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### TOWN OF DURHAM STORMWATER MANAGEMENT PLAN FOR CLARK PROPERTIES, LLC

74 MAIN STREET TAX MAP 106, LOT 59 (FORMERLY TAX MAP 2, LOT 14-1)

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# 1. PROJECT INFORMATION NARRATIVE

### 1.1. Project narrative

# 1.1.1. Project summary

Clark Properties, LLC intends to redevelop the property at 74 Main Street in Durham, New Hampshire (Tax Map 106, Lot 59). The project will demolish the existing 1100 ft<sup>2</sup> building on the property and construct five-story mixed-use building. Additionally, the parking and traffic flow will be modified. This report was prepared by Horizons Engineering to ensure the design of the stormwater management for 74 Main Street complies with the applicable federal, state and local regulations for stormwater.

# 1.1.2. Existing conditions

The proposed work is located at the corner of Main Street and Pettee Brook Lane. The project site currently consists of an office building and two paved parking areas with a combined 13 spaces. The stormwater runoff from the office building and the larger parking area in the north drain to catch basins on Pettee Brook Lane at the northeast side of the property. The stormwater runoff from the western portion of the site is collected in catch basins along Main Street. All the existing catch basins are part of Durham's municipal separate storm sewer system (MS4). The flow is split between two drainage points. The first point (PA-1) is located at a catch basin on Main Street. This catch basin is routed to the west into UNH property and ultimately outlets to College Brook. The second point (PA-2) is located at a catch basin on the northeast corner of the property along Pettee Brook Lane. The storm sewer ultimately outlets to the Pettee Brook.

### 1.1.3. Proposed site conditions & disturbances

In the proposed post-developed condition the majority of the lot will be covered by the new building. The majority of the remained of the land will be paved using pervious interlocking concrete pavers (PICP). A small remainder of the land, ca. 300 square feet will be grassed. Due to the negligible impact of this grassed area on the over runoff from the site, and the potential to compact the soils during construction, the entire lot has been modelled as impervious land cover.

The new building will have a roof area of about 6100 square feet. Two-thirds (4000 sq. ft.) of the roof will be routed to permeable paver system to infiltrate some of the runoff and buffer the peak flow. The remainder of the roof will be routed to a new catch basin (1P)

The permeable paver system have been split into three cells. The system is built on a max. 5% grade and two membrane barriers will be installed to create storage space on the slope. Overall the system takes up about 1880 sq. ft. with some of the open-graded reservoir stone extending below the concrete slab under the building overhang.

The runoff from the adjacent property (TM160, L61) will be collected along the property line. The design intent is to have a the concrete pad and concrete edge restraint to be 1/4" proud of the new asphalt to concentrate flow towards a new deep-sump catch basin (2P). The purpose of this to prevent heavily sediment laden runoff from flowing directly into the PICP system. It is expected that during larger storms, the flow depth in this location may exceed 1/2" for very short periods of time, and the PICIP is able to handle these additional flows without ponding.

The remainder of the runoff form the site are the narrow strip between the front of the building and the road which currently flows to the street, and a small 300 sq. ft. area by the proposed transformer pad. These areas will be collected in the existing catch basins located on Pettee Brook Lane (E2) and on the abutting town property (E1).

The flows towards PA-1 have been reduced due to the removal of the paved area on the abutting property.

# 1.1.4. Hydrologic data and methods

The stormwater model was built in the software program HydroCAD (Version 10.00 25). HydroCAD uses the methods described in the NRCS National Engineering Handbook [2] to create rainfall-runoff relationships, determine time of concentration, generate unit hydrographs for each subcatchment area.

The direct runoff from the site was estimated using the Weighted-Q method. Synthetic design storms used rainfall data and intensity curves from the NOAA (Atlas 14). Soils maps generated by the Natural Resources Conservation Service (NRCS), and land cover data from the field survey were used to determine the soil-complex CN values.

Using SCS TR-20, run under HydroCAD Version 10.0 with 24-hour rainfall events based on Atlas 14 data for Durham, NH, pre- and post-development cover types and drainage paths were modeled to generate peak discharge rates. These data are provided in full in section 1.3 of this report and are summarized below in Table 1.1.

# 1.1.5. Peak runoff control requirement

Town of Durham Site Design Standards require that measures be taken to control the post-development peak rate runoff so that it does not exceed pre-development runoff for the 1 inch, 2-, 10-, and 17<sup>1</sup>- year, 24-hour storm events. Due to the post-project grading of the site and changes in land cover, stormwater devices were used to attenuate flow in order to meet these Peak Runoff Control requirements. Table 1.2 summarizes the stormwater runoff peak flow rate for the 1 inch, 2-, 10- and 25-year storm events.

|              |        | Storm event runoff volume (cf) |         |         |       |        |
|--------------|--------|--------------------------------|---------|---------|-------|--------|
|              | 1-inch | 2-year                         | 10-year | 25-year | 50-yr | 100-yr |
| PA-1         |        |                                |         |         |       |        |
| Pre          | 0.28   | 1.07                           | 1.71    | 2.12    | 2.43  | 2.75   |
| Post (w/ UD) | 0.23   | 0.95                           | 1.58    | 1.95    | 2.28  | 2.60   |
| PA-2         |        |                                |         |         |       |        |
| Pre          | 0.19   | 0.83                           | 1.40    | 1.76    | 2.03  | 2.32   |
| Post (w/ UD) | 0.15   | 0.51                           | 0.98    | 1.41    | 1.36  | 1.51   |

Table 1.2: Peak flow from 74 Main Street

The peak flows for all events are decreased in the post-development conditions.

<sup>&</sup>lt;sup>1</sup> Understood to be a typo and the 25-year rainfall event is intended

#### 1.1.6. Runoff volume control

|              |        | Storm event runoff volume (cf) |         |         |       |        |
|--------------|--------|--------------------------------|---------|---------|-------|--------|
|              | 1-inch | 2-year                         | 10-year | 25-year | 50-yr | 100-yr |
| PA-1         |        |                                |         |         |       |        |
| Pre          | 834    | 3532                           | 6048    | 7649    | 8833  | 10 141 |
| Post (w/ UD) | 690    | 3129                           | 5505    | 7034    | 8170  | 9429   |
| PA-2         |        |                                |         |         |       |        |
| Pre          | 591    | 2747                           | 4873    | 6247    | 7269  | 8402   |
| Post (w/ UD) | 412    | 2080                           | 4134    | 5548    | 6617  | 7806   |

The runoff volume from each storm event is summarized in table 1.3.

In all events the volume of runoff leaving the site is less in the post-development conditions than the pre-development conditions.

1.2. NRCS soils information



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 Strafford County, 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

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

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

#### MAP LEGEND **MAP INFORMATION** The soil surveys that comprise your AOI were mapped at Area of Interest (AOI) Spoil Area 8 1:20,000. Area of Interest (AOI) Stony Spot 0 Soils Very Stony Spot 00 Warning: Soil Map may not be valid at this scale. Soil Map Unit Polygons Ŷ Wet Spot Soil Map Unit Lines -Enlargement of maps beyond the scale of mapping can cause Other $\triangle$ inisunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of Soil Map Unit Points .-Special Line Features Special Point Features contrasting soils that could have been shown at a more detailed Water Features scale. Blowout (0) Streams and Canals Borrow Pit Transportation Please rely on the bar scale on each map sheet for map Clay Spot × +++ Rails measurements. Closed Depression 0 ~ Interstate Highways Source of Map: Natural Resources Conservation Service Gravel Pit X US Routes Web Soil Survey URL: ~ Coordinate System: Web Mercator (EPSG:3857) Gravelly Spot ... Major Roads Ø Landfill Local Roads Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts 100 A Lava F**l**ow Background distance and area. A projection that preserves area, such as the Marsh or swamp Aerial Photography 业 Page Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required. 旁 Mine or Quarry Miscellaneous Water 0 This product is generated from the USDA-NRCS certified data as of the version date(s) listed below. 0 Perennial Water Rock Outcrop 11 Soil Survey Area: Strafford County, New Hampshire Survey Area Data: Version 20, May 29, 2020 + Saline Spot Sandy Spot °.\*\* Soil map units are labeled (as space allows) for map scales 1:50,000 or larger. Severely Eroded Spot -Sinkhole ô Date(s) aerial images were photographed: Dec 31, 2009-Sep 9.2017 Slide or Slip ò ø Sodic Spot The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

#### 10

| Map Unit Symbol Map Unit Name |   | Acres in AOI | Percent of AOI |  |
|-------------------------------|---|--------------|----------------|--|
| BzB                           | Buxton silt loam, 3 to 8 percent slopes                                   | 6.1          | 29.8%          |  |
| HdB                           | Hollis-Charlton very rocky fine<br>sandy loams, 3 to 8 percent<br>slopes  | 6.6          | 32.4%          |  |
| HdC                           | Hollis-Charlton very rocky fine<br>sandy loams, 8 to 15 percent<br>slopes | 5.4          | 26.6%          |  |
| Sb                            | Saugatuck loamy sand  | 2.2          | 10.6%          |  |
| SfC                           | Suffield silt loam, 8 to 15 percent slopes                                | 0.1          | 0.6%           |  |
| Totals for Area of Interest   |   | 20.4         | 100.0%         |  |

# **Map Unit Legend**

# **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 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.

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.

# Strafford County, New Hampshire

### BzB—Buxton silt loam, 3 to 8 percent slopes

#### **Map Unit Setting**

National map unit symbol: 9d6p Elevation: 0 to 260 feet Mean annual precipitation: 36 to 71 inches Mean annual air temperature: 39 to 55 degrees F Frost-free period: 140 to 240 days Farmland classification: All areas are prime farmland

#### **Map Unit Composition**

Buxton and similar soils: 85 percent Minor components: 15 percent Estimates are based on observations, descriptions, and transects of the mapunit.

#### **Description of Buxton**

#### Setting

Parent material: Glaciomarine

#### **Typical profile**

H1 - 0 to 10 inches: silt loam H2 - 10 to 28 inches: silty clay loam H3 - 28 to 43 inches: silty clay

#### **Properties and qualities**

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.5 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified Land capability classification (nonirrigated): 2e Hydrologic Soil Group: C/D Ecological site: F145XY006CT - Semi-Rich Moist Lake Plain Hydric soil rating: No

#### **Minor Components**

#### Elmwood

Percent of map unit: 10 percent Hydric soil rating: No

#### Not named

*Percent of map unit:* 5 percent *Hydric soil rating:* No

### HdB—Hollis-Charlton very rocky fine sandy loams, 3 to 8 percent slopes

#### Map Unit Setting

National map unit symbol: 9d7m Elevation: 0 to 1,000 feet Mean annual precipitation: 36 to 71 inches Mean annual air temperature: 39 to 55 degrees F Frost-free period: 120 to 240 days Farmland classification: Not prime farmland

#### **Map Unit Composition**

*Hollis and similar soils:* 40 percent *Charlton and similar soils:* 30 percent *Minor components:* 30 percent *Estimates are based on observations, descriptions, and transects of the mapunit.* 

#### **Description of Hollis**

#### Setting

Parent material: Till

#### Typical profile

*H1 - 0 to 14 inches:* very stony fine sandy loam *H2 - 14 to 18 inches:* bedrock

#### **Properties and qualities**

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.0 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified Land capability classification (nonirrigated): 6s Hydrologic Soil Group: D Ecological site: F144AY033MA - Shallow Dry Till Uplands Hydric soil rating: No

#### **Description of Charlton**

#### Setting

Parent material: Till

#### Typical profile

H1 - 0 to 13 inches: very stony fine sandy loam

H2 - 13 to 36 inches: fine sandy loam

H3 - 36 to 40 inches: gravelly loamy sand

### **Properties and qualities**

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.4 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified Land capability classification (nonirrigated): 6s Hydrologic Soil Group: A Ecological site: F144AY034CT - Well Drained Till Uplands Hydric soil rating: No

