Stormwater Management Report

For the:
Proposed Parking Lot Expansion

Located at:
7, 11, 15, & 17 Bradley Park Road
Town of East Granby, Connecticut

Prepared for Submission to:
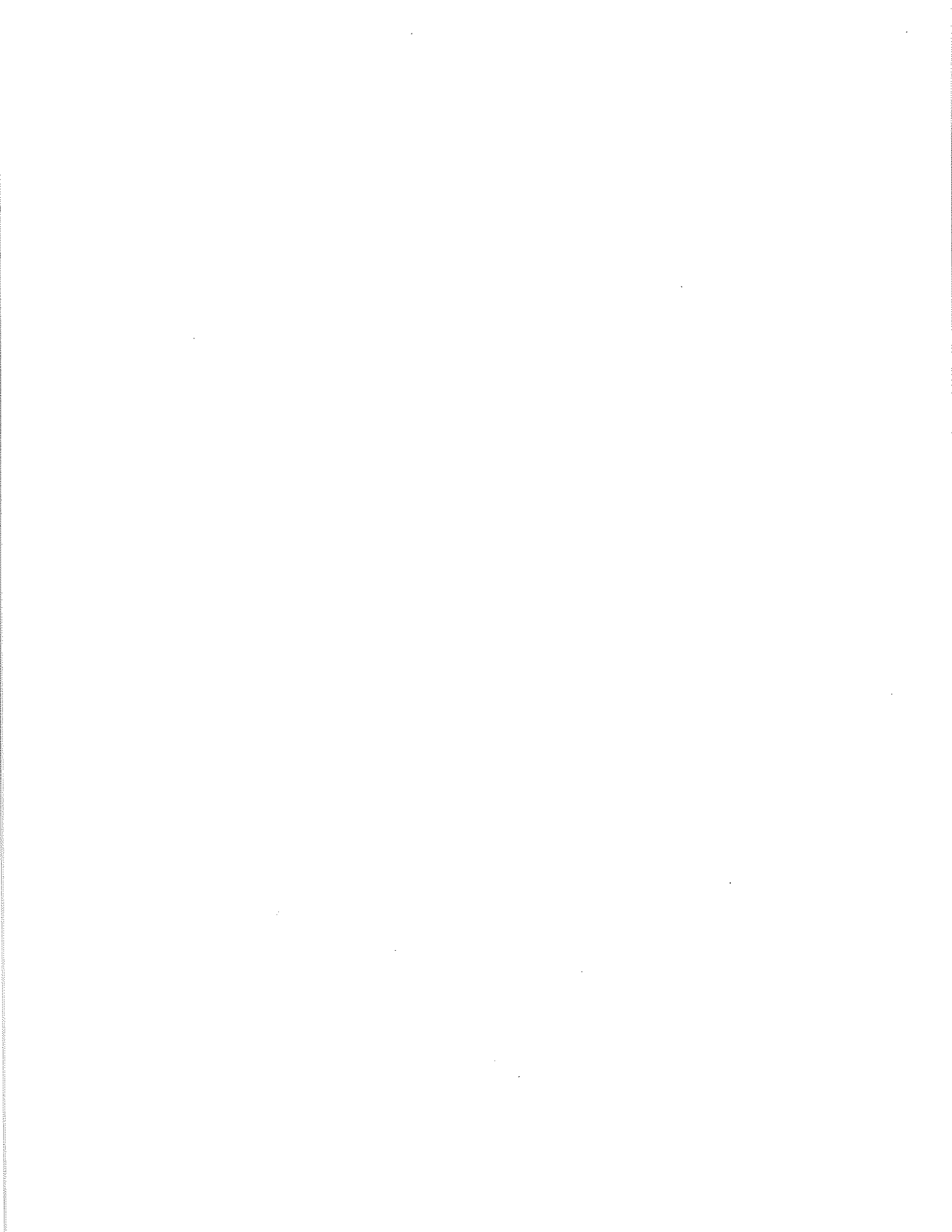**Town of East Granby, CT**

August 10, 2022

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Executive Summary

This report has been prepared in support of a Permit Application submission to the Town of East Granby by GFI Partners, LLC for the Proposed Parking Lot Expansion at Bradley Park Road. The design and analysis as presented within this report complies with the *2002 Connecticut Guidelines for Soil Erosion,* the *2004 Connecticut Stormwater Quality Manual,* and the *East Granby Low Impact Development and Stormwater Management Design Manual.*

There are no areas of wetlands present on-site and the proposed conditions do not adversely impact any wetlands nearby.

