average
4.583		Pervious Area
0.311		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.3	300	0.0830	0.16		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"
10.6	970	0.0930	1.52		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
41.9	1,270	Total			

Subcatchment 3S: 3

Runoff = 5.95 cfs @ 12.81 hrs, Volume= 1.003 af, Depth> 1.08"

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

Area (ac)	CN	Description
0.113	98	Paved roads w/curbs & sewers
4.000	65	2 acre lots, 12% imp, HSG B
6.985	55	Woods, Good, HSG B
11.098	59	Weighted Average
10.505		Pervious Area
0.593		Impervious Area

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Type III 24-hr 25-year Rainfall=5.00"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.9	300	0.0730	0.15		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"
20.1	1,800	0.0890	1.49		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
53.0	2,100	Total			

Subcatchment 4S: 4

Runoff = 4.69 cfs @ 12.81 hrs, Volume= 0.811 af, Depth> 0.91"

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

Area (ac)	CN	Description
0.037	98	Paved roads w/curbs & sewers
1.000	65	2 acre lots, 12% imp, HSG B
9.688	55	Woods, Good, HSG B
10.725	56	Weighted Average
10.568		Pervious Area
0.157		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
32.9	300	0.0730	0.15		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"
18.0	1,662	0.0950	1.54		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
50.9	1,962	Total			

Subcatchment 5S: 5

Runoff = 2.97 cfs @ 12.63 hrs, Volume= 0.427 af, Depth> 1.22"

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

Area (ac)	CN	Description
0.120	98	Paved roads w/curbs & sewers
2.000	65	2 acre lots, 12% imp, HSG B
2.084	55	Woods, Good, HSG B
4.204	61	Weighted Average
3.844		Pervious Area
0.360		Impervious Area

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Type III 24-hr 25-year Rainfall=5.00"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.1	300	0.0670	0.15		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"
7.0	553	0.0700	1.32		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
41.1	853	Total			

Subcatchment 6S: 6

Runoff = 4.63 cfs @ 12.73 hrs, Volume= 0.756 af, Depth> 0.91"

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

Area (ac)	CN	Description
0.076	98	Paved roads w/curbs & sewers
1.000	65	2 acre lots, 12% imp, HSG B
8.897	55	Woods, Good, HSG B
9.973	56	Weighted Average
9.777		Pervious Area
0.196		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.5	300	0.0650	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"
11.3	1,110	0.1080	1.64		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
45.8	1,410	Total			

Subcatchment 7S: 7

Runoff = 1.61 cfs @ 12.66 hrs, Volume= 0.239 af, Depth> 1.15"

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

Area (ac)	CN	Description
0.053	98	Paved parking & roofs
1.000	65	2 acre lots, 12% imp, HSG B
1.438	55	Woods, Good, HSG B
2.491	60	Weighted Average
2.318		Pervious Area
0.173		Impervious Area

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Type III 24-hr 25-year Rainfall=5.00"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.5	300	0.0650	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"
8.5	868	0.1150	1.70		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
43.0	1,168	Total			

Subcatchment 8S: 8

Runoff = 0.80 cfs @ 12.63 hrs, Volume= 0.115 af, Depth> 1.15"

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

Area (ac)	CN	Description
0.037	98	Paved roads w/curbs & sewers
0.115	98	Paved parking & roofs
1.041	55	Woods, Good, HSG B
1.193	60	Weighted Average
1.041		Pervious Area
0.152		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.5	300	0.0650	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"
5.9	570	0.1050	1.62		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
40.4	870	Total			

Subcatchment 9S: 9

Runoff = 0.91 cfs @ 12.64 hrs, Volume= 0.132 af, Depth> 1.15"

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

Area (ac)	CN	Description
0.037	98	Paved roads w/curbs & sewers
0.115	98	Paved parking & roofs
1.218	55	Woods, Good, HSG B
1.370	60	Weighted Average
1.218		Pervious Area
0.152		Impervious Area

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Type III 24-hr 25-year Rainfall=5.00"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.5	300	0.0650	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"
6.6	540	0.0750	1.37		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
41.1	840	Total			

Subcatchment 10S: 10

Runoff = 1.18 cfs @ 12.58 hrs, Volume= 0.159 af, Depth> 1.35"

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

Area (ac)	CN	Description
0.021	98	Paved roads w/curbs & sewers
1.000	65	2 acre lots, 12% imp, HSG B
0.395	55	Woods, Good, HSG B
1.416	63	Weighted Average
1.275		Pervious Area
0.141		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.3	300	0.0830	0.16		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"
6.7	714	0.1260	1.77		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
38.0	1,014	Total			

Subcatchment 11S: 11

Runoff = 1.30 cfs @ 12.58 hrs, Volume= 0.178 af, Depth> 1.22"

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

Area (ac)	CN	Description
0.025	98	Paved roads w/curbs & sewers
1.000	65	2 acre lots, 12% imp, HSG B
0.721	55	Woods, Good, HSG B
1.746	61	Weighted Average
1.601		Pervious Area
0.145		Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.3	300	0.0830	0.16		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"
5.9	628	0.1270	1.78		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
37.2	928	Total			

Subcatchment 12S: 12

Runoff = 1.97 cfs @ 12.51 hrs, Volume= 0.257 af, Depth> 1.10"

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

Area (ac)	CN	Description
0.025	98	Paved roads w/curbs & sewers
1.000	65	2 acre lots, 12% imp, HSG B
1.790	55	Woods, Good, HSG B
2.815	59	Weighted Average
2.670		Pervious Area
0.145		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.9	300	0.1330	0.19		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"
6.3	662	0.1208	1.74		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
32.2	962	Total			

Subcatchment 13S: 13

Runoff = 11.50 cfs @ 12.77 hrs, Volume= 1.857 af, Depth> 1.21"