#### **Minor Components**

#### Rock outcrop

Percent of map unit: 10 percent Hydric soil rating: No

#### Not named

*Percent of map unit:* 5 percent *Hydric soil rating:* No

#### Sutton

Percent of map unit: 5 percent Hydric soil rating: No

#### Buxton

Percent of map unit: 5 percent Hydric soil rating: No

#### Leicester

Percent of map unit: 5 percent Landform: Depressions Hydric soil rating: Yes

# HdC—Hollis-Charlton very rocky fine sandy loams, 8 to 15 percent slopes

#### **Map Unit Setting**

National map unit symbol: 9d7n Elevation: 0 to 1,200 feet Mean annual precipitation: 36 to 71 inches Mean annual air temperature: 39 to 55 degrees F Frost-free period: 120 to 240 days Farmland classification: Not prime farmland

#### **Map Unit Composition**

*Hollis and similar soils:* 40 percent *Charlton and similar soils:* 30 percent *Minor components:* 30 percent *Estimates are based on observations, descriptions, and transects of the mapunit.* 

#### **Description of Hollis**

#### Setting

Parent material: Till

#### **Typical profile**

*H1 - 0 to 14 inches:* very stony fine sandy loam *H2 - 14 to 18 inches:* bedrock

### **Properties and qualities**

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.0 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified Land capability classification (nonirrigated): 6s Hydrologic Soil Group: D Ecological site: F144AY033MA - Shallow Dry Till Uplands Hydric soil rating: No

#### **Description of Charlton**

#### Setting

Parent material: Till

#### **Typical profile**

*H1 - 0 to 13 inches:* very stony fine sandy loam *H2 - 13 to 36 inches:* fine sandy loam *H3 - 36 to 40 inches:* gravelly loamy sand

#### **Properties and qualities**

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.4 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified Land capability classification (nonirrigated): 6s Hydrologic Soil Group: A Ecological site: F144AY034CT - Well Drained Till Uplands Hydric soil rating: No

#### **Minor Components**

#### Rock outcrop

Percent of map unit: 10 percent Hydric soil rating: No

#### Not named

Percent of map unit: 10 percent Hydric soil rating: No

#### Woodbridge

*Percent of map unit:* 5 percent *Hydric soil rating:* No

#### Sutton

Percent of map unit: 5 percent Hydric soil rating: No

### Sb—Saugatuck loamy sand

#### Map Unit Setting

National map unit symbol: 9d8r Elevation: 300 to 1,000 feet Mean annual precipitation: 27 to 71 inches Mean annual air temperature: 39 to 55 degrees F Frost-free period: 125 to 240 days Farmland classification: Not prime farmland

#### **Map Unit Composition**

Saugatuck and similar soils: 85 percent Minor components: 15 percent Estimates are based on observations, descriptions, and transects of the mapunit.

#### **Description of Saugatuck**

#### Setting

Landform: Outwash terraces Parent material: Outwash

#### **Typical profile**

H1 - 0 to 4 inches: loamy sand H2 - 4 to 7 inches: sand H3 - 7 to 26 inches: loamy sand H4 - 26 to 42 inches: sand

#### **Properties and qualities**

Slope: 0 to 3 percent
Depth to restrictive feature: 10 to 16 inches to undefined
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.1 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified Land capability classification (nonirrigated): 4w Hydrologic Soil Group: B/D Hydric soil rating: Yes

#### **Minor Components**

#### Not named wet

Percent of map unit: 15 percent

Landform: Outwash terraces Hydric soil rating: Yes

### SfC—Suffield silt loam, 8 to 15 percent slopes

#### **Map Unit Setting**

National map unit symbol: 9d8v Elevation: 0 to 250 feet Mean annual precipitation: 36 to 71 inches Mean annual air temperature: 39 to 55 degrees F Frost-free period: 140 to 240 days Farmland classification: Farmland of statewide importance

#### **Map Unit Composition**

Suffield and similar soils: 85 percent Minor components: 15 percent Estimates are based on observations, descriptions, and transects of the mapunit.

#### **Description of Suffield**

#### **Typical profile**

H1 - 0 to 19 inches: silt loam H2 - 19 to 28 inches: silt loam H3 - 28 to 41 inches: silty clay

#### **Properties and qualities**

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.4 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified Land capability classification (nonirrigated): 3e Hydrologic Soil Group: C Ecological site: F144AY017NH - Well Drained Lake Plain Hydric soil rating: No

#### **Minor Components**

#### Not named

Percent of map unit: 9 percent Hydric soil rating: No

### Buxton

Percent of map unit: 5 percent Hydric soil rating: No

#### Rock outcrop

Percent of map unit: 1 percent Hydric soil rating: No

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1.3. Precipitation tables



NOAA Atlas 14, Volume 10, Version 3 Location name: Durham, New Hampshire, USA\* Latitude: 43.1354°, Longitude: -70.9281° Elevation: m/ft\*\* \* source: ESRI Maps \*\* source: USGS



### POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF\_tabular | PF\_graphical | Maps\_&\_aerials

### PF tabular

| PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) <sup>1</sup> |                                     |                               |                               |                               |                               |                              |                              |                              |                             |                             |
|--|-------------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|------------------------------|------------------------------|-----------------------------|-----------------------------|
| Duration   | Average recurrence interval (years) |                               |                               |                               |                               |                              |                              |                              |                             |                             |
| Duration   | 1                                   | 2                             | 5                             | 10                            | 25                            | 50                           | 100                          | 200                          | 500                         | 1000                        |
| 5-min  | <b>0.300</b><br>(0.242-0.374)       | <b>0.363</b><br>(0.293-0.453) | <b>0.466</b><br>(0.374-0.584) | <b>0.550</b><br>(0.439-0.693) | <b>0.667</b><br>(0.512-0.877) | <b>0.755</b><br>(0.565-1.01) | <b>0.847</b><br>(0.613-1.18) | <b>0.952</b><br>(0.648-1.35) | <b>1.10</b><br>(0.718-1.62) | <b>1.23</b><br>(0.776-1.84) |
| 10-min   | <b>0.425</b><br>(0.343-0.531)       | <b>0.514</b><br>(0.415-0.642) | <b>0.659</b><br>(0.529-0.825) | <b>0.779</b><br>(0.622-0.982) | <b>0.945</b><br>(0.725-1.24)  | <b>1.07</b><br>(0.802-1.44)  | <b>1.20</b><br>(0.869-1.67)  | <b>1.35</b><br>(0.917-1.92)  | <b>1.56</b><br>(1.02-2.30)  | <b>1.74</b><br>(1.10-2.61)  |
| 15-min   | <b>0.500</b><br>(0.404-0.624)       | <b>0.605</b><br>(0.488-0.755) | <b>0.776</b><br>(0.624-0.972) | <b>0.917</b><br>(0.731-1.16)  | <b>1.11</b> (0.853-1.46)      | <b>1.26</b><br>(0.943-1.69)  | <b>1.41</b><br>(1.02-1.97)   | <b>1.59</b><br>(1.08-2.26)   | <b>1.84</b><br>(1.20-2.70)  | <b>2.04</b><br>(1.29-3.07)  |
| 30-min   | <b>0.669</b><br>(0.540-0.834)       | <b>0.808</b><br>(0.652-1.01)  | <b>1.03</b><br>(0.832-1.30)   | <b>1.22</b><br>(0.977-1.54)   | <b>1.48</b><br>(1.14-1.96)    | <b>1.68</b> (1.26-2.26)      | <b>1.88</b><br>(1.37-2.63)   | <b>2.12</b><br>(1.44-3.02)   | <b>2.47</b> (1.61-3.64)     | <b>2.77</b><br>(1.75-4.15)  |
| 60-min   | <b>0.837</b><br>(0.676-1.04)        | <b>1.01</b><br>(0.815-1.26)   | <b>1.30</b><br>(1.04-1.62)    | <b>1.53</b><br>(1.22-1.93)    | <b>1.86</b><br>(1.43-2.45)    | <b>2.10</b><br>(1.58-2.83)   | <b>2.36</b><br>(1.71-3.30)   | <b>2.66</b><br>(1.81-3.79)   | <b>3.11</b><br>(2.02-4.58)  | <b>3.49</b><br>(2.21-5.24)  |
| 2-hr   | <b>1.12</b><br>(0.911-1.39)         | <b>1.37</b><br>(1.11-1.69)    | <b>1.76</b><br>(1.43-2.19)    | <b>2.09</b><br>(1.68-2.62)    | <b>2.55</b><br>(1.97-3.34)    | <b>2.88</b><br>(2.18-3.87)   | <b>3.25</b><br>(2.38-4.55)   | <b>3.69</b><br>(2.52-5.22)   | <b>4.36</b><br>(2.84-6.38)  | <b>4.94</b><br>(3.14-7.36)  |
| 3-hr   | <b>1.33</b><br>(1.08-1.64)          | <b>1.62</b><br>(1.32-2.00)    | <b>2.10</b><br>(1.70-2.60)    | <b>2.50</b><br>(2.01-3.11)    | <b>3.05</b><br>(2.37-3.99)    | <b>3.45</b><br>(2.62-4.62)   | <b>3.89</b><br>(2.87-5.44)   | <b>4.43</b><br>(3.03-6.24)   | <b>5.26</b><br>(3.44-7.67)  | <b>5.97</b><br>(3.80-8.87)  |
| 6-hr   | <b>1.74</b><br>(1.43-2.14)          | <b>2.14</b><br>(1.75-2.63)    | <b>2.78</b><br>(2.27-3.43)    | <b>3.32</b> (2.69-4.11)       | <b>4.06</b><br>(3.17-5.28)    | <b>4.60</b><br>(3.52-6.13)   | <b>5.20</b><br>(3.85-7.22)   | <b>5.93</b><br>(4.07-8.30)   | <b>7.05</b><br>(4.62-10.2)  | <b>8.03</b> (5.12-11.8)     |
| 12-hr  | <b>2.22</b><br>(1.84-2.71)          | <b>2.74</b><br>(2.26-3.34)    | <b>3.58</b><br>(2.94-4.39)    | <b>4.29</b><br>(3.50-5.27)    | <b>5.25</b><br>(4.13-6.79)    | <b>5.96</b><br>(4.58-7.89)   | <b>6.74</b><br>(5.02-9.31)   | <b>7.69</b><br>(5.30-10.7)   | <b>9.17</b><br>(6.03-13.2)  | <b>10.4</b><br>(6.68-15.3)  |
| 24-hr  | <b>2.63</b><br>(2.19-3.19)          | <b>3.30</b><br>(2.74-4.00)    | <b>4.39</b><br>(3.63-5.33)    | <b>5.29</b><br>(4.34-6.46)    | <b>6.53</b><br>(5.17-8.41)    | <b>7.44</b><br>(5.76-9.82)   | <b>8.44</b><br>(6.34-11.7)   | <b>9.71</b><br>(6.71-13.4)   | <b>11.7</b> (7.72-16.8)     | <b>13.5</b><br>(8.64-19.6)  |
| 2-day  | <b>2.92</b><br>(2.44-3.51)          | <b>3.74</b><br>(3.12-4.50)    | <b>5.09</b><br>(4.23-6.14)    | <b>6.20</b> (5.12-7.53)       | <b>7.74</b><br>(6.18-9.95)    | <b>8.86</b> (6.92-11.7)      | <b>10.1</b> (7.69-14.0)      | <b>11.8</b> (8.15-16.2)      | <b>14.5</b> (9.56-20.6)     | <b>16.9</b><br>(10.9-24.4)  |
| 3-day  | <b>3.14</b><br>(2.64-3.76)          | <b>4.03</b><br>(3.38-4.83)    | <b>5.47</b><br>(4.57-6.58)    | <b>6.67</b><br>(5.53-8.06)    | <b>8.32</b> (6.66-10.7)       | <b>9.52</b> (7.46-12.5)      | <b>10.9</b><br>(8.29-15.0)   | <b>12.7</b><br>(8.78-17.3)   | <b>15.6</b><br>(10.3-22.1)  | <b>18.2</b><br>(11.7-26.3)  |
| 4-day  | <b>3.38</b><br>(2.84-4.03)          | <b>4.29</b><br>(3.61-5.13)    | <b>5.78</b><br>(4.84-6.93)    | <b>7.02</b> (5.83-8.46)       | <b>8.72</b> (7.00-11.1)       | <b>9.96</b><br>(7.83-13.1)   | <b>11.4</b> (8.68-15.6)      | <b>13.2</b><br>(9.18-18.0)   | <b>16.2</b> (10.8-22.9)     | <b>18.9</b><br>(12.2-27.2)  |
| 7-day  | <b>4.10</b><br>(3.47-4.86)          | <b>5.05</b><br>(4.27-6.00)    | <b>6.62</b> (5.57-7.89)       | <b>7.91</b><br>(6.61-9.49)    | <b>9.70</b><br>(7.81-12.3)    | <b>11.0</b> (8.66-14.3)      | <b>12.5</b> (9.52-16.9)      | <b>14.3</b><br>(10.0-19.5)   | <b>17.4</b> (11.6-24.5)     | <b>20.1</b> (13.0-28.8)     |
| 10-day   | <b>4.79</b><br>(4.07-5.66)          | <b>5.78</b><br>(4.90-6.84)    | <b>7.40</b><br>(6.24-8.79)    | <b>8.74</b><br>(7.32-10.4)    | <b>10.6</b> (8.54-13.3)       | <b>11.9</b> (9.40-15.4)      | <b>13.4</b><br>(10.2-18.1)   | <b>15.3</b><br>(10.7-20.7)   | <b>18.3</b><br>(12.2-25.7)  | <b>21.0</b> (13.6-29.9)     |
| 20-day   | <b>6.76</b><br>(5.78-7.94)          | <b>7.86</b><br>(6.71-9.25)    | <b>9.66</b> (8.21-11.4)       | <b>11.2</b> (9.41-13.2)       | <b>13.2</b><br>(10.7-16.4)    | <b>14.8</b> (11.6-18.7)      | <b>16.4</b><br>(12.4-21.5)   | <b>18.3</b><br>(12.9-24.5)   | <b>21.0</b> (14.1-29.1)     | <b>23.3</b> (15.1-32.9)     |
| 30-day   | <b>8.32</b><br>(7.14-9.74)          | <b>9.52</b> (8.16-11.2)       | <b>11.5</b> (9.79-13.5)       | <b>13.1</b><br>(11.1-15.5)    | <b>15.3</b> (12.4-18.8)       | <b>17.0</b> (13.4-21.3)      | <b>18.8</b><br>(14.1-24.3)   | <b>20.6</b> (14.6-27.5)      | <b>23.2</b> (15.6-32.0)     | <b>25.2</b> (16.4-35.5)     |
| 45-day   | <b>10.2</b> (8.79-11.9)             | <b>11.5</b> (9.90-13.4)       | <b>13.7</b><br>(11.7-16.0)    | <b>15.4</b> (13.1-18.2)       | <b>17.9</b> (14.5-21.8)       | <b>19.8</b> (15.6-24.6)      | <b>21.7</b> (16.2-27.7)      | <b>23.5</b> (16.7-31.2)      | <b>25.9</b> (17.5-35.6)     | <b>27.6</b> (18.0-38.8)     |
| 60-day   | <b>11.7</b> (10.1-13.6)             | <b>13.1</b><br>(11.3-15.3)    | <b>15.4</b><br>(13.3-18.0)    | <b>17.3</b> (14.8-20.4)       | <b>20.0</b> (16.2-24.2)       | <b>22.1</b> (17.4-27.2)      | <b>24.0</b> (18.0-30.5)      | <b>25.9</b><br>(18.4-34.2)   | <b>28.1</b> (19.0-38.5)     | <b>29.7</b> (19.4-41.6)     |