Location

The proposed expansion is situated on the existing tax parcel, totaling approximately 8.60 acres. The property is bordered by Bradley Park Road to the East and Rainbow Road (Route 20) to the South. On the Northern border is an industrial warehouse and on the Western border is a commercial use property. Per the Town of East Granby's Zoning Map, the property and its abutters are located in the CP-A (Commerce Park A) district.

Property Description

The existing site impacted by the proposed parking lot expansion is currently developed with four existing warehouse buildings, paved parking, utility connections, stormwater management system, and landscaping. The existing topography inside of the limit of disturbance ranges from elevation 179' to about 168'. Site runoff flows overland to existing catch basins on-site, which flow through the existing stormwater system and discharge into the Municipal Drainage Network on Bradley Park Road. Based on the existing drainage patterns, the site hydrology can be divided into two drainage areas. See Figure ED-1 in Appendix F for a map of the existing drainage areas.

The proposed parking lot expansion includes two unconnected locations on-site. The first lot expansion is located at the southern corner of the property abutting Rainbow Road (Lot Expansion 1). The second lot expansion is located at the Northwest corner of the property bordering the industrial warehouse abutter (Lot Expansion 2). In total, the proposed expansion includes approximately 40,500 S.F. of new pavement, a 1,350 S.F. building extension, a 425 S.F. concrete pad, and associated landscaping areas. The expansion will also include a 425 L.F. retaining wall at Lot Expansion 2 and an addition to the stormwater system as well as pervious pavement at the truck stalls at Lot Expansion 1. To improve the existing stormwater quality conditions for the site and

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support the overall proposed development, a subsurface infiltration basin and a Hydrodynamic separator has been incorporated into the design. A complete summary of the supporting analysis and sizing is provided in subsequent sections of this report.

FEMA Flood Insurance Rate Map

Per the FEMA Flood Insurance Rate Map Number 09003C0212F for Hartford County, Connecticut effective date September 26, 2008 the parcel resides in an area of minimal flood hazard. The FEMA Flood Insurance Rate Map is included in Appendix A.

Stormwater Analysis Summary

A HydroCAD model, using TR-55 and SCS methodology, was developed to evaluate the site's existing and proposed drainage conditions for 2-, 10-, 25-, and 100-year storm events. Water quality treatment has been provided for this project and consists of an infiltration basin located upstream of each discharge point. The proposed Best Management Practices (BMPs) will provide water quality treatment for the project. The proposed stormwater management BMPs will provide the minimum required Total Suspended Solids (TSS) removal rate of 80% per the *2004 Connecticut Stormwater Quality Manual.*

Hydrologic Modeling Methodology

Hydrologic Modeling

The SCS Runoff Curve Number and TR-55 Methods were utilized to determine the peak runoff for each watershed impacted by the proposed development. All supporting calculations have been completed using the stormwater computer modeling program known as HydroCAD, version 10.00, developed by HydroCAD Software Solutions, LLC. Hydrographs for each watershed were developed using the SCS Synthetic Unit Hydrograph Method and rainfall depths per the NOAA Atlas 14 for East Granby, CT as shown in Table 1. The drainage areas, or sub catchments as labeled by the program, are depicted by hexagons on the attached drainage diagrams. Pre-development HydroCAD results can be found in Appendix B and Post-development HydroCAD results can be found in Appendix C.