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

Area (ac)	CN	Description
0.092	98	Paved roads w/curbs & sewers
3.000	65	2 acre lots, 12% imp, HSG B
11.050	55	Woods, Good, HSG B
3.569	70	Woods, Good, HSG C
0.689	77	Woods, Good, HSG D
18.400	61	Weighted Average
17.948		Pervious Area
0.452		Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.1	300	0.0670	0.15		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"
17.2	1,653	0.1030	1.60		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
51.3	1,953	Total			

Subcatchment 14S: 14

Runoff = 0.23 cfs @ 12.46 hrs, Volume= 0.028 af, Depth> 1.93"

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

Area (ac)	CN	Description
0.009	98	Paved roads w/curbs & sewers
0.164	70	Woods, Good, HSG C
0.173	71	Weighted Average
0.164		Pervious Area
0.009		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.3	300	0.0830	0.16		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"

Subcatchment 15A: 15A

Runoff = 7.12 cfs @ 12.69 hrs, Volume= 1.052 af, Depth> 2.07"

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

Area (ac)	CN	Description
0.042	98	Paved roads w/curbs & sewers
2.000	82	2 acre lots, 12% imp, HSG D
1.631	58	Woods/grass comb., Good, HSG B
0.849	70	Woods, Good, HSG C
1.561	77	Woods, Good, HSG D
6.083	73	Weighted Average
5.801		Pervious Area
0.282		Impervious Area

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Type III 24-hr 25-year Rainfall=5.00"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.6	300	0.0810	0.16		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"
17.4	1,703	0.1070	1.64		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
49.0	2,003	Total			

Subcatchment 15S: 15

Runoff = 8.90 cfs @ 12.70 hrs, Volume= 1.327 af, Depth> 1.69"

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

Area (ac)	CN	Description
0.042	98	Paved roads w/curbs & sewers
2.000	82	2 acre lots, 12% imp, HSG D
4.951	58	Woods/grass comb., Good, HSG B
0.849	70	Woods, Good, HSG C
1.561	77	Woods, Good, HSG D
9.403	68	Weighted Average
9.121		Pervious Area
0.282		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.3	300	0.0830	0.16		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"
17.1	1,680	0.1070	1.64		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
48.4	1,980	Total			

Subcatchment 16S: 16

Runoff = 26.86 cfs @ 13.16 hrs, Volume= 5.488 af, Depth> 1.59"

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

Area (ac)	CN	Description
0.055	98	Paved roads w/curbs & sewers
2.000	82	2 acre lots, 12% imp, HSG D
11.340	58	Woods/grass comb., Good, HSG B
27.020	70	Woods, Good, HSG C
0.889	77	Woods, Good, HSG D
41.304	67	Weighted Average
41.009		Pervious Area
0.295		Impervious Area

167006 Lower Bay Road

Type III 24-hr 25-year Rainfall=5.00"

Prepared by Holden Engineering & Surveying, Inc.

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10/30/2017 11:54:55 AM

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
55.3	300	0.0200	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"
27.4	2,318	0.0798	1.41		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
82.7	2,618	Total			

Subcatchment 17S: 17

Runoff = 14.78 cfs @ 12.58 hrs, Volume= 1.976 af, Depth> 1.85"

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

Area (ac)	CN	Description
0.140	98	Paved roads w/curbs & sewers
4.000	77	2 acre lots, 12% imp, HSG C
2.547	58	Woods/grass comb., Good, HSG B
6.136	70	Woods, Good, HSG C
12.823	70	Weighted Average
12.203		Pervious Area
0.620		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.0	300	0.1000	0.17		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"
10.8	1,097	0.1140	1.69		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
39.8	1,397	Total			

Subcatchment 18S: 18

Runoff = 7.36 cfs @ 12.87 hrs, Volume= 1.254 af, Depth> 1.61"

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

Area (ac)	CN	Description
0.074	98	Paved roads w/curbs & sewers
2.000	82	2 acre lots, 12% imp, HSG D
4.427	58	Woods/grass comb., Good, HSG B
2.839	70	Woods, Good, HSG C
0.000	77	Woods, Good, HSG D
9.340	67	Weighted Average
9.026		Pervious Area
0.314		Impervious Area

167006 Lower Bay Road

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.6	300	0.0290	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.80"
13.6	1,260	0.0960	1.55		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
61.2	1,560	Total			

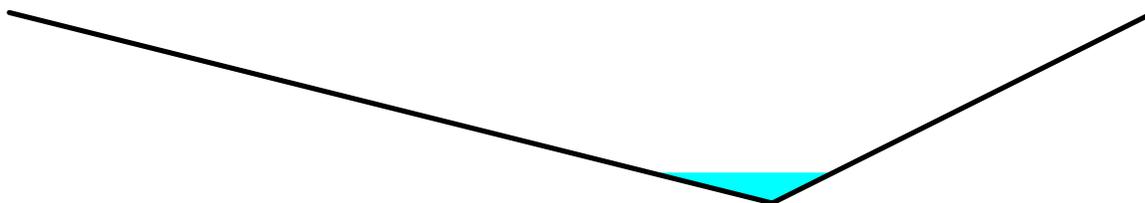
Reach 0: SWALE~STA 6+94-5+75

Inflow Area = 0.069 ac, Inflow Depth > 3.08" for 25-year event
 Inflow = 0.30 cfs @ 12.00 hrs, Volume= 0.018 af
 Outflow = 0.28 cfs @ 12.02 hrs, Volume= 0.018 af, Atten= 6%, Lag= 1.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 1.64 fps, Min. Travel Time= 1.2 min
 Avg. Velocity = 0.69 fps, Avg. Travel Time= 2.9 min

Peak Storage= 21 cf @ 12.02 hrs, Average Depth at Peak Storage= 0.24'
 Bank-Full Depth= 1.50', Capacity at Bank-Full= 37.84 cfs

0.00' x 1.50' deep channel, n= 0.022 Earth, clean & straight
 Side Slope Z-value= 4.0 2.0 '/' Top Width= 9.00'
 Length= 119.0' Slope= 0.0109 '/'
 Inlet Invert= 510.10', Outlet Invert= 508.80'