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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# **PF** graphical







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Maps & aerials

Small scale terrain







Large scale aerial



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US Department of Commerce National Oceanic and Atmospheric Administration National Weather Service National Water Center 1325 East West Highway Silver Spring, MD 20910 Questions?: <u>HDSC.Questions@noaa.gov</u>

**Disclaimer** 

2. DRAINAGE CALCULATIONS

2.1. Pre-development analysis



# Area Listing (all nodes)

| Area    | CN | Description                             |
|---------|----|---|
| (sq-ft) |    | (subcatchment-numbers)                  |
| 8,902   | 74 | >75% Grass cover, Good, HSG C (1, 2, 3) |
| 18,468  | 98 | Paved parking & roofs, HSG C (1, 2, 3)  |
| 2,892   | 98 | Paved parking, HSG C (1, 2, 3)          |
| 30,262  | 91 | TOTAL AREA                              |
| NM18054_PRE_06                              | NH-Durham(NOAA) 2        | 4-hr S1 1-yr 1" Rainfall=1.00" |
|---|--------------------------|--------------------------------|
| Prepared by Horizons Engineering Inc.       |                          | Printed 2023-03-24             |
| HydroCAD® 10.10-7a s/n 01179 © 2021 HydroCA | D Software Solutions LLC | Page 3                         |

| Subcatchment 1: Subcatchment 1 | Runoff Area=14,023 sf 82.49% Impervious Runoff Depth=0.66"<br>Tc=6.0 min CN=WQ Runoff=0.26 cfs 767 cf         |
|--------------------------------|---|
| Subcatchment 2: Subcatchment 2 | Runoff Area=2,059 sf   47.50% Impervious   Runoff Depth=0.39"<br>Tc=6.0 min   CN=WQ   Runoff=0.02 cfs  67 cf  |
| Subcatchment 3: Subcatchment 3 | Runoff Area=14,180 sf 62.17% Impervious Runoff Depth=0.50"<br>Tc=6.0 min CN=WQ Runoff=0.19 cfs 591 cf         |
| Pond 1P: CB 2078 12.0"         | Peak Elev=50.25' Inflow=0.26 cfs 767 cf<br>Round Culvert n=0.012 L=90.0' S=0.0100 '/' Outflow=0.26 cfs 767 cf |
| Link PA-1: POA-1               | Inflow=0.28 cfs 834 cf<br>Primary=0.28 cfs 834 cf   |
| Link PA-2: POA-2               | Inflow=0.19 cfs 591 cf<br>Primary=0.19 cfs 591 cf   |

## Total Runoff Area = 30,262 sf Runoff Volume = 1,425 cfAverage Runoff Depth = 0.57"29.42% Pervious = 8,902 sf70.58% Impervious = 21,360 sf

| NM18054_PRE_06                           | NH-Durham(NOAA) 24-hr S1 2-yr Rainfall=3.30" |                             |
|--|--|-----------------------------|
| Prepared by Horizons Engineering Inc.    |  | Printed 2023-03-24          |
| HydroCAD® 10.10-7a s/n 01179 © 2021 Hydr | OCAD Software Solutions LLC                  | Page 4                      |
|  |  |                             |
| Time span=0.00-4                         | 8.00 hrs, dt=0.01 hrs, 4801 points x 2       |                             |
| Runoff by SCS II                         | R-20 method, UH=SCS, Weighted-Q              |                             |
| Reach routing by Dyn-Stor-Inc            | a method - Pond routing by Dyn-Stor          | -Ind method                 |
| Subcatchment 1: Subcatchment 1           | Runoff Area=14.023 sf 82.49% Impe            | vious Runoff Depth=2.72"    |
|  | Tc=6.0 min CN=WC                             | Runoff=0.96 cfs 3,182 cf    |
|  |  |                             |
| Subcatchment 2: Subcatchment 2           | Runoff Area=2,059 sf 47.50% Impe             | vious Runoff Depth=2.04"    |
|  | Tc=6.0 min CN=W                              | Q Runoff=0.11 cfs 349 cf    |
| Subcatchment 3: Subcatchment 3           | Runoff Area=14 180 sf 62 17% Impe            | vious Runoff Depth=2.32"    |
| Subcatchment J. Subcatchment J           | Tc=6.0 min CN=WQ                             | Runoff=0.83 cfs 2.747 cf    |
|  |  |                             |
| Pond 1P: CB 2078                         | Peak Elev=50.50                              | )' Inflow=0.96 cfs 3,182 cf |
| 12.0" Round                              | d Culvert n=0.012 L=90.0' S=0.0100 '/'       | Outflow=0.96 cfs 3,182 cf   |
|  |  |                             |
| Link PA-1: POA-1                         |  | Inflow=1.07 cfs 3,532 cf    |
|  |  | Primary=1.07 cfs 3,532 cf   |
| $I ink PA_2 POA_2$                       |  | Inflow=0.83 cfs 2.747 cf    |
|  |  | Primary=0.83 cfs 2.747 cf   |
|  |  |                             |

# Total Runoff Area = 30,262 sfRunoff Volume = 6,278 cfAverage Runoff Depth = 2.49"29.42% Pervious = 8,902 sf70.58% Impervious = 21,360 sf

| NM18054_PRE_06   | NH-Durham(NOAA) 24-hr S1 10-yr Rainfa | all=5.29" |
|--|---------------------------------------|-----------|
| Prepared by Horizons Engineering Inc.                  | Printed 202                           | 23-03-24  |
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|  |                                       | -         |

| Subcatchment 1: Subcatchment 1 | Runoff Area=14,023 sf 82.49% Impervious Runoff Depth=4.62"<br>Tc=6.0 min CN=WQ Runoff=1.52 cfs 5,402 cf           |
|--------------------------------|---|
| Subcatchment 2: Subcatchment 2 | Runoff Area=2,059 sf   47.50% Impervious   Runoff Depth=3.76"<br>Tc=6.0 min   CN=WQ   Runoff=0.19 cfs  646 cf     |
| Subcatchment 3: Subcatchment 3 | Runoff Area=14,180 sf 62.17% Impervious Runoff Depth=4.12"<br>Tc=6.0 min CN=WQ Runoff=1.40 cfs 4,873 cf           |
| Pond 1P: CB 2078<br>12.0"      | Peak Elev=50.66' Inflow=1.52 cfs 5,402 cf<br>Round Culvert n=0.012 L=90.0' S=0.0100 '/' Outflow=1.52 cfs 5,402 cf |
| Link PA-1: POA-1               | Inflow=1.71 cfs 6,048 cf<br>Primary=1.71 cfs 6,048 cf   |
| Link PA-2: POA-2               | Inflow=1.40 cfs 4,873 cf<br>Primary=1.40 cfs 4,873 cf   |

Total Runoff Area = 30,262 sf Runoff Volume = 10,921 cfAverage Runoff Depth = 4.33"29.42% Pervious = 8,902 sf70.58% Impervious = 21,360 sf

| NM18054_PRE_06                                  | NH-Durham(NOAA) 24-hr S1 25-yr Rainfall=6.53" |
|---|---|
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|   |   |

| Subcatchment 1: Subcatchment 1 | Runoff Area=14,023 sf  82.49% Impervious  Runoff Depth=5.83"<br>Tc=6.0 min  CN=WQ  Runoff=1.88 cfs  6,808 cf      |
|--------------------------------|---|
| Subcatchment 2: Subcatchment 2 | Runoff Area=2,059 sf   47.50% Impervious   Runoff Depth=4.90"<br>Tc=6.0 min   CN=WQ   Runoff=0.24 cfs  840 cf     |
| Subcatchment 3: Subcatchment 3 | Runoff Area=14,180 sf 62.17% Impervious Runoff Depth=5.29"<br>Tc=6.0 min CN=WQ Runoff=1.76 cfs 6,247 cf           |
| Pond 1P: CB 2078<br>12.0"      | Peak Elev=50.75' Inflow=1.88 cfs 6,808 cf<br>Round Culvert n=0.012 L=90.0' S=0.0100 '/' Outflow=1.88 cfs 6,808 cf |
| Link PA-1: POA-1               | Inflow=2.12 cfs 7,649 cf<br>Primary=2.12 cfs 7,649 cf   |
| Link PA-2: POA-2               | Inflow=1.76 cfs  6,247 cf<br>Primary=1.76 cfs  6,247 cf   |