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Table 1 – 24-HR Rainfall Depths per NOAA Atlas 14 (East Granby, CT)

Return Period	24-hour Rainfall Depth (in)
2-year	3.23
10-year	5.98
25-year	6.39
100-year	8.26

Existing Site Conditions and Hydrology Conditions

General Site Information

The existing areas for proposed Lot Expansions 1 and 2 generally both slope from West to East and ultimately flow to low points at the catch basins in the existing parking lot areas. Based on existing drainage patterns, the site hydrology can be divided into two drainage areas (one drainage area per lot expansion). Runoff from both of the drainage areas flow through the existing stormwater management system on-site and into the Municipal Drainage Network (DP-1)

Soil Description

The soils included within this stormwater analysis were identified using available online resources created by the United States Department of Agriculture (USDA) Natural Resource Conservation Services (NRCS). They are as follows:

- Udorthents-Urban land complex – Type B Soil

A copy of the USDA NRCS Hydrologic Soil Group map is located within Appendix A of this report for reference.

Existing Hydrologic Conditions

The existing site drainage area analyzed within this study totals 2.48 acres and is approximately 33% impervious. Runoff in the Southern corner of the property flows overland from the grass area in the West down to the existing parking lot area to the East and into one of the three catch basins located in that area. Runoff in the Northwest corner of the property follows a similar pattern beginning at the grass area in the West. Water flows overland into a stone swale where it is directed to the low point in the paved area to the existing catch basin. Stormwater collected into the existing stormwater management system ultimately discharges into the Municipal Drainage Network (DP-1).

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The following is a brief summary of the existing drainage areas as shown on the enclosed Existing Drainage Map (ED-1), in Appendix F.

Existing Drainage Area 1 (EDA-1): This area is located at the Southern Corner of the property and includes a grass area as well as existing parking area. EDA-1 is approximately 1.47 acres. The approximate imperviousness of this drainage area and CN number are 45% and 78, respectively. Stormwater runoff from EDA-1 flows overland into an existing catch basin and into the Municipal Drainage Network (Design Point 1).

Existing Drainage Area 2 (EDA-2): This area is located at the Northwest corner of the site and includes a grass area, concrete sidewalk and a small, paved area. EDA-2 is approximately 1.01 acres. The approximate imperviousness of this drainage area and CN number are 16% and 67, respectively. Stormwater runoff from EDA-2 flows overland into the existing catch basin in the paved area and into the Municipal Drainage Network (Design Point 1).

Table 2 – Pre-Development (Existing Conditions) Drainage Characteristics

Drainage Area	Area (Acre)	Composite Curve Number	Imperviousness Cover (%)	Time of Concentration (minutes)
EDA-1	1.47	78	45%	9.60
EDA-2	1.01	67	16%	8.40

Table 3 – Pre-Development Conditions Peak Flows

Analysis Point	Description	Peak Flows (CFS)			
		2-YR	10-YR	25-YR	100-YR
Design Point 1	Municipal Drainage Network	2.84	6.72	9.32	13.41

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Developed Site Conditions and Hydrology Conditions

General Site Information

As mentioned before, the proposed parking lot expansion includes the two unconnected locations on-site: Lot Expansion 1 in the Southern corner of the property and Lot Expansion 2 in the Northwest corner of the property. The proposed parking lot expansion includes approximately 40,500 S.F. of new pavement, a 1,350 S.F. building extension, a 425 S.F. concrete pad, and associated landscaping areas. The expansion will also include a 425 L.F. retaining wall at Lot Expansion 2 and an addition to the stormwater system as well as pervious pavement at the truck stalls at Lot Expansion 1.

The proposed project will disturb approximately 2.0 acres.

Proposed Hydrologic Conditions

The proposed hydrologic analysis for this project maintains the methodologies and design points. The intent of the proposed stormwater design is to mimic the existing drainage patterns and runoff flowrates to the greatest extent practical, while improving the stormwater quality for the site.

The proposed site drainage area analyzed within this study maintains the original 8.60 acres described above. The proposed parking lot expansion will add to the impervious coverage to the site and increases the total lot coverage to approximately 75.4%. This includes all paved areas, concrete pads and sidewalks. The Groundwater table varies throughout the site and was approximated using information provided by the NRCS Soil Report.