Reach 1C: SWALE~STA 3+69-3+50

Inflow Area = 3.918 ac, Inflow Depth > 0.96" for 25-year event
 Inflow = 1.91 cfs @ 12.65 hrs, Volume= 0.313 af
 Outflow = 1.91 cfs @ 12.71 hrs, Volume= 0.313 af, Atten= 0%, Lag= 3.6 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 2.54 fps, Min. Travel Time= 0.9 min
 Avg. Velocity = 1.07 fps, Avg. Travel Time= 2.2 min

Peak Storage= 107 cf @ 12.71 hrs, Average Depth at Peak Storage= 0.31'
 Bank-Full Depth= 2.00', Capacity at Bank-Full= 68.96 cfs

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2.00' x 2.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 1.5 '/' Top Width= 8.00'
Length= 142.5' Slope= 0.0309 '/'
Inlet Invert= 502.40', Outlet Invert= 498.00'



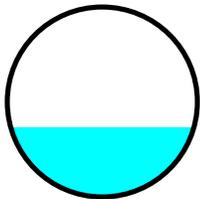
Reach 1R: 6+95--3+61

Inflow Area = 3.093 ac, Inflow Depth > 0.91" for 25-year event
Inflow = 1.49 cfs @ 12.70 hrs, Volume= 0.235 af
Outflow = 1.48 cfs @ 12.71 hrs, Volume= 0.235 af, Atten= 0%, Lag= 0.7 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.72 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 3.44 fps, Avg. Travel Time= 1.6 min

Peak Storage= 86 cf @ 12.71 hrs, Average Depth at Peak Storage= 0.37'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 5.21 cfs

12.0" Diameter Pipe, n= 0.013
Length= 333.0' Slope= 0.0214 '/'
Inlet Invert= 508.13', Outlet Invert= 501.00'



Reach 2: 6+98--9+72

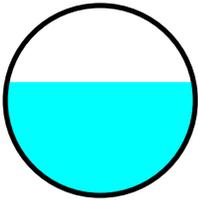
Inflow Area = 4.894 ac, Inflow Depth > 1.15" for 25-year event
Inflow = 3.21 cfs @ 12.65 hrs, Volume= 0.470 af
Outflow = 3.21 cfs @ 12.66 hrs, Volume= 0.470 af, Atten= 0%, Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.58 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 3.85 fps, Avg. Travel Time= 1.2 min

Peak Storage= 134 cf @ 12.66 hrs, Average Depth at Peak Storage= 0.60'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 4.83 cfs

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12.0" Diameter Pipe, n= 0.013
Length= 274.0' Slope= 0.0184 '/'
Inlet Invert= 507.63', Outlet Invert= 502.60'



Reach 2A: SWALE

Inflow Area = 4.894 ac, Inflow Depth > 1.15" for 25-year event
Inflow = 3.21 cfs @ 12.66 hrs, Volume= 0.470 af
Outflow = 3.21 cfs @ 12.66 hrs, Volume= 0.470 af, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.59 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.91 fps, Avg. Travel Time= 0.9 min

Peak Storage= 89 cf @ 12.66 hrs, Average Depth at Peak Storage= 0.34'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 25.85 cfs

2.00' x 1.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 2.0 '/' Top Width= 6.00'
Length= 100.0' Slope= 0.0575 '/'
Inlet Invert= 500.80', Outlet Invert= 495.05'



Reach 2B: SWALE

Inflow Area = 4.894 ac, Inflow Depth > 1.15" for 25-year event
Inflow = 3.21 cfs @ 12.66 hrs, Volume= 0.470 af
Outflow = 3.21 cfs @ 12.66 hrs, Volume= 0.470 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.69 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.46 fps, Avg. Travel Time= 0.1 min

Peak Storage= 8 cf @ 12.66 hrs, Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 38.12 cfs

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2.00' x 1.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 2.0 '/' Top Width= 6.00'
Length= 12.0' Slope= 0.1250 '/'
Inlet Invert= 495.05', Outlet Invert= 493.55'



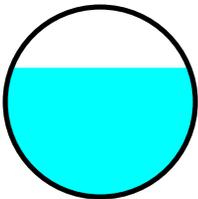
Reach 3R: 9+78--14+27

Inflow Area = 11.098 ac, Inflow Depth > 1.08" for 25-year event
Inflow = 5.95 cfs @ 12.81 hrs, Volume= 1.003 af
Outflow = 5.95 cfs @ 12.83 hrs, Volume= 1.002 af, Atten= 0%, Lag= 0.9 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.70 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 4.20 fps, Avg. Travel Time= 1.8 min

Peak Storage= 400 cf @ 12.83 hrs, Average Depth at Peak Storage= 0.85'
Bank-Full Depth= 1.25', Capacity at Bank-Full= 7.39 cfs

15.0" Diameter Pipe, n= 0.013
Length= 450.0' Slope= 0.0131 '/'
Inlet Invert= 502.59', Outlet Invert= 496.70'



Reach 4R: 15+72--14+32

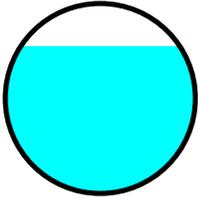
Inflow Area = 10.725 ac, Inflow Depth > 0.91" for 25-year event
Inflow = 4.69 cfs @ 12.81 hrs, Volume= 0.811 af
Outflow = 4.69 cfs @ 12.81 hrs, Volume= 0.810 af, Atten= 0%, Lag= 0.4 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.60 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 3.01 fps, Avg. Travel Time= 0.8 min

Peak Storage= 142 cf @ 12.81 hrs, Average Depth at Peak Storage= 0.97'
Bank-Full Depth= 1.25', Capacity at Bank-Full= 4.96 cfs

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15.0" Diameter Pipe, n= 0.013
Length= 139.0' Slope= 0.0059 '/'
Inlet Invert= 497.52', Outlet Invert= 496.70'