Total Runoff Area = 30,262 sf Runoff Volume = 13,895 cfAverage Runoff Depth = 5.51"29.42% Pervious = 8,902 sf70.58% Impervious = 21,360 sf

| NM18054_PRE_06   | NH-Durham(NOAA) 24-hr S1 50-yr Rainfall=7.44" |
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|  |   |

| Subcatchment 1: Subcatchment 1 | Runoff Area=14,023 sf  82.49% Impervious  Runoff Depth=6.71"<br>Tc=6.0 min  CN=WQ  Runoff=2.15 cfs  7,847 cf      |
|--------------------------------|---|
| Subcatchment 2: Subcatchment 2 | Runoff Area=2,059 sf   47.50% Impervious   Runoff Depth=5.74"<br>Tc=6.0 min   CN=WQ   Runoff=0.28 cfs  986 cf     |
| Subcatchment 3: Subcatchment 3 | Runoff Area=14,180 sf 62.17% Impervious Runoff Depth=6.15"<br>Tc=6.0 min CN=WQ Runoff=2.03 cfs 7,269 cf           |
| Pond 1P: CB 2078<br>12.0"      | Peak Elev=50.83' Inflow=2.15 cfs 7,847 cf<br>Round Culvert n=0.012 L=90.0' S=0.0100 '/' Outflow=2.15 cfs 7,847 cf |
| Link PA-1: POA-1               | Inflow=2.43 cfs 8,833 cf<br>Primary=2.43 cfs 8,833 cf   |
| Link PA-2: POA-2               | Inflow=2.03 cfs  7,269 cf<br>Primary=2.03 cfs  7,269 cf   |

Total Runoff Area = 30,262 sf Runoff Volume = 16,102 cf Average Runoff Depth = 6.39"29.42% Pervious = 8,902 sf70.58% Impervious = 21,360 sf

| NM18054_PRE_06                                  | NH-Durham(NOAA) 24-hr S1 100-yr Rainfall=8.44" |
|---|--|
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| Subcatchment 1: Subcatchment 1 | Runoff Area=14,023 sf  82.49% Impervious  Runoff Depth=7.70"<br>Tc=6.0 min  CN=WQ  Runoff=2.43 cfs  8,993 cf      |
|--------------------------------|---|
| Subcatchment 2: Subcatchment 2 | Runoff Area=2,059 sf   47.50% Impervious   Runoff Depth=6.69"<br>Tc=6.0 min   CN=WQ   Runoff=0.32 cfs   1,148 cf  |
| Subcatchment 3: Subcatchment 3 | Runoff Area=14,180 sf 62.17% Impervious Runoff Depth=7.11"<br>Tc=6.0 min CN=WQ Runoff=2.32 cfs 8,402 cf           |
| Pond 1P: CB 2078<br>12.0"      | Peak Elev=50.91' Inflow=2.43 cfs 8,993 cf<br>Round Culvert n=0.012 L=90.0' S=0.0100 '/' Outflow=2.43 cfs 8,993 cf |
| Link PA-1: POA-1               | Inflow=2.75 cfs 10,141 cf<br>Primary=2.75 cfs 10,141 cf   |
| Link PA-2: POA-2               | Inflow=2.32 cfs 8,402 cf<br>Primary=2.32 cfs 8,402 cf   |

Total Runoff Area = 30,262 sf Runoff Volume = 18,543 cfAverage Runoff Depth = 7.35"29.42% Pervious = 8,902 sf70.58% Impervious = 21,360 sf

#### **Summary for Subcatchment 1: Subcatchment 1**

Runoff = 1.52 cfs @ 12.04 hrs, Volume= 5,402 cf, Depth= 4.62" Routed to Pond 1P : CB 2078

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs NH-Durham(NOAA) 24-hr S1 10-yr Rainfall=5.29"

| A     | rea (sf) | CN     | Description                   |              |               |  |
|-------|----------|--------|-------------------------------|--------------|---------------|--|
|       | 21       | 74     | >75% Grass cover, Good, HSG C |              |               |  |
|       | 2,435    | 74     | >75% Gras                     | s cover, Go  | ood, HSG C    |  |
|       | 147      | 98     | Paved park                    | ing, HSG C   | ;             |  |
|       | 11,420   | 98     | Paved park                    | ing & roofs  | , HSG C       |  |
|       | 14,023   |        | Weighted A                    | verage       |               |  |
|       | 2,456    |        | 17.51% Pervious Area          |              |               |  |
|       | 11,567   |        | 82.49% Imp                    | pervious Are | ea            |  |
|       |          |        |                               |              |               |  |
| Тс    | Length   | Slope  | e Velocity                    | Capacity     | Description   |  |
| (min) | (feet)   | (ft/ft | ) (ft/sec)                    | (cfs)        |               |  |
| 6.0   |          |        |                               |              | Direct Entry, |  |

### Subcatchment 1: Subcatchment 1



#### Summary for Subcatchment 2: Subcatchment 2

Runoff = 0.19 cfs @ 12.04 hrs, Volume= 646 cf, Depth= 3.76" Routed to Link PA-1 : POA-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs NH-Durham(NOAA) 24-hr S1 10-yr Rainfall=5.29"

| AI    | rea (sf) | CN     | Description |                   |               |  |
|-------|----------|--------|-------------|-------------------|---------------|--|
|       | 123      | 74     | >75% Gras   | s cover, Go       | ood, HSG C    |  |
|       | 958      | 74     | >75% Gras   | s cover, Go       | ood, HSG C    |  |
|       | 310      | 98     | Paved park  | ing, HSG C        | C             |  |
|       | 668      | 98     | Paved park  | ing & roofs       | s, HSG C      |  |
|       | 2,059    |        | Weighted A  | verage            |               |  |
|       | 1,081    |        | 52.50% Per  | rvious Area       | a             |  |
|       | 978      |        | 47.50% Imp  | pervious Ar       | rea           |  |
| Тс    | Length   | Slop   | a Velocity  | Canacity          | Description   |  |
| (min) | (foot)   | (ff/ff |             | Capacity<br>(cfs) | Description   |  |
|       |          | (101   |             | (015)             |               |  |
| 6.0   |          |        |             |                   | Direct Entry, |  |

#### Subcatchment 2: Subcatchment 2



#### **Summary for Subcatchment 3: Subcatchment 3**

Runoff = 1.40 cfs @ 12.04 hrs, Volume= 4,873 cf, Depth= 4.12" Routed to Link PA-2 : POA-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs NH-Durham(NOAA) 24-hr S1 10-yr Rainfall=5.29"

| A     | rea (sf) | CN     | Description |             |               |  |
|-------|----------|--------|-------------|-------------|---------------|--|
|       | 658      | 74     | >75% Gras   | s cover, Go | ood, HSG C    |  |
|       | 4,707    | 74     | >75% Gras   | s cover, Go | ood, HSG C    |  |
|       | 2,435    | 98     | Paved park  | ing, HSG C  | )             |  |
|       | 6,380    | 98     | Paved park  | ing & roofs | , HSG C       |  |
|       | 14,180   |        | Weighted A  | verage      |               |  |
|       | 5,365    |        | 37.83% Pei  | rvious Area |               |  |
|       | 8,815    |        | 62.17% Imp  | pervious Ar | ea            |  |
|       |          |        |             |             |               |  |
| Тс    | Length   | Slop   | e Velocity  | Capacity    | Description   |  |
| (min) | (feet)   | (ft/fl | :) (ft/sec) | (cfs)       |               |  |
| 6.0   |          |        |             |             | Direct Entry, |  |

#### Subcatchment 3: Subcatchment 3



## Summary for Pond 1P: CB 2078

[57] Hint: Peaked at 50.66' (Flood elevation advised)

 Inflow Area =
 14,023 sf, 82.49% Impervious, Inflow Depth = 4.62" for 10-yr event

 Inflow =
 1.52 cfs @ 12.04 hrs, Volume=
 5,402 cf

 Outflow =
 1.52 cfs @ 12.04 hrs, Volume=
 5,402 cf, Atten= 0%, Lag= 0.0 min

 Primary =
 1.52 cfs @ 12.04 hrs, Volume=
 5,402 cf, Atten= 0%, Lag= 0.0 min

 Primary =
 1.52 cfs @ 12.04 hrs, Volume=
 5,402 cf

 Routed to Link PA-1 : POA-1
 1.52 cfs
 12.04 hrs, Volume=

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2 Peak Elev= 50.66' @ 12.04 hrs

| Device | Routing | Invert | Outlet Devices  |
|--------|---------|--------|---|
| #1     | Primary | 50.00' | <b>12.0'' Round Outlet</b><br>L= 90.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 50.00' / 49.10' S= 0.0100 '/' Cc= 0.900<br>n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf |

Primary OutFlow Max=1.52 cfs @ 12.04 hrs HW=50.66' TW=0.00' (Dynamic Tailwater) **1=Outlet** (Inlet Controls 1.52 cfs @ 2.76 fps)



Pond 1P: CB 2078

## Summary for Link PA-1: POA-1

| Inflow <i>J</i> | Area = | 16,082 sf, 78.01% Impervious,   | Inflow Depth = 4.51" for 10-yr even | nt     |
|-----------------|--------|---------------------------------|-------------------------------------|--------|
| Inflow          | =      | 1.71 cfs @ 12.04 hrs, Volume=   | 6,048 cf                            |        |
| Primar          | y =    | 1.71 cfs @  12.04 hrs,  Volume= | 6,048 cf, Atten= 0%, Lag= 0         | .0 min |

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



#### Link PA-1: POA-1

## Summary for Link PA-2: POA-2

| Inflow / | Area = | 14,180 sf, 62.17% Impervious,   | Inflow Depth = 4.12" | for 10-yr event    |
|----------|--------|---------------------------------|----------------------|--------------------|
| Inflow   | =      | 1.40 cfs @ 12.04 hrs, Volume=   | 4,873 cf             |                    |
| Primar   | y =    | 1.40 cfs @  12.04 hrs,  Volume= | 4,873 cf, Atten      | = 0%, Lag= 0.0 min |

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



#### Link PA-2: POA-2

2.2. Post-development analysis



## Area Listing (all nodes)

| Area    | CN | Description                             |
|---------|----|---|
| (sq-ft) |    | (subcatchment-numbers)                  |
| 5,386   | 74 | >75% Grass cover, Good, HSG C (1, 2)    |
| 9,434   | 98 | Paved parking & roofs, HSG C (1, 2)     |
| 9,830   | 98 | Paved parking, HSG C (1, 2, 4, 7, 8, 9) |
| 5,612   | 98 | Roofs, HSG C (3)                        |
| 30,262  | 94 | TOTAL AREA                              |

| NM18054_POST_12                              | NH-Durham(NOAA) 24-hr S1 1-yr 1" Rainfall=1.00 | ״כ |
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| Subcatchment 1: Subcatchment 1 | Runoff Area=13,191 sf   70.70% Impervious   Runoff Depth=0.57"<br>Tc=6.0 min   CN=WQ   Runoff=0.21 cfs  622 cf                    |
|--------------------------------|---|
| Subcatchment 2: Subcatchment 2 | Runoff Area=2,499 sf 39.14% Impervious Runoff Depth=0.32"<br>Tc=6.0 min CN=WQ Runoff=0.02 cfs 67 cf                               |
| Subcatchment 3: Subcatchment 3 | (New Runoff Area=5,612 sf 100.00% Impervious Runoff Depth=0.79"<br>Tc=6.0 min CN=98 Runoff=0.12 cfs 370 cf                        |
| Subcatchment 4: Subcatchment 4 | Runoff Area=2,307 sf 100.00% Impervious Runoff Depth=0.79"<br>Tc=6.0 min CN=98 Runoff=0.05 cfs 152 cf                             |
| Subcatchment 7: Subcatchment 7 | Runoff Area=3,750 sf 100.00% Impervious Runoff Depth=0.79"<br>Tc=6.0 min CN=98 Runoff=0.08 cfs 247 cf                             |
| Subcatchment 8: Subcatchment 8 | Runoff Area=2,572 sf 100.00% Impervious Runoff Depth=0.79"<br>Tc=6.0 min CN=98 Runoff=0.06 cfs 170 cf                             |
| Subcatchment 9: Subcatchment 9 | Runoff Area=331 sf 100.00% Impervious Runoff Depth=0.79"<br>Tc=6.0 min CN=98 Runoff=0.01 cfs 22 cf                                |
| Pond 1P: Permeable pavers      | Peak Elev=49.98' Storage=125 cf Inflow=0.17 cfs 522 cf<br>Discarded=0.02 cfs 522 cf Primary=0.00 cfs 0 cf Outflow=0.02 cfs 522 cf |
| Pond 2P: PR. CB-2<br>12        | Peak Elev=48.26' Storage=16 cf Inflow=0.08 cfs 247 cf<br>.0" Round Culvert n=0.013 L=44.0' S=0.0068 '/' Outflow=0.08 cfs 233 cf   |
| Pond E1: EX. CB-2008           | Peak Elev=47.71' Storage=9 cf Inflow=0.15 cfs 418 cf<br>.0" Round Culvert n=0.025 L=22.4' S=0.0223 '/' Outflow=0.15 cfs 412 cf    |
| Pond E2: EX. CB-2293           | Peak Elev=47.75' Storage=9 cf Inflow=0.06 cfs 170 cf<br>.0" Round Culvert n=0.025 L=22.4' S=0.0223 '/' Outflow=0.06 cfs 163 cf    |
| Pond E3: CB 2078               | Peak Elev=50.22' Inflow=0.21 cfs 622 cf<br>.0" Round Culvert n=0.012 L=90.0' S=0.0100 '/' Outflow=0.21 cfs 622 cf                 |
| Link PA-1: POA-1               | Inflow=0.23 cfs  690 cf<br>Primary=0.23 cfs  690 cf   |
| Link PA-2: POA-2               | Inflow=0.15 cfs 412 cf<br>Primary=0.15 cfs 412 cf   |
| Total Punoff Area -            | 20.262 cf. Bunoff Volume = 1.650 cf. Average Bunoff Depth = 0.65"   |