The intent of the proposed stormwater design is to mimic the existing drainage patterns for the drainage areas as described within the Existing Hydrology Conditions section of this report. All calculations were based on the 2-, 10-, 25-, and 100-year stormfall events in order to accurately depict the proposed conditions. To mitigate any impact and improve the overall water quality for both of the parking lot expansions, the existing stormwater management system has been upgraded to add a subsurface infiltration basin and a hydrodynamic separator. Stormwater will be treated and discharged through the subsurface infiltration basin for Lot Expansion 1 and will be treated through a hydrodynamic separator for Lot Expansion 2. Design calculations for the overall treatment effectiveness of the proposed system and water quality calculations are included in Appendix D. All stormwater quality treatment measures have been designed per *2004 Connecticut Stormwater Quality Manual.*

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Proposed Drainage Areas

The following section briefly describes each drainage area as shown on the enclosed Proposed Drainage Map (PDA-1), located in Appendix F of this report.

Proposed Drainage Area 1 (PDA-1): PDA-1 is located in the Southern corner of the site where Lot Expansion 1 is proposed. PDA-1 consists of approximately 1.47 acres and is 60% impervious. Stormwater runoff from this area flows overland into an existing catch basin or trench drain and into the Municipal Drainage Network (Design Point 1).

Proposed Drainage Area 2 (PDA-2): PDA-2 is located in the Northwest corner of the site where Lot Expansion 2 is proposed. PDA-2 consists of approximately 1.01 acres and is 82% impervious. Stormwater runoff from this area flows overland into one of the proposed catch basins or trench drains and into the Municipal Drainage Network (Design Point 1).

Post-Development Hydrologic Analysis Results

The results of the post-development hydrologic analysis are as follows and summarized in Table 4 and Table 5 below:

Table 4 – Post-Development (Proposed Conditions) Drainage Characteristics

Drainage Area	Area (Acre)	Composite Curve Number	Imperviousness Cover (%)	Time of Concentration (minutes)
PDA-1	1.47	83	60%	9.60
PDA-2	1.01	92	82%	9.00

Table 5 – Post-Development Conditions Peak Flows

Analysis Point	Description	Peak Flows (CFS)			
		2-YR	10-YR	25-YR	100-YR
Design Point 1	Municipal Drainage Network	2.79	5.36	6.68	10.77