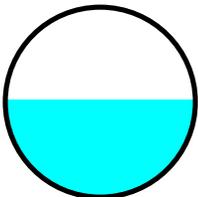
Reach 5R: 15+76--20+47

Inflow Area = 4.204 ac, Inflow Depth > 1.22" for 25-year event
Inflow = 2.97 cfs @ 12.63 hrs, Volume= 0.427 af
Outflow = 2.97 cfs @ 12.65 hrs, Volume= 0.426 af, Atten= 0%, Lag= 0.7 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.32 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 4.18 fps, Avg. Travel Time= 1.9 min

Peak Storage= 191 cf @ 12.65 hrs, Average Depth at Peak Storage= 0.51'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 5.69 cfs

12.0" Diameter Pipe, n= 0.013
Length= 471.0' Slope= 0.0255 '/'
Inlet Invert= 497.52', Outlet Invert= 485.50'



Reach 6R: 23+45--20+51

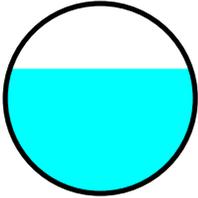
Inflow Area = 9.973 ac, Inflow Depth > 0.91" for 25-year event
Inflow = 4.63 cfs @ 12.73 hrs, Volume= 0.756 af
Outflow = 4.63 cfs @ 12.74 hrs, Volume= 0.755 af, Atten= 0%, Lag= 0.7 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.42 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 3.42 fps, Avg. Travel Time= 1.4 min

Peak Storage= 249 cf @ 12.74 hrs, Average Depth at Peak Storage= 0.82'
Bank-Full Depth= 1.25', Capacity at Bank-Full= 6.04 cfs

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15.0" Diameter Pipe, n= 0.013
Length= 292.0' Slope= 0.0087 '/'
Inlet Invert= 488.05', Outlet Invert= 485.50'



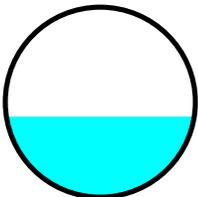
Reach 7R: 23+49--25+58

Inflow Area = 2.491 ac, Inflow Depth > 1.15" for 25-year event
Inflow = 1.61 cfs @ 12.66 hrs, Volume= 0.239 af
Outflow = 1.61 cfs @ 12.67 hrs, Volume= 0.239 af, Atten= 0%, Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.11 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 2.95 fps, Avg. Travel Time= 1.2 min

Peak Storage= 65 cf @ 12.67 hrs, Average Depth at Peak Storage= 0.42'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 4.34 cfs

12.0" Diameter Pipe, n= 0.013
Length= 206.0' Slope= 0.0148 '/'
Inlet Invert= 488.05', Outlet Invert= 485.00'



Reach 8R: 27+04--25+62

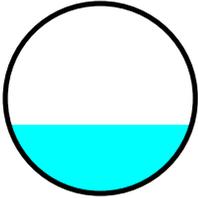
Inflow Area = 1.193 ac, Inflow Depth > 1.15" for 25-year event
Inflow = 0.80 cfs @ 12.63 hrs, Volume= 0.115 af
Outflow = 0.80 cfs @ 12.64 hrs, Volume= 0.115 af, Atten= 0%, Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.14 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.78 fps, Avg. Travel Time= 1.3 min

Peak Storage= 36 cf @ 12.64 hrs, Average Depth at Peak Storage= 0.36'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.88 cfs

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12.0" Diameter Pipe, n= 0.013
Length= 142.0' Slope= 0.0065 '/'
Inlet Invert= 485.93', Outlet Invert= 485.00'



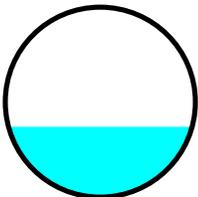
Reach 9R: 27+08--28+36

Inflow Area = 1.370 ac, Inflow Depth > 1.15" for 25-year event
Inflow = 0.91 cfs @ 12.64 hrs, Volume= 0.132 af
Outflow = 0.91 cfs @ 12.64 hrs, Volume= 0.132 af, Atten= 0%, Lag= 0.4 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.47 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.98 fps, Avg. Travel Time= 1.0 min

Peak Storage= 32 cf @ 12.64 hrs, Average Depth at Peak Storage= 0.37'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.15 cfs

12.0" Diameter Pipe, n= 0.013
Length= 124.0' Slope= 0.0078 '/'
Inlet Invert= 485.93', Outlet Invert= 484.96'



Reach 10R: 28+40--29+20

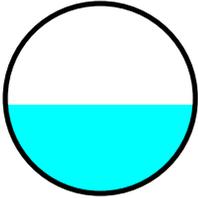
Inflow Area = 1.416 ac, Inflow Depth > 1.35" for 25-year event
Inflow = 1.18 cfs @ 12.58 hrs, Volume= 0.159 af
Outflow = 1.18 cfs @ 12.58 hrs, Volume= 0.159 af, Atten= 0%, Lag= 0.4 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.29 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.80 fps, Avg. Travel Time= 0.7 min

Peak Storage= 29 cf @ 12.58 hrs, Average Depth at Peak Storage= 0.46'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.67 cfs

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12.0" Diameter Pipe, n= 0.013
Length= 80.0' Slope= 0.0056 '/'
Inlet Invert= 485.55', Outlet Invert= 485.10'



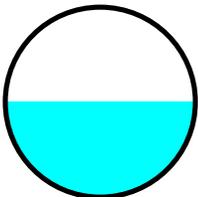
Reach 11R: 29+24--30+20

Inflow Area = 1.746 ac, Inflow Depth > 1.22" for 25-year event
Inflow = 1.30 cfs @ 12.58 hrs, Volume= 0.178 af
Outflow = 1.30 cfs @ 12.58 hrs, Volume= 0.177 af, Atten= 0%, Lag= 0.4 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.28 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.84 fps, Avg. Travel Time= 0.9 min