Total Runoff Area = 30,262 sf Runoff Volume = 1,650 cf Average Runoff Depth = 0.65" 17.80% Pervious = 5,386 sf 82.20% Impervious = 24,876 sf

| NM18054_POST_12                                 | NH-Durham(NOAA) 24-hr S1 2-yr Rainfall=3.30" |
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| Subcatchment 1: Subcatchmer      | nt 1          | Runoff Area=13,191 sf 70.70% Impervious Runoff Depth=2.49"<br>Tc=6.0 min CN=WQ Runoff=0.83 cfs 2,739 cf                    |
|----------------------------------|---------------|--|
| Subcatchment 2: Subcatchmer      | nt 2          | Runoff Area=2,499 sf 39.14% Impervious Runoff Depth=1.87"<br>Tc=6.0 min CN=WQ Runoff=0.12 cfs 390 cf                       |
| Subcatchment 3: Subcatchmer      | nt 3 (New     | Runoff Area=5,612 sf 100.00% Impervious Runoff Depth=3.07"<br>Tc=6.0 min CN=98 Runoff=0.43 cfs 1,434 cf                    |
| Subcatchment 4: Subcatchmer      | nt 4          | Runoff Area=2,307 sf 100.00% Impervious Runoff Depth=3.07"<br>Tc=6.0 min CN=98 Runoff=0.18 cfs 590 cf                      |
| Subcatchment 7: Subcatchmer      | nt 7          | Runoff Area=3,750 sf 100.00% Impervious Runoff Depth=3.07"<br>Tc=6.0 min CN=98 Runoff=0.29 cfs 958 cf                      |
| Subcatchment 8: Subcatchmer      | nt 8          | Runoff Area=2,572 sf 100.00% Impervious Runoff Depth=3.07"<br>Tc=6.0 min CN=98 Runoff=0.20 cfs 657 cf                      |
| Subcatchment 9: Subcatchmer      | nt 9          | Runoff Area=331 sf 100.00% Impervious Runoff Depth=3.07"<br>Tc=6.0 min CN=98 Runoff=0.03 cfs 85 cf                         |
| Pond 1P: Permeable pavers<br>Dis | carded=0.02 ( | Peak Elev=50.53' Storage=603 cf Inflow=0.61 cfs 2,024 cf<br>cfs 1,618 cf Primary=0.09 cfs 406 cf Outflow=0.11 cfs 2,024 cf |
| Pond 2P: PR. CB-2                | 12.0" Roun    | Peak Elev=48.39' Storage=18 cf Inflow=0.29 cfs 958 cf<br>nd Culvert n=0.013 L=44.0' S=0.0068 '/' Outflow=0.29 cfs 945 cf   |
| Pond E1: EX. CB-2008             | 12.0" Round   | Peak Elev=47.90' Storage=11 cf Inflow=0.51 cfs 2,086 cf<br>Culvert n=0.025 L=22.4' S=0.0223 '/' Outflow=0.51 cfs 2,080 cf  |
| Pond E2: EX. CB-2293             | 12.0" Roun    | Peak Elev=47.96' Storage=12 cf Inflow=0.20 cfs 657 cf<br>nd Culvert n=0.025 L=22.4' S=0.0223 '/' Outflow=0.20 cfs 651 cf   |
| Pond E3: CB 2078                 | 12.0" Round   | Peak Elev=50.46' Inflow=0.83 cfs 2,739 cf<br>Culvert n=0.012 L=90.0' S=0.0100 '/' Outflow=0.83 cfs 2,739 cf                |
| Link PA-1: POA-1                 |               | Inflow=0.95 cfs_3,129 cf<br>Primary=0.95 cfs_3,129 cf  |
| Link PA-2: POA-2                 |               | Inflow=0.51 cfs_2,080 cf<br>Primary=0.51 cfs_2,080 cf  |
| Total Runoff Ar                  |               | sf Runoff Volume = 6 854 cf Average Runoff Donth = 2 72"   |

Total Runoff Area = 30,262 sf Runoff Volume = 6,854 cf Average Runoff Depth = 2.72" 17.80% Pervious = 5,386 sf 82.20% Impervious = 24,876 sf

| NM18054_POST_12                                | NH-Durham(NOAA) 24-hr S1 10-yr Rainfall=5.29" |
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| Subcatchment 1: Subcatchme         | nt 1          | Runoff Area=13,191 sf   70.70% Imper<br>Tc=6.0 min   CN=WQ            | vious Runoff Depth=4.33"<br>Runoff=1.36 cfs 4,763 cf     |
|------------------------------------|---------------|---|--|
| Subcatchment 2: Subcatchme         | nt 2          | Runoff Area=2,499 sf 39.14% Imper<br>Tc=6.0 min CN=W                  | rvious Runoff Depth=3.56"<br>/Q Runoff=0.22 cfs 741 cf   |
| Subcatchment 3: Subcatchme         | nt 3 (New     | Runoff Area=5,612 sf 100.00% Imper<br>Tc=6.0 min CN=98                | vious Runoff Depth=5.05"<br>Runoff=0.66 cfs 2,363 cf     |
| Subcatchment 4: Subcatchme         | nt 4          | Runoff Area=2,307 sf 100.00% Imper<br>Tc=6.0 min CN=                  | rvious Runoff Depth=5.05"<br>98 Runoff=0.27 cfs 971 cf   |
| Subcatchment 7: Subcatchme         | nt 7          | Runoff Area=3,750 sf 100.00% Imper<br>Tc=6.0 min CN=98                | rvious Runoff Depth=5.05"<br>Runoff=0.44 cfs 1,579 cf    |
| Subcatchment 8: Subcatchme         | nt 8          | Runoff Area=2,572 sf 100.00% Imper<br>Tc=6.0 min CN=98                | rvious Runoff Depth=5.05"<br>Runoff=0.30 cfs 1,083 cf    |
| Subcatchment 9: Subcatchme         | nt 9          | Runoff Area=331 sf 100.00% Imper<br>Tc=6.0 min CN=                    | rvious Runoff Depth=5.05"<br>98 Runoff=0.04 cfs 139 cf   |
| Pond 1P: Permeable pavers<br>Disca | arded=0.02 cf | Peak Elev=50.92' Storage=935 c<br>1,976 cf Primary=0.27 cfs 1,359 cf  | f Inflow=0.93 cfs 3,334 cf<br>Outflow=0.29 cfs 3,334 cf  |
| Pond 2P: PR. CB-2                  | 12.0" Round   | Peak Elev=48.47' Storage=18 c<br>Culvert n=0.013 L=44.0' S=0.0068 '/' | f Inflow=0.44 cfs 1,579 cf<br>Outflow=0.44 cfs 1,565 cf  |
| Pond E1: EX. CB-2008               | 12.0" Round   | Peak Elev=48.07' Storage=13 c<br>Culvert n=0.025 L=22.4' S=0.0223 '/' | f Inflow=0.99 cfs 4,140 cf<br>Outflow=0.98 cfs 4,134 cf  |
| Pond E2: EX. CB-2293               | 12.0" Round   | Peak Elev=48.12' Storage=14 c<br>Culvert n=0.025 L=22.4' S=0.0223 '/' | f Inflow=0.30 cfs 1,083 cf<br>Outflow=0.30 cfs 1,077 cf  |
| Pond E3: CB 2078                   | 12.0" Round   | Peak Elev=50.62<br>// Culvert n=0.012 L=90.0' S=0.0100                | 2' Inflow=1.36 cfs 4,763 cf<br>Outflow=1.36 cfs 4,763 cf |
| Link PA-1: POA-1                   |               |   | Inflow=1.58 cfs 5,505 cf<br>Primary=1.58 cfs 5,505 cf    |
| Link PA-2: POA-2                   |               |   | Inflow=0.98 cfs 4,134 cf<br>Primary=0.98 cfs 4,134 cf    |
| Total Runoff Are                   | a = 30,262 st | Runoff Volume = 11,640 cf Avera<br>7.80% Pervious = 5,386 sf  82.20   | age Runoff Depth = 4.62''<br>% Impervious = 24,876 sf    |

| NM18054_POST_12                                | NH-Durham(NOAA) 24-hr S1 25-yr Rainfall=6.53" |
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| Subcatchment 1: Subcatchme        | nt 1           | Runoff Area=13,19<br>T             | 91 sf 70.70%<br>c=6.0 min C    | lmpervious<br>N=WQ Runγ         | Runoff Dept<br>off=1.69 cfs   | h=5.51"<br>6,060 cf  |
|-----------------------------------|----------------|------------------------------------|--------------------------------|---------------------------------|-------------------------------|----------------------|
| Subcatchment 2: Subcatchme        | nt 2           | Runoff Area=2,4                    | 99 sf 39.14%<br>Tc=6.0 min     | lmpervious<br>CN=WQ Rι          | Runoff Dept<br>unoff=0.28 cfs | h=4.67''<br>974 cf   |
| Subcatchment 3: Subcatchme        | nt 3 (New      | Runoff Area=5,61                   | 2 sf 100.00%<br>Tc=6.0 min     | 6 Impervious<br>CN=98 Run       | Runoff Dept                   | h=6.29''<br>2,942 cf |
| Subcatchment 4: Subcatchme        | nt 4           | Runoff Area=2,30                   | 7 sf 100.00%<br>Tc=6.0 min     | 6 Impervious<br>CN=98 Run       | Runoff Dept<br>off=0.33 cfs   | h=6.29''<br>1,210 cf |
| Subcatchment 7: Subcatchme        | nt 7           | Runoff Area=3,75                   | 0 sf 100.00%<br>Tc=6.0 min     | 6 Impervious<br>CN=98 Run       | Runoff Dept<br>off=0.53 cfs   | h=6.29''<br>1,966 cf |
| Subcatchment 8: Subcatchme        | nt 8           | Runoff Area=2,57                   | 2 sf 100.00%<br>Tc=6.0 min     | 6 Impervious<br>CN=98 Run       | Runoff Dept<br>off=0.37 cfs   | h=6.29''<br>1,348 cf |
| Subcatchment 9: Subcatchme        | nt 9           | Runoff Area=33                     | 1 sf 100.00%<br>Tc=6.0 min     | 6 Impervious<br>1 CN=98 Rt      | Runoff Dept<br>unoff=0.05 cfs | h=6.29"<br>3 174 cf  |
| Pond 1P: Permeable pavers<br>Disc | arded=0.02 cf  | Peak Elev=51.<br>s 2,065 cf Primar | 11' Storage=<br>y=0.33 cfs  2, | 1,098 cf Infl<br>086 cf Outfl   | ow=1.13 cfs<br>ow=0.35 cfs    | 4,152 cf<br>4,152 cf |
| Pond 2P: PR. CB-2                 | 12.0" Round    | Peak Elev=<br>Culvert_n=0.013_L    | 48.52' Storaç<br>.=44.0' S=0.0 | ge=19 cf Infl<br>)068 '/' Outfl | ow=0.53 cfs<br>ow=0.53 cfs    | 1,966 cf<br>1,952 cf |
| Pond E1: EX. CB-2008              | 12.0" Round    | Peak Elev=<br>Culvert_n=0.025_L    | 48.15' Storaç<br>.=22.4' S=0.0 | ge=14 cf Infl<br>)223 '/' Outfl | ow=1.21 cfs<br>ow=1.21 cfs    | 5,554 cf<br>5,548 cf |
| Pond E2: EX. CB-2293              | 12.0" Round    | Peak Elev=<br>Culvert_n=0.025_L    | 48.19' Storaç<br>.=22.4' S=0.0 | ge=15 cf Infl<br>)223 '/' Outfl | ow=0.37 cfs<br>ow=0.36 cfs    | 1,348 cf<br>1,342 cf |
| Pond E3: CB 2078                  | 12.0" Round    | Culvert n=0.012 L                  | Peak Ele<br>90.0' S=0.0.       | v=50.71' Infl<br>)100 '/' Outfl | ow=1.69 cfs<br>ow=1.69 cfs    | 6,060 cf<br>6,060 cf |
| Link PA-1: POA-1                  |                |                                    |                                | Infl<br>Prima                   | ow=1.98 cfs<br>ary=1.98 cfs   | 7,034 cf<br>7,034 cf |
| Link PA-2: POA-2                  |                |                                    |                                | Infl<br>Prima                   | ow=1.21 cfs<br>ary=1.21 cfs   | 5,548 cf<br>5,548 cf |
| Total Runoff Are                  | ea = 30,262 st | Runoff Volume<br>17.80% Pervious   | = 14,674 cf<br>= 5,386 sf      | Average R<br>82.20% Imp         | unoff Depth<br>pervious = 24  | = 5.82''<br>4,876 sf |