For a complete comparison of pre- and post-development runoff rates for each design storm, refer to Table 6, shown below.
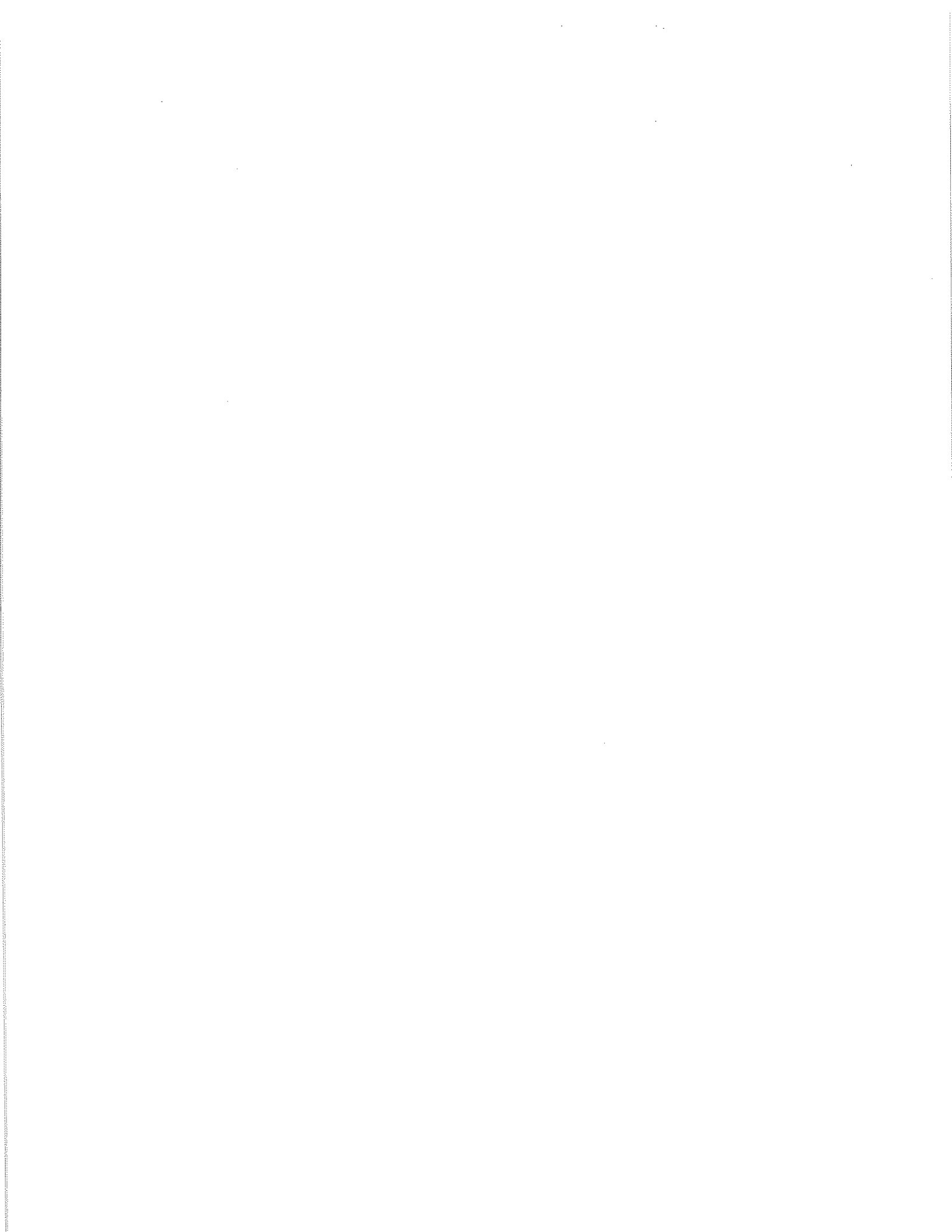
Table 6 Existing vs. Proposed Peak Runoff Rates

Peak Flow (CFS)				
	Design Storms			
Analysis Point	2-YR	10-YR	25-YR	100-YR
DP-1 Municipal Drainage Network				
Existing	2.84	6.71	9.30	13.38
Proposed	2.79	5.36	6.98	10.77
Percent Change	-1.76%	-20.12%	-24.95%	-19.51%

Permanent BMP's and Water Quality

Permanent Water Quality Best Management Practices (BMPs) have been incorporated into the project design and include an infiltration basin to treat the required water quality and mitigate peak runoff flow rates for the proposed project. For location of each permanent BMP, refer to the drainage maps included in Appendix F of this report.

Summary

This stormwater analysis and report has been prepared to comply the *2002 Connecticut Guidelines for Soil Erosion,* and the *2004 Connecticut Stormwater Quality Manual.* The proposed project has been designed to treat the require water quality volume and mitigate peak stormwater runoff. The stormwater management design will not result in any adverse impacts to abutting properties or roadways. All post-development stormwater drainage patterns have been maintained to match the pre-development conditions. Stormwater quality is provided with the installation of proposed subsurface infiltration basin and hydrodynamic separator. These features will provide the minimum required 80% TSS removal.