Peak Storage= 41 cf @ 12.58 hrs, Average Depth at Peak Storage= 0.50'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.57 cfs

12.0" Diameter Pipe, n= 0.013
Length= 104.0' Slope= 0.0052 '/'
Inlet Invert= 485.55', Outlet Invert= 485.01'



Reach 12R: 30+27--31+18

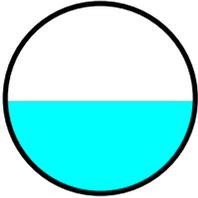
Inflow Area = 2.815 ac, Inflow Depth > 1.10" for 25-year event
Inflow = 1.97 cfs @ 12.51 hrs, Volume= 0.257 af
Outflow = 1.97 cfs @ 12.52 hrs, Volume= 0.257 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.17 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.91 fps, Avg. Travel Time= 0.5 min

Peak Storage= 36 cf @ 12.52 hrs, Average Depth at Peak Storage= 0.49'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 4.11 cfs

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12.0" Diameter Pipe, n= 0.013
Length= 94.0' Slope= 0.0133 '/'
Inlet Invert= 485.55', Outlet Invert= 484.30'



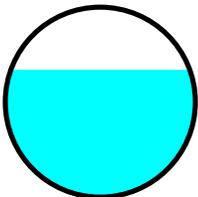
Reach 13R: 34+81--31+22

Inflow Area = 18.400 ac, Inflow Depth > 1.21" for 25-year event
Inflow = 11.50 cfs @ 12.77 hrs, Volume= 1.857 af
Outflow = 11.50 cfs @ 12.78 hrs, Volume= 1.855 af, Atten= 0%, Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.72 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 4.05 fps, Avg. Travel Time= 1.5 min

Peak Storage= 616 cf @ 12.78 hrs, Average Depth at Peak Storage= 1.17'
Bank-Full Depth= 1.75', Capacity at Bank-Full= 14.58 cfs

21.0" Diameter Pipe, n= 0.013
Length= 360.0' Slope= 0.0085 '/'
Inlet Invert= 487.09', Outlet Invert= 484.04'



Reach 14R: 34+85--35+18

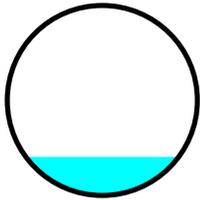
Inflow Area = 0.173 ac, Inflow Depth > 1.93" for 25-year event
Inflow = 0.23 cfs @ 12.46 hrs, Volume= 0.028 af
Outflow = 0.23 cfs @ 12.46 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.08 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.00 fps, Avg. Travel Time= 0.5 min

Peak Storage= 4 cf @ 12.46 hrs, Average Depth at Peak Storage= 0.20'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.65 cfs

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12.0" Diameter Pipe, n= 0.013
Length= 32.5' Slope= 0.0055 '/'
Inlet Invert= 487.09', Outlet Invert= 486.91'



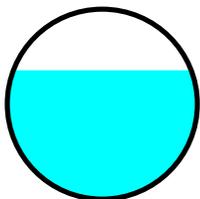
Reach 15B: 37+18--36+64

Inflow Area = 6.083 ac, Inflow Depth > 2.07" for 25-year event
Inflow = 7.12 cfs @ 12.69 hrs, Volume= 1.052 af
Outflow = 7.11 cfs @ 12.69 hrs, Volume= 1.051 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.58 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.97 fps, Avg. Travel Time= 0.3 min

Peak Storage= 71 cf @ 12.69 hrs, Average Depth at Peak Storage= 1.02'
Bank-Full Depth= 1.50', Capacity at Bank-Full= 8.88 cfs

18.0" Diameter Pipe, n= 0.013
Length= 56.0' Slope= 0.0071 '/'
Inlet Invert= 484.90', Outlet Invert= 484.50'



Reach 15R: 35+24--36+58

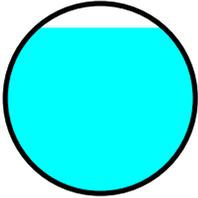
Inflow Area = 9.403 ac, Inflow Depth > 1.69" for 25-year event
Inflow = 8.90 cfs @ 12.70 hrs, Volume= 1.327 af
Outflow = 8.91 cfs @ 12.71 hrs, Volume= 1.327 af, Atten= 0%, Lag= 0.4 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.89 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 4.60 fps, Avg. Travel Time= 0.5 min

Peak Storage= 156 cf @ 12.71 hrs, Average Depth at Peak Storage= 1.09'
Bank-Full Depth= 1.25', Capacity at Bank-Full= 8.50 cfs

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15.0" Diameter Pipe, n= 0.013
Length= 137.0' Slope= 0.0173 '/'
Inlet Invert= 486.87', Outlet Invert= 484.50'



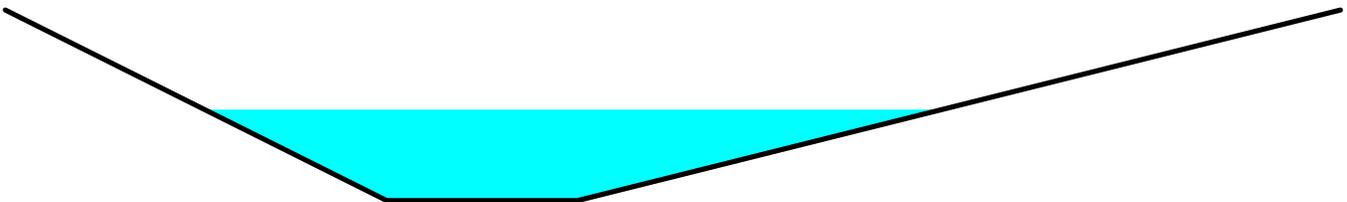
Reach 16R: SWALE~STA 38+35-37+37

Inflow Area = 41.304 ac, Inflow Depth > 1.59" for 25-year event
Inflow = 26.86 cfs @ 13.16 hrs, Volume= 5.488 af
Outflow = 26.84 cfs @ 13.17 hrs, Volume= 5.486 af, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.78 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 3.47 fps, Avg. Travel Time= 0.5 min