| NM18054_POST_12                                | NH-Durham(NOAA) 24-hr S1 50-yr Rainfall=7.44" |
|--|---|
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| Subcatchment 1: Subcatchme        | nt 1          | Runoff Area           | a=13,191 s<br>Tc=6.     | f 70.70<br>.0 min   | % Imperv<br>CN=WQ      | vious F<br>Runof  | Runoff De <sub>l</sub><br>f=1.95 cfs | oth=6.39"<br>7,022 cf  |
|-----------------------------------|---------------|-----------------------|-------------------------|---------------------|------------------------|-------------------|--------------------------------------|------------------------|
| Subcatchment 2: Subcatchme        | nt 2          | Runoff Are            | ea=2,499 s<br>Tc=6.     | f 39.14<br>.0 min   | % Imperv<br>CN=WQ      | /ious F<br>Runof  | Runoff De <sub>l</sub><br>f=0.33 cfs | oth=5.51"<br>1,148 cf  |
| Subcatchment 3: Subcatchme        | nt 3 (New     | Runoff Area           | a=5,612 sf<br>Tc=       | 100.00<br>6.0 min   | 0% Imperv<br>CN=98     | vious F<br>Runof  | Runoff De <sub>l</sub><br>f=0.91 cfs | oth=7.20"<br>3,367 cf  |
| Subcatchment 4: Subcatchme        | nt 4          | Runoff Area           | a=2,307 sf<br>Tc=       | 100.00<br>6.0 min   | 0% Imperv<br>CN=98     | vious F<br>Runof  | Runoff De<br>f=0.37 cfs              | oth=7.20"<br>1,384 cf  |
| Subcatchment 7: Subcatchme        | nt 7          | Runoff Area           | a=3,750 sf<br>Tc=       | 100.00<br>6.0 min   | 0% Imperv<br>CN=98     | vious F<br>Runof  | Runoff De<br>f=0.61 cfs              | oth=7.20"<br>2,250 cf  |
| Subcatchment 8: Subcatchme        | nt 8          | Runoff Area           | a=2,572 sf<br>Tc=       | 100.00<br>6.0 min   | 0% Imperv<br>CN=98     | vious F<br>Runof  | Runoff De<br>f=0.42 cfs              | oth=7.20"<br>1,543 cf  |
| Subcatchment 9: Subcatchme        | nt 9          | Runoff Ar             | rea=331 sf<br>To        | 100.00<br>c=6.0 m   | % Imperv<br>in CN=98   | vious F<br>8 Run  | Runoff De<br>off=0.05 c              | oth=7.20"<br>fs 199 cf |
| Pond 1P: Permeable pavers<br>Disc | arded=0.02 cf | Peak El<br>s 2,100 cf | ev=51.23'<br>Primary=0. | Storage<br>36 cfs 2 | =1,198 cf<br>2,651 cf  | Inflow<br>Outflow | /=1.28 cfs<br>/=0.38 cfs             | 4,752 cf<br>4,752 cf   |
| Pond 2P: PR. CB-2                 | 12.0" Round   | Peak<br>Culvert n=0   | Elev=48.5<br>.013 L=44  | 5' Stora<br>.0' S=0 | age=20 cf<br>.0068 '/' | Inflow<br>Outflow | v=0.61 cfs<br>v=0.60 cfs             | 2,250 cf<br>2,236 cf   |
| Pond E1: EX. CB-2008              | 12.0" Round   | Peak<br>Culvert n=0   | Elev=48.1               | 9' Stora<br>.4' S=0 | age=15 cf<br>.0223 '/' | Inflow<br>Outflow | v=1.36 cfs<br>v=1.36 cfs             | 6,623 cf<br>6,617 cf   |
| Pond E2: EX. CB-2293              | 12.0" Round   | Peak<br>Culvert n=0   | Elev=48.2<br>.025 L=22  | 4' Stora<br>.4' S=0 | age=16 cf<br>.0223 '/' | Inflow<br>Outflow | /=0.42 cfs<br>/=0.41 cfs             | 1,543 cf<br>1,537 cf   |
| Pond E3: CB 2078                  | 12.0" Round   | Culvert n=0           | l<br>.012 L=90          | Peak El<br>.0' S=0  | ev=50.77'<br>.0100 '/' | Inflow<br>Outflow | /=1.95 cfs<br>/=1.95 cfs             | 7,022 cf<br>7,022 cf   |
| Link PA-1: POA-1                  |               |                       |                         |                     |                        | Inflow<br>Primary | /=2.28 cfs<br>/=2.28 cfs             | 8,170 cf<br>8,170 cf   |
| Link PA-2: POA-2                  |               |                       |                         |                     |                        | Inflow<br>Primary | v=1.36 cfs<br>v=1.36 cfs             | 6,617 cf<br>6,617 cf   |
| Total Runoff Are                  | a = 30,262 si | Runoff V              | olume = 1               | 6.914 c             | f Avera                | qe Rur            | noff Dept                            | h = 6.71''             |

30,262 sf Runoff Volume = 16,914 cf Average Runoff Depth = 6.71" 17.80% Pervious = 5,386 sf 82.20% Impervious = 24,876 sf

| NM18054_POST_12                              | NH-Durham(NOAA) 24-hr S1 100-yr Rainfall=8.44 | 4" |
|--|---|----|
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| Subcatchment 1: Subcatchme        | nt 1          | Runoff Area            | a=13,191 si<br>Tc=6.        | f 70.70<br>0 min     | % Imperv<br>CN=WQ      | rious F<br>Runof  | Runoff De<br>f=2.21 cfs  | pth=7.36"<br>\$ 8,087 cf     |
|-----------------------------------|---------------|------------------------|-----------------------------|----------------------|------------------------|-------------------|--------------------------|------------------------------|
| Subcatchment 2: Subcatchme        | nt 2          | Runoff Are             | ea=2,499 st<br>Tc=6.        | f 39.14<br>0 min     | % Imperv<br>CN=WQ      | rious F<br>Runof  | Runoff De<br>f=0.38 cfs  | pth=6.45"<br>3 1,343 cf      |
| Subcatchment 3: Subcatchme        | nt 3 (New     | Runoff Area            | a=5,612 sf<br>Tc=0          | 100.00<br>6.0 min    | % Imperv<br>CN=98      | rious F<br>Runof  | Runoff De<br>f=1.02 cfs  | pth=8.20"<br>3,835 cf        |
| Subcatchment 4: Subcatchme        | nt 4          | Runoff Area            | a=2,307 sf<br>Tc=0          | 100.00<br>6.0 min    | % Imperv<br>CN=98      | rious F<br>Runof  | Runoff De<br>f=0.42 cfs  | pth=8.20"<br>3 1,576 cf      |
| Subcatchment 7: Subcatchme        | nt 7          | Runoff Area            | a=3,750 sf<br>Tc=6          | 100.00<br>6.0 min    | % Imperv<br>CN=98      | rious F<br>Runof  | Runoff De<br>f=0.68 cfs  | pth=8.20"<br>\$ 2,562 cf     |
| Subcatchment 8: Subcatchme        | nt 8          | Runoff Area            | a=2,572 sf<br>Tc=(          | 100.00<br>6.0 min    | % Imperv<br>CN=98      | vious F<br>Runof  | Runoff De<br>f=0.47 cfs  | pth=8.20"<br>\$  1,758 cf    |
| Subcatchment 9: Subcatchme        | nt 9          | Runoff Ar              | ea=331 sf<br>To             | 100.00<br>=6.0 mi    | % Imperv<br>n CN=98    | rious F<br>8 Run  | Runoff De<br>off=0.06 c  | pth=8.20"<br>sfs_226 cf      |
| Pond 1P: Permeable pavers<br>Disc | arded=0.02 cf | Peak Ele<br>s 2,125 cf | ev=51.35' \$<br>Primary=0.3 | Storage<br>39 cfs 3  | =1,305 cf<br>3,286 cf  | Inflov<br>Outflov | /=1.44 cfs<br>/=0.41 cfs | 5,411 cf<br>5,411 cf         |
| Pond 2P: PR. CB-2                 | 12.0" Round   | Peak<br>Culvert n=0    | Elev=48.5<br>.013 L=44.     | 9' Stora<br>.0' S=0. | age=20 cf<br>.0068 '/' | Inflov<br>Outflov | v=0.68 cfs<br>v=0.68 cfs | ; 2,562 cf<br>; 2,549 cf     |
| Pond E1: EX. CB-2008              | 12.0" Round   | Peak<br>Culvert n=0    | Elev=48.2<br>.025 L=22.     | 4' Stora<br>.4' S=0. | age=16 cf<br>.0223 '/' | Inflov<br>Outflov | v=1.51 cfs<br>v=1.51 cfs | 7,812 cf<br>7,806 cf         |
| Pond E2: EX. CB-2293              | 12.0" Round   | Peak<br>Culvert n=0    | Elev=48.2<br>.025 L=22.     | 9' Stora<br>.4' S=0. | age=16 cf<br>.0223 '/' | Inflov<br>Outflov | /=0.47 cfs<br>/=0.46 cfs | 5 1,758 cf<br>5 1,751 cf     |
| Pond E3: CB 2078                  | 12.0" Round   | Culvert n=0            | F<br>.012 L=90.             | Peak Ele<br>.0' S=0. | ev=50.84'<br>.0100 '/' | Inflov<br>Outflov | /=2.21 cfs<br>/=2.21 cfs | 8,087 cf<br>8,087 cf         |
| Link PA-1: POA-1                  |               |                        |                             |                      |                        | Inflov<br>Primar  | /=2.60 cfs<br>/=2.60 cfs | \$  9,429 cf<br>\$  9,429 cf |
| Link PA-2: POA-2                  |               |                        |                             |                      |                        | Inflov<br>Primar  | v=1.51 cfs<br>v=1.51 cfs | 37,806 cf<br>37,806 cf       |
| Total Runoff Are                  | a = 30,262 st | Runoff V               | olume = 19                  | 9 387 c              | f Avera                | ae Rur            | off Dent                 | h = 7.69"                    |

off Area = 30,262 sf Runoff Volume = 19,387 ct Average Runoff Upptn = ۲.80% Pervious = 5,386 sf 82.20% Impervious = 24,876 sf