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APPENDIX A

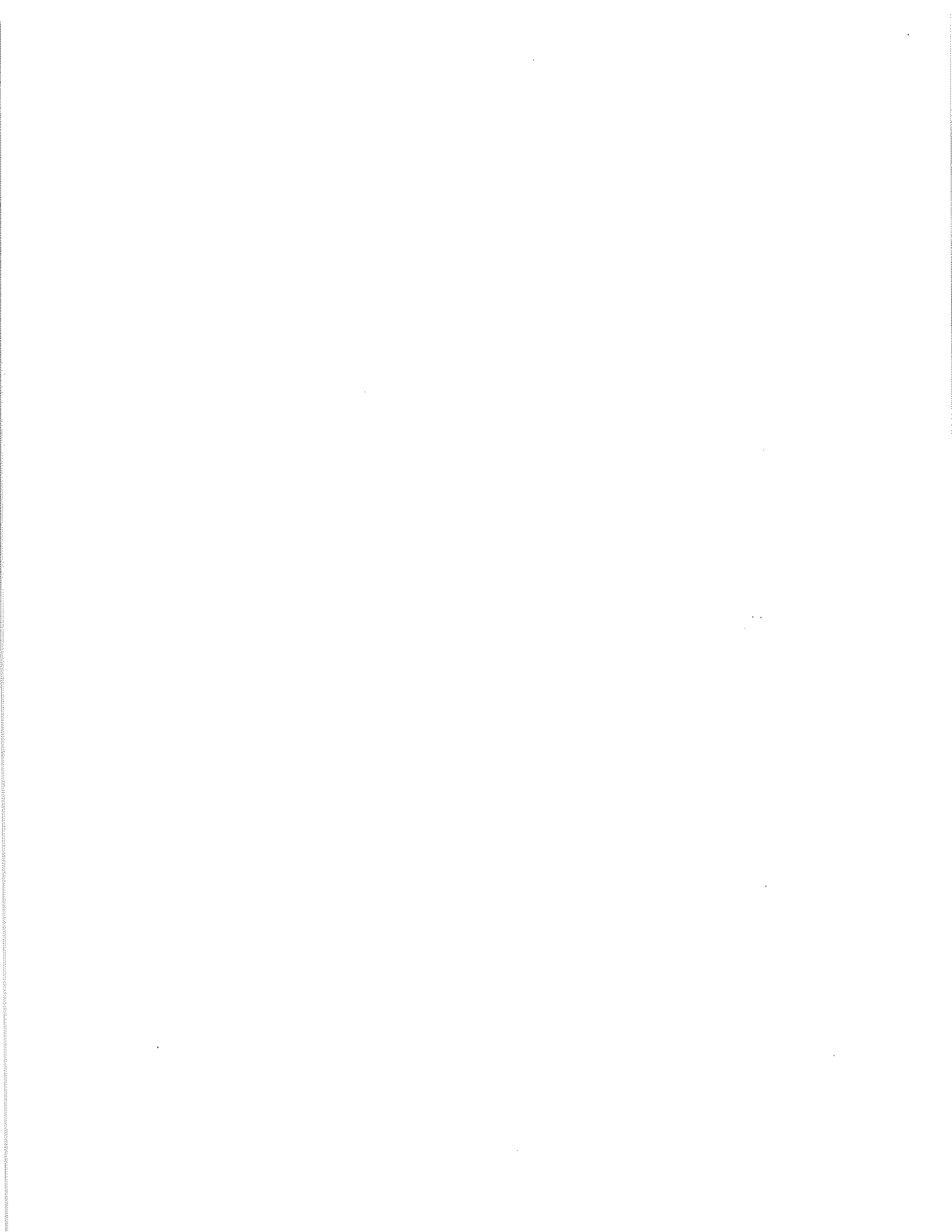LOCATION MAPS
Figure 1: USGS Location Map
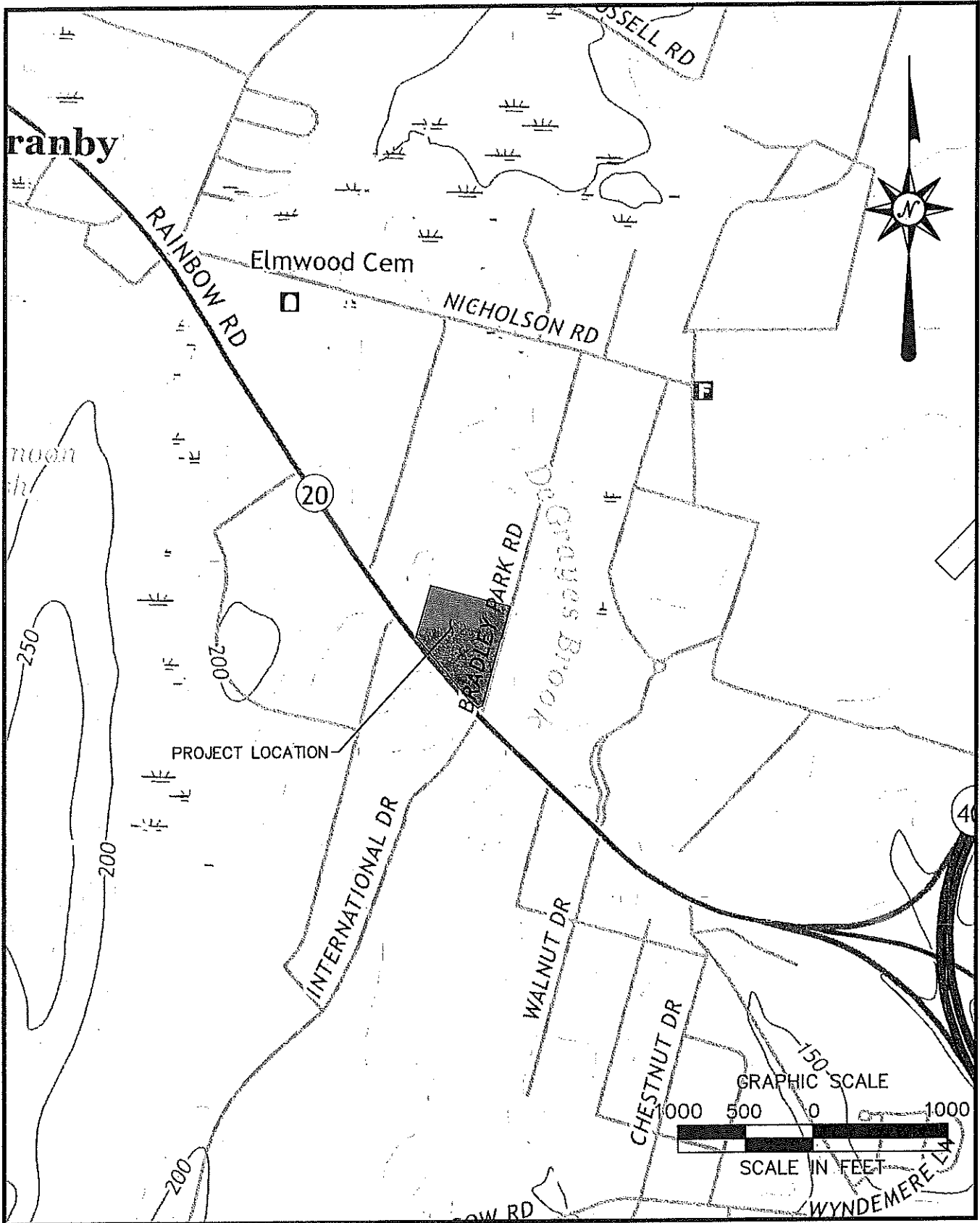Figure 2: Aerial Location Map
Figure 3: NRCS Soil Survey Map with Hydrologic Soil Group Data, Depth to
Groundwater Table, and Soil Report
Figure 4: FEMA Federal Insurance Rate Map
Figure 5: FEMA Firmette
Figure 5: NOAA Atlas 14 Storm Data