Peak Storage= 455 cf @ 13.17 hrs, Average Depth at Peak Storage= 0.96'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 141.23 cfs

2.00' x 2.00' deep channel, n= 0.040 Earth, cobble bottom, clean sides
Side Slope Z-value= 2.0 4.0 '/' Top Width= 14.00'
Length= 98.0' Slope= 0.0505 '/'
Inlet Invert= 488.40', Outlet Invert= 483.45'



Reach 17R: 43+85--38+38

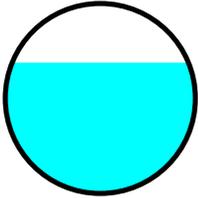
Inflow Area = 12.823 ac, Inflow Depth > 1.85" for 25-year event
Inflow = 14.78 cfs @ 12.58 hrs, Volume= 1.976 af
Outflow = 14.76 cfs @ 12.59 hrs, Volume= 1.974 af, Atten= 0%, Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 11.39 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 6.05 fps, Avg. Travel Time= 1.5 min

Peak Storage= 713 cf @ 12.59 hrs, Average Depth at Peak Storage= 1.03'
Bank-Full Depth= 1.50', Capacity at Bank-Full= 18.06 cfs

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18.0" Diameter Pipe, n= 0.013
 Length= 550.0' Slope= 0.0295 '/'
 Inlet Invert= 501.65', Outlet Invert= 485.40'



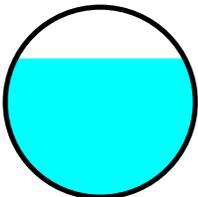
Reach 18R: 45+89--43+92

Inflow Area = 9.340 ac, Inflow Depth > 1.61" for 25-year event
 Inflow = 7.36 cfs @ 12.87 hrs, Volume= 1.254 af
 Outflow = 7.35 cfs @ 12.88 hrs, Volume= 1.254 af, Atten= 0%, Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Max. Velocity= 7.68 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 4.52 fps, Avg. Travel Time= 0.7 min

Peak Storage= 186 cf @ 12.88 hrs, Average Depth at Peak Storage= 0.91'
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 8.35 cfs

15.0" Diameter Pipe, n= 0.013
 Length= 194.0' Slope= 0.0167 '/'
 Inlet Invert= 504.89', Outlet Invert= 501.65'



Pond 1: CB102~STA 5+75

Inflow Area = 0.069 ac, Inflow Depth > 3.07" for 25-year event
 Inflow = 0.28 cfs @ 12.02 hrs, Volume= 0.018 af
 Outflow = 0.28 cfs @ 12.02 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.28 cfs @ 12.02 hrs, Volume= 0.018 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 504.77' @ 12.02 hrs
 Flood Elev= 508.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	504.53'	15.0" x 203.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 500.45' S= 0.0201 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections

Primary OutFlow Max=0.27 cfs @ 12.02 hrs HW=504.77' TW=502.47' (Dynamic Tailwater)

↑1=Culvert (Inlet Controls 0.27 cfs @ 1.66 fps)

Pond 1A: DMH101~STA 3+68

Inflow Area = 0.069 ac, Inflow Depth > 3.07" for 25-year event
 Inflow = 0.28 cfs @ 12.02 hrs, Volume= 0.018 af
 Outflow = 0.29 cfs @ 12.03 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.6 min
 Primary = 0.29 cfs @ 12.03 hrs, Volume= 0.018 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 502.77' @ 12.79 hrs
 Flood Elev= 504.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	500.35'	15.0" x 30.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 500.00' S= 0.0117 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections

Primary OutFlow Max=0.00 cfs @ 12.03 hrs HW=502.47' TW=502.49' (Dynamic Tailwater)

↑1=Culvert (Controls 0.00 cfs)

Pond 1B: LB130~STA 3+58

Inflow Area = 3.162 ac, Inflow Depth > 0.96" for 25-year event
 Inflow = 1.52 cfs @ 12.73 hrs, Volume= 0.252 af
 Outflow = 1.52 cfs @ 12.73 hrs, Volume= 0.252 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.52 cfs @ 12.73 hrs, Volume= 0.252 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 502.77' @ 12.74 hrs
 Flood Elev= 504.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	499.90'	15.0" x 29.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 499.55' S= 0.0121 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections

Primary OutFlow Max=1.51 cfs @ 12.73 hrs HW=502.77' TW=502.71' (Dynamic Tailwater)

↑1=Culvert (Inlet Controls 1.51 cfs @ 1.23 fps)

Pond 2C: CULVERT

Inflow Area = 4.894 ac, Inflow Depth > 1.15" for 25-year event
 Inflow = 3.21 cfs @ 12.66 hrs, Volume= 0.470 af
 Outflow = 3.21 cfs @ 12.66 hrs, Volume= 0.470 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.21 cfs @ 12.66 hrs, Volume= 0.470 af

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

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Peak Elev= 494.35' @ 12.66 hrs

Device	Routing	Invert	Outlet Devices
#1	Device 2	493.50'	18.0" x 79.5' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 483.62' S= 0.1243 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections
#2	Primary	483.62'	18.0" x 40.0' long Culvert RCP, end-section conforming to fill, Ke= 0.500 Outlet Invert= 483.00' S= 0.0155 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Primary OutFlow Max=3.20 cfs @ 12.66 hrs HW=494.34' (Free Discharge)

↑ **2=Culvert** (Passes 3.20 cfs of 26.87 cfs potential flow)

↑ **1=Culvert** (Inlet Controls 3.20 cfs @ 3.13 fps)