## Summary for Subcatchment 1: Subcatchment 1

| Runoff | =         | 1.36 cfs @  | 12.04 hrs, | Volume= | 4,763 cf, | Depth= | 4.33' |
|--------|-----------|-------------|------------|---------|-----------|--------|-------|
| Routed | l to Pond | E3 : CB 207 | 8          |         |           |        |       |

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs NH-Durham(NOAA) 24-hr S1 10-yr Rainfall=5.29"

| AI           | rea (sf) | CN                   | Description |                              |               |  |  |  |  |
|--------------|----------|----------------------|-------------|------------------------------|---------------|--|--|--|--|
|              | 21       | 74                   | >75% Gras   | s cover, Go                  | ood, HSG C    |  |  |  |  |
|              | 3,844    | 74                   | >75% Gras   | s cover, Go                  | ood, HSG C    |  |  |  |  |
|              | 560      | 98                   | Paved park  | ing, HSG C                   | )             |  |  |  |  |
|              | 8,766    | 98                   | Paved park  | Paved parking & roofs, HSG C |               |  |  |  |  |
|              | 13,191   |                      | Weighted A  | verage                       |               |  |  |  |  |
|              | 3,865    | 29.30% Pervious Area |             |                              |               |  |  |  |  |
|              | 9,326    |                      | 70.70% Imp  | pervious Ar                  | ea            |  |  |  |  |
|              |          |                      |             |                              |               |  |  |  |  |
| Tc           | Length   | Slop                 | e Velocity  | Capacity                     | Description   |  |  |  |  |
| <u>(min)</u> | (feet)   | (ft/fl               | :) (ft/sec) | (cfs)                        |               |  |  |  |  |
| 6.0          |          |                      |             |                              | Direct Entry, |  |  |  |  |

#### Subcatchment 1: Subcatchment 1



#### Summary for Subcatchment 2: Subcatchment 2

Runoff = 0.22 cfs @ 12.04 hrs, Volume= 741 cf, Depth= 3.56" Routed to Link PA-1 : POA-1

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs NH-Durham(NOAA) 24-hr S1 10-yr Rainfall=5.29"

| A            | rea (sf) | CN                         | Description |                              |               |  |  |  |  |
|--------------|----------|----------------------------|-------------|------------------------------|---------------|--|--|--|--|
|              | 123      | 74                         | >75% Gras   | s cover, Go                  | ood, HSG C    |  |  |  |  |
|              | 1,398    | 74                         | >75% Gras   | s cover, Go                  | ood, HSG C    |  |  |  |  |
|              | 310      | 98                         | Paved park  | ing, HSG C                   | )             |  |  |  |  |
|              | 668      | 98                         | Paved park  | Paved parking & roofs, HSG C |               |  |  |  |  |
|              | 2,499    |                            | Weighted A  | verage                       |               |  |  |  |  |
|              | 1,521    | 1,521 60.86% Pervious Area |             |                              |               |  |  |  |  |
|              | 978      |                            | 39.14% Imp  | pervious Ar                  | ea            |  |  |  |  |
|              |          |                            |             |                              |               |  |  |  |  |
| Тс           | Length   | Slop                       | e Velocity  | Capacity                     | Description   |  |  |  |  |
| <u>(min)</u> | (feet)   | (ft/f                      | :) (ft/sec) | (cfs)                        |               |  |  |  |  |
| 6.0          |          |                            |             |                              | Direct Entry, |  |  |  |  |

#### Subcatchment 2: Subcatchment 2



Hydrograph

#### Summary for Subcatchment 3: Subcatchment 3 (New Bldg)

Runoff = 0.66 cfs @ 12.04 hrs, Volume= Routed to Pond 1P : Permeable pavers 2,363 cf, Depth= 5.05"



#### **Summary for Subcatchment 4: Subcatchment 4**

971 cf, Depth= 5.05"

Runoff = 0.27 cfs @ 12.04 hrs, Volume= Routed to Pond 1P : Permeable pavers



## Summary for Subcatchment 7: Subcatchment 7

Runoff = 0.44 cfs @ 12.04 hrs, Volume= Routed to Pond 2P : PR. CB-2

1,579 cf, Depth= 5.05"

| A                        | rea (sf)         | CN D             | escription           |                   |            |       |       |       |        |       |       |       |     |          |
|--------------------------|------------------|------------------|----------------------|-------------------|------------|-------|-------|-------|--------|-------|-------|-------|-----|----------|
|                          | 3,750            | 98 P             | aved park            | ing, HSG C        | )          |       |       |       |        |       |       |       |     |          |
|                          | 3,750            | 1                | 00.00% In            | npervious A       | \rea       |       |       |       |        |       |       |       |     |          |
| Tc<br>(min)              | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Descript   | ion   |       |       |        |       |       |       |     |          |
| 6.0                      |                  |                  |                      |                   | Direct E   | ntry, |       |       |        |       |       |       |     |          |
|                          |                  |                  | Sul                  | ocatchme<br>Hydro | ent 7: Su  | bcat  | chme  | ent 7 | ,      |       |       |       |     |          |
|                          |                  |                  |                      |                   |            |       |       |       |        |       |       |       |     |          |
| 0.48                     |                  |                  |                      |                   |            |       |       |       |        |       |       |       |     | 📘 Runoff |
| 0.46                     | $\downarrow$     | 0.44 cf          | s                    |                   |            |       |       |       |        |       |       | —     | +-1 |          |
| 0.44-                    |                  |                  |                      |                   | - N        | lΗ-Dι | irham | n(NO/ | AA) 2  | 24-hı | - S1  | 10-   | yr  |          |
| 0.42                     |                  |                  |                      |                   |            |       |       |       | F      | Rain  | fall= | =5.2  | 9'' |          |
| 0.4                      |                  |                  |                      |                   |            |       |       | Ru    | noff / | Area  | =3 '  | 750   | sf  |          |
| 0.36-                    |                  |                  |                      |                   |            |       |       |       | fVal   |       | -4    | E 70  | J.  |          |
| 0.34-                    |                  |                  |                      |                   |            |       | П     | unor  |        | ume   | - 1,: | 5/9   |     |          |
| 0.32                     |                  |                  |                      |                   |            |       |       | Rı    | unoff  | Dep   | əth=  | -5.0  | 5'' |          |
| 0.3-                     |                  |                  |                      |                   |            |       |       |       |        | Т     | :=6.  | .0 m  | in  |          |
| <u>ຮ</u> 0.28<br>ວັດ 26- |                  |                  |                      |                   |            |       |       |       |        |       | C     | CN=   | 98  |          |
| ≥ 0.20                   |                  |                  |                      |                   |            |       |       |       |        |       |       |       |     |          |
| <u>6</u> 0.22            |                  |                  |                      |                   |            |       |       |       |        |       |       |       |     |          |
| 0.2                      | $\downarrow$     |                  |                      |                   |            |       |       |       |        |       |       |       |     |          |
| 0.18-                    | 1/+++            |                  |                      |                   |            |       |       |       |        |       |       |       |     |          |
| 0.16                     |                  |                  |                      |                   |            |       |       |       |        |       |       |       |     |          |
| 0.14                     |                  |                  |                      |                   |            |       |       |       |        |       |       |       |     |          |
| 0.1-                     |                  |                  |                      |                   |            |       |       |       |        |       |       |       |     |          |
| 0.08                     |                  |                  |                      |                   |            |       |       |       |        |       |       |       |     |          |
| 0.06                     | ¥/+++            |                  |                      |                   |            |       |       |       |        |       |       |       |     |          |
| 0.04-                    | Ĭ /              |                  | Umm                  | minin             |            |       |       |       |        | _     |       |       |     |          |
| 0.02                     |                  |                  |                      |                   |            |       | ///// |       |        | 1//// |       | 7//// |     |          |
| 0-                       | 0 2 4 6          | 8 10 12          | 14 16 18 2           | 0 22 24 26 2      | 8 30 32 34 | 36 38 | 40 42 | 44 46 | 48 50  | 52    | 54 56 | 6 58  | 60  |          |
|                          | •                |                  |                      | Tin               | ne (hours) |       |       |       |        |       |       | .,    |     |          |

#### **Summary for Subcatchment 8: Subcatchment 8**

Runoff = 0.30 cfs @ 12.04 hrs, Volume= Routed to Pond E2 : EX. CB-2293 1,083 cf, Depth= 5.05"

| Area (sf)                      | CN Description                     |                   |                 |                   |             |           |        |  |  |
|--------------------------------|------------------------------------|-------------------|-----------------|-------------------|-------------|-----------|--------|--|--|
| 2,572                          | 98 Paved park                      | ing, HSG C        | ;               |                   |             |           |        |  |  |
| 2,572                          | 100.00% In                         | npervious A       | rea             |                   |             |           |        |  |  |
| Tc Length<br>(min) (feet)      | Slope Velocity<br>(ft/ft) (ft/sec) | Capacity<br>(cfs) | Description     |                   |             |           |        |  |  |
| 6.0                            |                                    |                   | Direct Entr     | у,                |             |           |        |  |  |
| Subcatchment 8: Subcatchment 8 |                                    |                   |                 |                   |             |           |        |  |  |
|                                |                                    | Hydro             | graph           |                   |             |           |        |  |  |
| 0.22                           |                                    |                   |                 |                   |             |           | Runoff |  |  |
| 0.32                           | 0.30 cfs                           |                   | NH-             | Durham(NO         | AA) 24-hr S | S1 10-vr  |        |  |  |
| 0.28                           |                                    |                   |                 |                   | Rainfa      | II=5.29'' |        |  |  |
| 0.26                           |                                    |                   |                 | Ru                | noff Area=  | 2,572 sf  |        |  |  |
| 0.24                           |                                    |                   |                 | Runof             | ff Volume=  | 1,083 cf  |        |  |  |
| 0.22                           |                                    |                   |                 | R                 | unoff Dept  | h=5.05"   |        |  |  |
| <u>ج</u> و 0.2                 |                                    |                   |                 |                   | T¢=         | 6.0 min   |        |  |  |
| 5 0.18                         |                                    |                   |                 |                   |             | CN=98     |        |  |  |
|                                |                                    |                   |                 |                   |             |           |        |  |  |
| 0.14                           |                                    |                   |                 |                   |             |           |        |  |  |
| 0.12                           |                                    |                   |                 |                   |             |           |        |  |  |
| 0.08                           |                                    |                   |                 |                   |             |           |        |  |  |
| 0.06                           |                                    |                   |                 |                   |             |           |        |  |  |
| 0.04                           |                                    |                   |                 |                   |             |           |        |  |  |
| 0.02                           |                                    |                   |                 |                   |             |           |        |  |  |
|                                | 8 10 12 14 16 18 2                 | 0 22 24 26 2      | 8 30 32 34 36 3 | 38 40 42 44 46    | 18 50 52 54 | 56 58 60  |        |  |  |
| 0240                           | 5 10 12 14 10 10 2                 | Tim               | ne (hours)      | 00 -10 -12 -14 40 |             | 00 00 00  |        |  |  |

#### **Summary for Subcatchment 9: Subcatchment 9**

Runoff = 0.04 cfs @ 12.04 hrs, Volume= Routed to Pond E1 : EX. CB-2008 139 cf, Depth= 5.05"



## Summary for Pond 1P: Permeable pavers

Applied discharge multiplier of 0,8 to account for horizontal infiltration area loss due to geomembrane. Some infiltration under geomembrane that may occur due to geotextile underlaying, which will allow some in-plane water movement below the membrane. Ignoring this addiitonal infiltration was ignored to be conservative as geotextile will not be selected for in-plane transmissivity.