Pond 2P: LB103~STA 9+75

Inflow Area =	4.894 ac, Inflow Depth > 1.15" for 25-year event
Inflow =	3.21 cfs @ 12.66 hrs, Volume= 0.470 af
Outflow =	3.21 cfs @ 12.66 hrs, Volume= 0.470 af, Atten= 0%, Lag= 0.0 min
Primary =	3.21 cfs @ 12.66 hrs, Volume= 0.470 af

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

Peak Elev= 502.52' @ 12.66 hrs

Flood Elev= 505.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	501.67'	18.0" x 36.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 500.90' S= 0.0214 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=3.21 cfs @ 12.66 hrs HW=502.51' TW=501.13' (Dynamic Tailwater)

↑ **1=Culvert** (Inlet Controls 3.21 cfs @ 3.13 fps)

Pond 3A: LB105~STA14+30

Inflow Area =	21.823 ac, Inflow Depth > 1.00" for 25-year event
Inflow =	10.64 cfs @ 12.82 hrs, Volume= 1.812 af
Outflow =	10.64 cfs @ 12.82 hrs, Volume= 1.812 af, Atten= 0%, Lag= 0.0 min
Primary =	10.64 cfs @ 12.82 hrs, Volume= 1.812 af

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

Peak Elev= 497.51' @ 12.87 hrs

Flood Elev= 499.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	495.30'	24.0" x 16.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 495.20' S= 0.0063 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=10.37 cfs @ 12.82 hrs HW=497.49' TW=497.02' (Dynamic Tailwater)

↑**1=Culvert** (Inlet Controls 10.37 cfs @ 3.30 fps)

Pond 3B: DMH106~STA 14+30

Inflow Area = 21.823 ac, Inflow Depth > 1.00" for 25-year event
 Inflow = 10.64 cfs @ 12.82 hrs, Volume= 1.812 af
 Outflow = 10.64 cfs @ 12.82 hrs, Volume= 1.812 af, Atten= 0%, Lag= 0.0 min
 Primary = 10.64 cfs @ 12.82 hrs, Volume= 1.812 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 497.03' @ 12.85 hrs
 Flood Elev= 500.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	495.10'	24.0" x 76.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 494.70' S= 0.0053 '/ Cc= 0.900 n= 0.013

Primary OutFlow Max=10.54 cfs @ 12.82 hrs HW=497.02' TW=496.37' (Dynamic Tailwater)

↑**1=Culvert** (Outlet Controls 10.54 cfs @ 4.34 fps)

Pond 3C: DMH106~STA 14+30

Inflow Area = 21.823 ac, Inflow Depth > 1.00" for 25-year event
 Inflow = 10.64 cfs @ 12.82 hrs, Volume= 1.812 af
 Outflow = 10.64 cfs @ 12.82 hrs, Volume= 1.812 af, Atten= 0%, Lag= 0.0 min
 Primary = 10.64 cfs @ 12.82 hrs, Volume= 1.812 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 496.37' @ 12.82 hrs
 Flood Elev= 500.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	494.60'	24.0" x 28.5' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 494.40' S= 0.0070 '/ Cc= 0.900 n= 0.013

Primary OutFlow Max=10.61 cfs @ 12.82 hrs HW=496.37' (Free Discharge)

↑**1=Culvert** (Barrel Controls 10.61 cfs @ 4.80 fps)

Pond 5P: LB108~STA 20+50

Inflow Area = 14.177 ac, Inflow Depth > 1.00" for 25-year event
 Inflow = 7.53 cfs @ 12.71 hrs, Volume= 1.181 af
 Outflow = 7.53 cfs @ 12.71 hrs, Volume= 1.181 af, Atten= 0%, Lag= 0.0 min
 Primary = 7.53 cfs @ 12.71 hrs, Volume= 1.181 af

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

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Peak Elev= 485.33' @ 12.71 hrs

Flood Elev= 489.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	483.80'	18.0" x 40.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 483.30' S= 0.0125 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=7.52 cfs @ 12.71 hrs HW=485.33' (Free Discharge)

↑**1=Culvert** (Inlet Controls 7.52 cfs @ 4.26 fps)

Pond 7P: LB110~STA 25+60

Inflow Area = 3.684 ac, Inflow Depth > 1.15" for 25-year event
 Inflow = 2.41 cfs @ 12.66 hrs, Volume= 0.354 af
 Outflow = 2.41 cfs @ 12.66 hrs, Volume= 0.354 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.41 cfs @ 12.66 hrs, Volume= 0.354 af

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

Peak Elev= 485.22' @ 12.66 hrs

Flood Elev= 488.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	484.50'	18.0" x 33.5' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 483.80' S= 0.0209 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=2.40 cfs @ 12.66 hrs HW=485.22' (Free Discharge)

↑**1=Culvert** (Inlet Controls 2.40 cfs @ 2.88 fps)

Pond 9P: LB111~STA 28+38

Inflow Area = 2.786 ac, Inflow Depth > 1.25" for 25-year event
 Inflow = 2.08 cfs @ 12.61 hrs, Volume= 0.291 af
 Outflow = 2.08 cfs @ 12.61 hrs, Volume= 0.291 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.08 cfs @ 12.61 hrs, Volume= 0.291 af

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

Peak Elev= 484.76' @ 12.61 hrs

Flood Elev= 488.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	484.10'	18.0" x 39.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 483.30' S= 0.0205 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=2.07 cfs @ 12.61 hrs HW=484.76' (Free Discharge)

↑**1=Culvert** (Inlet Controls 2.07 cfs @ 2.77 fps)

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Pond 11P: LB133~STA 30+22

Inflow Area = 1.746 ac, Inflow Depth > 1.22" for 25-year event
 Inflow = 1.30 cfs @ 12.58 hrs, Volume= 0.177 af
 Outflow = 1.30 cfs @ 12.58 hrs, Volume= 0.177 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.30 cfs @ 12.58 hrs, Volume= 0.177 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 484.37' @ 12.58 hrs
 Flood Elev= 487.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	483.82'	15.0" x 41.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 483.00' S= 0.0200 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=1.30 cfs @ 12.58 hrs HW=484.37' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 1.30 cfs @ 2.52 fps)