| Inflow Are<br>Inflow<br>Outflow<br>Discarded<br>Primary<br>Routed | ea = 0<br>= 0<br>d = 0<br>= 0<br>d to Pond E | 7,919 sf,100<br>).93 cfs @ 12<br>).29 cfs @ 12<br>).02 cfs @ 6<br>).27 cfs @ 12<br>E1 : EX. CB-20 | 0.00% Imperviou<br>2.04 hrs, Volume<br>2.20 hrs, Volume<br>5.44 hrs, Volume<br>2.20 hrs, Volume<br>08  | s, Inflow Dep<br>= 3,3<br>= 3,3<br>= 1,5<br>= 1,3 | th = 5.05"<br>334 cf<br>334 cf, Atten<br>376 cf<br>359 cf | for 10-yr e<br>= 68%, Lag | vent<br> = 9.6 min |  |  |
|---|--|---|--|---|---|---------------------------|--------------------|--|--|
| Routing b<br>Peak Elev  | y Dyn-Stor<br>v= 50.92' @                    | -Ind method, T<br>0 12.20 hrs S   | ime Span= 0.00-<br>urf.Area= 2,144 s   | 60.00 hrs, dt=<br>sf Storage= \$                  | : 0.01 hrs / 3<br>935 cf                                  |                           |                    |  |  |
| Plug-Flow<br>Center-of  | v detention<br>-Mass det.                    | time= 148.5 m<br>time= 148.5 m  | in calculated for<br>in ( 897.5 - 749.0  | 3,334 cf (100º<br>))                              | % of inflow)  |                           |                    |  |  |
| Volume  | Invert                                       | Avail.Stor  | age Storage De   | escription  |   |                           |                    |  |  |
| #1  | 49.83'                                       | 1,71  | 5 cf <b>Permeable</b><br>4,288 cf Ov   | e <b>pavers (Pris</b><br>verall x 40.0%           | <b>matic)</b> Listed<br>6 Voids                           | below (Rec                | ;alc)              |  |  |
| Flevation   | n Si   | ırf Area  | Inc Store  | Cum Store   |   |                           |                    |  |  |
| (feet)  | )  | (sa-ft)   | (cubic-feet)   | (cubic-feet)                                      |   |                           |                    |  |  |
| 10.82   | 2  | 2144  | 0  | (00010-1000)                                      |   |                           |                    |  |  |
| 51 33   | 2  | 2,144   | 3 216  | 3 2 1 6   |   |                           |                    |  |  |
| 51.66   |  | 2,144   | 708  | 3 92/   |   |                           |                    |  |  |
| 51.83   | 3  | 2,144   | 364  | 4,288   |   |                           |                    |  |  |
| Device  | Routing                                      | Invert  | Outlet Devices   |   |   |                           |                    |  |  |
| #1  | Discarded                                    | 49.83'  | 0.500 in/hr Exfil  | tration X 0.80                                    | over Horizo   | ntal area                 | Phase-In= 0.01'    |  |  |
| #2  | Primary                                      | 48.00'  | 8.0" Round 8"  | CPP Outlet Pi                                     | ipe   |                           |                    |  |  |
| #3  | Device 2                                     | 50.33'  | L= 6.3' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 48.00' / 47.87' S= 0.0206 '/' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf<br><b>4.0'' Vert. 4'' Underdrain (reservoir stone&gt; structure)</b> C= 0.600<br>Limited to weir flow at low heads |   |   |                           |                    |  |  |
|   |  |   |  |   |   |                           |                    |  |  |

**Discarded OutFlow** Max=0.02 cfs @ 6.44 hrs HW=49.85' (Free Discharge) **1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.27 cfs @ 12.20 hrs HW=50.92' TW=47.91' (Dynamic Tailwater) 2=8" CPP Outlet Pipe (Passes 0.27 cfs of 2.70 cfs potential flow) 3=4" Underdrain (reservoir stone --> structure) (Orifice Controls 0.27 cfs @ 3.14 fps)



## Pond 1P: Permeable pavers

## Summary for Pond 2P: PR. CB-2

| Inflow Ar<br>Inflow<br>Outflow<br>Primary<br>Route   | ea =<br>=<br>=<br>=<br>ed to Pond | 3,750 sf,10<br>0.44 cfs @ 12<br>0.44 cfs @ 12<br>0.44 cfs @ 12<br>E1 : EX. CB-20 | 00.00%<br>2.04 hrs<br>2.04 hrs<br>2.04 hrs<br>2.04 hrs<br>008 | Impervious,<br>s, Volume=<br>s, Volume=<br>s, Volume= | Inflow D                            | epth = 5<br>1,579 cf<br>1,565 cf,<br>1,565 cf | 5.05"<br>Atten | for 1<br>= 0%,     | 0-yr e∖<br>Lag=  | vent<br>0.1 min |
|--|-----------------------------------|--|---|---|-------------------------------------|---|----------------|--------------------|------------------|-----------------|
| Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3<br>Peak Elev= 48.47' @ 12.04 hrs Surf.Area= 13 sf Storage= 18 cf |                                   |  |   |   |                                     |   |                |                    |                  |                 |
| Plug-Flow detention time= 12.8 min calculated for 1,565 cf (99% of inflow)<br>Center-of-Mass det. time= 6.6 min(755.6 - 749.0)               |                                   |  |   |   |                                     |   |                |                    |                  |                 |
| Volume   | Inver                             | t Avail.Stor   | rage S  | Storage Desc  | cription                            |   |                |                    |                  |                 |
| #1   | 47.00                             | ' 5  | 54 cf 4   | 1.00'D x 4.30   | 'H Vertio                           | al Cone/                                      | Cylind         | er                 |                  |                 |
| Device   | Routing                           | Invert   | Outlet  | Devices   |                                     |   |                |                    |                  |                 |
| #1   | Primary                           | 48.10'   | <b>12.0''</b><br>L= 44<br>Inlet /                             | Round 12"<br>0' CPP, en<br>Outlet Invert              | <b>CPP</b><br>d-sectior<br>= 48.10' | n conform<br>/ 47.80'                         | ning to t      | fill, Ko<br>068 '/ | e= 0.5(<br>″ Cc= | 00              |

Primary OutFlow Max=0.44 cfs @ 12.04 hrs HW=48.47' TW=48.07' (Dynamic Tailwater) ☐ 1=12'' CPP (Barrel Controls 0.44 cfs @ 2.50 fps)



## Pond 2P: PR. CB-2

n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

## Summary for Pond E1: EX. CB-2008

Inflow Area = 14,572 sf,100.00% Impervious, Inflow Depth = 3.41" for 10-yr event Inflow 0.99 cfs @ 12.04 hrs, Volume= 4.140 cf = Outflow 0.98 cfs @ 12.04 hrs, Volume= 4,134 cf, Atten= 0%, Lag= 0.1 min = 4,134 cf 0.98 cfs @ 12.04 hrs, Volume= Primary = Routed to Link PA-2 : POA-2 Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3 Peak Elev= 48.07' @ 12.04 hrs Surf Area= 13 sf Storage= 13 cf Plug-Flow detention time= 2.7 min calculated for 4,134 cf (100% of inflow) Center-of-Mass det. time= 1.5 min (772.2 - 770.7) Volume Avail Storage Storage Description Invert #1 47.00' 54 cf 4.00'D x 4.30'H Vertical Cone/Cylinder Device Routing Invert Outlet Devices #1 Primary 47.50' 12.0" Round 12" CMP L= 22.4' CMP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 47.50' / 47.00' S= 0.0223 '/' Cc= 0.900

**Primary OutFlow** Max=0.98 cfs @ 12.04 hrs HW=48.07' TW=0.00' (Dynamic Tailwater) **1=12'' CMP** (Barrel Controls 0.98 cfs @ 3.04 fps)

#### Pond E1: EX. CB-2008

n= 0.025 Corrugated metal, Flow Area= 0.79 sf



## Summary for Pond E2: EX. CB-2293

| Inflow Area = 2,572 sf,100.00% Impervious, Inflow Depth = 5.05" for 10-yr event |  |                                     |  |  |  |  |  |
|---|--|-------------------------------------|--|--|--|--|--|
| Inflow  | =  | 0.30 cfs @ 12                       | 2.04 hrs, Volume= 1,083 cf                                     |  |  |  |  |
| Outflow   | =  | 0.30 cfs 🥘 12                       | 2.04 hrs, Volume= 1,077 cf, Atten= 1%, Lag= 0.2 min            |  |  |  |  |
| Primary   | =  | 0.30 cfs 🥘 12                       | 2.04 hrs, Volume= 1,077 cf                                     |  |  |  |  |
| Route   | ed to Pond   | E1 : EX. ČB-20                      | 008  |  |  |  |  |
| Routing l<br>Peak Ele   | Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3<br>Peak Elev= 48.12' @ 12.04 hrs Surf.Area= 13 sf Storage= 14 cf |                                     |  |  |  |  |  |
| Plug-Flov<br>Center-o   | w detentior<br>f-Mass det  | i time= 10.2 mii<br>. time= 6.0 min | n calculated for 1,077 cf (99% of inflow)<br>(755.0 - 749.0)   |  |  |  |  |
| Volume  | Inver  | t Avail.Stor                        | rage Storage Description                                       |  |  |  |  |
| #1  | 47.00  | ' 5                                 | 64 cf 4.00'D x 4.30'H Vertical Cone/Cylinder                   |  |  |  |  |
| Device  | Routing  | Invert                              | Outlet Devices   |  |  |  |  |
| #1  | Primary  | 47.50'                              | 12.0" Round 12" CMP  |  |  |  |  |
|   | L= 22.4' CMP, end-section conforming to fill, Ke= 0.500  |                                     |  |  |  |  |  |
|   |  |                                     | Inlet / Outlet Invert= 47.50' / 47.00' S= 0.0223 '/' Cc= 0.900 |  |  |  |  |

n= 0.025 Corrugated metal, Flow Area= 0.79 sf

**Primary OutFlow** Max=0.30 cfs @ 12.04 hrs HW=48.12' TW=48.07' (Dynamic Tailwater) **1=12'' CMP** (Outlet Controls 0.30 cfs @ 0.84 fps)



#### Pond E2: EX. CB-2293

## Summary for Pond E3: CB 2078

[57] Hint: Peaked at 50.62' (Flood elevation advised)

 Inflow Area =
 13,191 sf, 70.70% Impervious, Inflow Depth =
 4.33" for 10-yr event

 Inflow =
 1.36 cfs @
 12.04 hrs, Volume=
 4,763 cf

 Outflow =
 1.36 cfs @
 12.04 hrs, Volume=
 4,763 cf, Atten= 0%, Lag= 0.0 min

 Primary =
 1.36 cfs @
 12.04 hrs, Volume=
 4,763 cf

 Routed to Link PA-1 : POA-1
 12.04 hrs, Volume=
 4,763 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs / 3 Peak Elev= 50.62' @ 12.04 hrs

| Device | Routing | Invert | Outlet Devices  |
|--------|---------|--------|---|
| #1     | Primary | 50.00' | <b>12.0'' Round Outlet</b><br>L= 90.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 50.00' / 49.10' S= 0.0100 '/' Cc= 0.900<br>n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf |

Primary OutFlow Max=1.35 cfs @ 12.04 hrs HW=50.61' TW=0.00' (Dynamic Tailwater) **1=Outlet** (Inlet Controls 1.35 cfs @ 2.67 fps)



Pond E3: CB 2078

## Summary for Link PA-1: POA-1

| Inflow / | Area = | 15,690 sf, 65.67% Impervious,   | Inflow Depth = 4.21" | for 10-yr event    |
|----------|--------|---------------------------------|----------------------|--------------------|
| Inflow   | =      | 1.58 cfs @ 12.04 hrs, Volume=   | 5,505 cf             |                    |
| Primar   | y =    | 1.58 cfs @  12.04 hrs,  Volume= | 5,505 cf, Atten=     | : 0%, Lag= 0.0 min |

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs



#### Link PA-1: POA-1

## Summary for Link PA-2: POA-2

| Inflow A | Area = | 14,572 sf,100.00% Impervious, | Inflow Depth = 3.40" for 10-yr event |
|----------|--------|-------------------------------|--------------------------------------|
| Inflow   | =      | 0.98 cfs @ 12.04 hrs, Volume= | 4,134 cf                             |
| Primary  | y =    | 0.98 cfs @ 12.04 hrs, Volume= | 4,134 cf, Atten= 0%, Lag= 0.0 min    |

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs



## Link PA-2: POA-2