Pond 13P: LB115~ STA 31+20

Inflow Area = 21.215 ac, Inflow Depth > 1.19" for 25-year event
 Inflow = 13.01 cfs @ 12.75 hrs, Volume= 2.113 af
 Outflow = 13.01 cfs @ 12.75 hrs, Volume= 2.113 af, Atten= 0%, Lag= 0.0 min
 Primary = 13.01 cfs @ 12.75 hrs, Volume= 2.113 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 485.44' @ 12.75 hrs
 Flood Elev= 487.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	483.70'	24.0" x 35.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 483.00' S= 0.0200 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=13.01 cfs @ 12.75 hrs HW=485.44' (Free Discharge)
 ↑**1=Culvert** (Inlet Controls 13.01 cfs @ 4.49 fps)

Pond 14P: LB117~STA 35+20

Inflow Area = 0.173 ac, Inflow Depth > 1.93" for 25-year event
 Inflow = 0.23 cfs @ 12.46 hrs, Volume= 0.028 af
 Outflow = 0.23 cfs @ 12.46 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.23 cfs @ 12.46 hrs, Volume= 0.028 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 485.77' @ 12.46 hrs
 Flood Elev= 489.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	485.55'	15.0" x 30.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 484.95' S= 0.0200 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=0.23 cfs @ 12.46 hrs HW=485.77' (Free Discharge)

↑**1=Culvert** (Inlet Controls 0.23 cfs @ 1.60 fps)

Pond 15P: LB119~STA 36+61

Inflow Area = 15.486 ac, Inflow Depth > 1.84" for 25-year event
 Inflow = 16.02 cfs @ 12.70 hrs, Volume= 2.378 af
 Outflow = 16.02 cfs @ 12.70 hrs, Volume= 2.378 af, Atten= 0%, Lag= 0.0 min
 Primary = 16.02 cfs @ 12.70 hrs, Volume= 2.378 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 485.25' @ 12.70 hrs
 Flood Elev= 487.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	483.20'	30.0" x 38.5' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 483.00' S= 0.0052 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=16.02 cfs @ 12.70 hrs HW=485.25' (Free Discharge)

↑**1=Culvert** (Barrel Controls 16.02 cfs @ 5.05 fps)

Pond 16A: HW122~STA 37+37

Inflow Area = 41.304 ac, Inflow Depth > 1.59" for 25-year event
 Inflow = 26.84 cfs @ 13.17 hrs, Volume= 5.486 af
 Outflow = 26.84 cfs @ 13.17 hrs, Volume= 5.486 af, Atten= 0%, Lag= 0.0 min
 Primary = 26.84 cfs @ 13.17 hrs, Volume= 5.486 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 487.35' @ 13.19 hrs
 Flood Elev= 487.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	483.45'	30.0" x 60.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 483.15' S= 0.0050 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=26.67 cfs @ 13.17 hrs HW=487.34' TW=486.07' (Dynamic Tailwater)

↑**1=Culvert** (Inlet Controls 26.67 cfs @ 5.43 fps)

Pond 16B: DMH121~STA 36+78

Inflow Area = 41.304 ac, Inflow Depth > 1.59" for 25-year event
 Inflow = 26.84 cfs @ 13.17 hrs, Volume= 5.486 af
 Outflow = 26.84 cfs @ 13.17 hrs, Volume= 5.486 af, Atten= 0%, Lag= 0.0 min
 Primary = 26.84 cfs @ 13.17 hrs, Volume= 5.486 af

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

167006 Lower Bay Road

Type III 24-hr 25-year Rainfall=5.00"

Prepared by Holden Engineering & Surveying, Inc.

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Peak Elev= 486.07' @ 13.17 hrs

Flood Elev= 488.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	483.05'	30.0" x 10.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 483.00' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections

Primary OutFlow Max=26.81 cfs @ 13.17 hrs HW=486.07' (Free Discharge)↑**1=Culvert** (Barrel Controls 26.81 cfs @ 5.74 fps)**Pond 17P: LB123~STA 38+35**

Inflow Area =	12.823 ac, Inflow Depth > 1.85"	for 25-year event
Inflow =	14.76 cfs @ 12.59 hrs, Volume=	1.974 af
Outflow =	14.76 cfs @ 12.59 hrs, Volume=	1.974 af, Atten= 0%, Lag= 0.0 min
Primary =	14.76 cfs @ 12.59 hrs, Volume=	1.974 af

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

Peak Elev= 486.09' @ 12.59 hrs

Flood Elev= 488.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	484.15'	24.0" x 32.5' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 483.50' S= 0.0200 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=14.74 cfs @ 12.59 hrs HW=486.09' (Free Discharge)↑**1=Culvert** (Inlet Controls 14.74 cfs @ 4.74 fps)**Pond 18P: LB125~STA 43+90**

Inflow Area =	9.340 ac, Inflow Depth > 1.61"	for 25-year event
Inflow =	7.35 cfs @ 12.88 hrs, Volume=	1.254 af
Outflow =	7.35 cfs @ 12.88 hrs, Volume=	1.254 af, Atten= 0%, Lag= 0.0 min
Primary =	7.35 cfs @ 12.88 hrs, Volume=	1.254 af

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

Peak Elev= 503.04' @ 12.88 hrs

Flood Elev= 504.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	501.55'	18.0" x 37.0' long Culvert RCP, square edge headwall, Ke= 0.500 Outlet Invert= 500.80' S= 0.0203 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=7.34 cfs @ 12.88 hrs HW=503.04' (Free Discharge)↑**1=Culvert** (Inlet Controls 7.34 cfs @ 4.16 fps)

LOWER BAY ROAD REHABILITATION

SANBORNTON, NH STORMWATER MANAGEMENT REPORT

DRAINAGE AREA PLANS