PROJECT LOCATION

Elmwood Cem

RAINBOW RD

NICHOLSON RD

OSSELL RD

BRADLEY PARK RD

INTERNATIONAL DR

WALNUT DR

CHESTNUT DR

WYNDEMERE LA

ranby

(20)

GRAPHIC SCALE

| 1000 | 500 | 0 | | 1000 |

SCALE IN FEET

PROPOSED
PARKING LOT EXTENSION

7,11,15,&17 BRADLEY PARK ROAD
EAST GRANBY, CONNECTICUT

Designed	R.M.D.
Drawn	R.M.D.
Checked	S.M.K.
Approved	S.M.K.
Scale	1"=1000'
Project No.	2200330
Date	04/22/2022
CAD File	EXH220033001

FIGURE 1

USGS LOCATION MAP

PROJECT LOCATION

RAINBOW ROAD (ROUTE 20)

BRADLEY PARK ROAD

GRAPHIC SCALE

200   100   0   200

SCALE IN FEET

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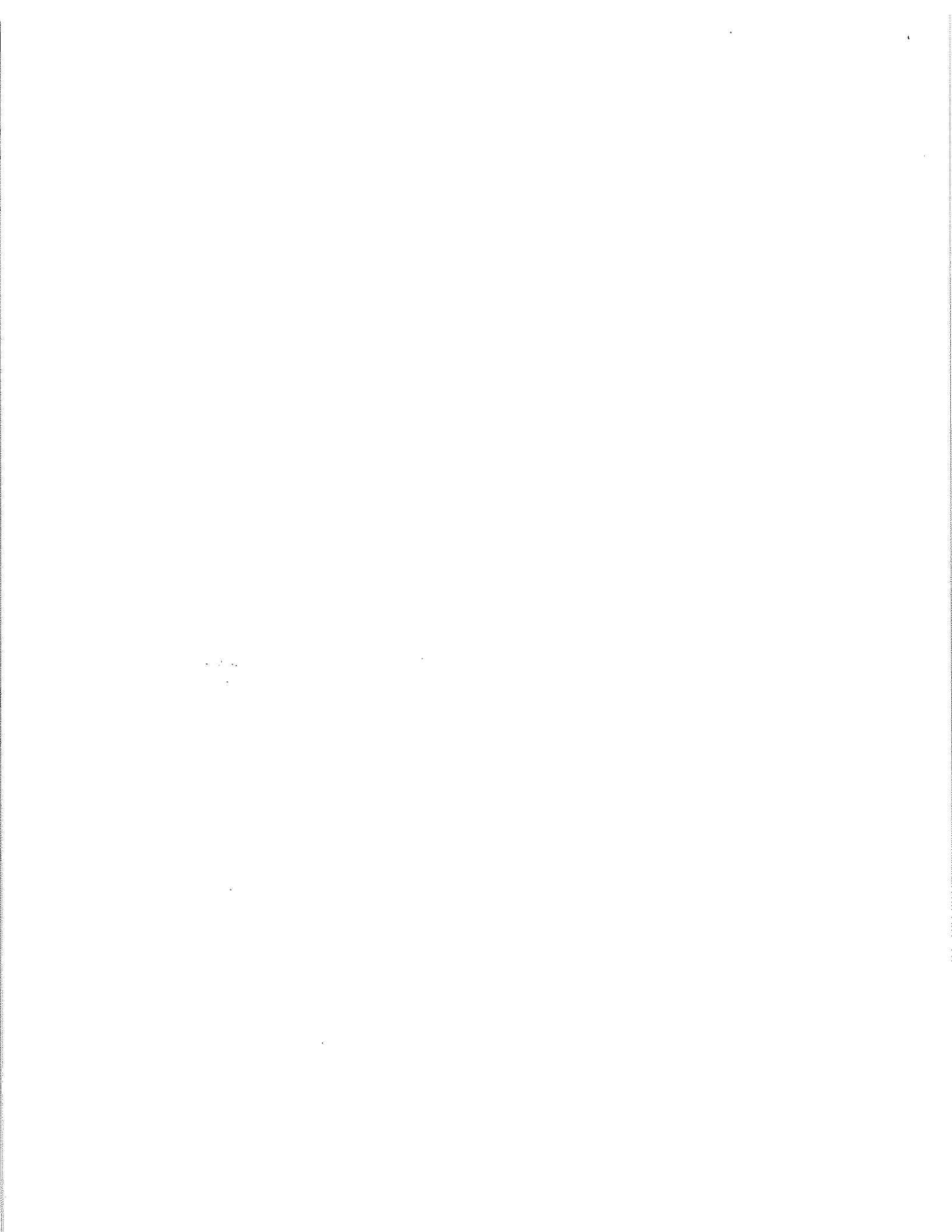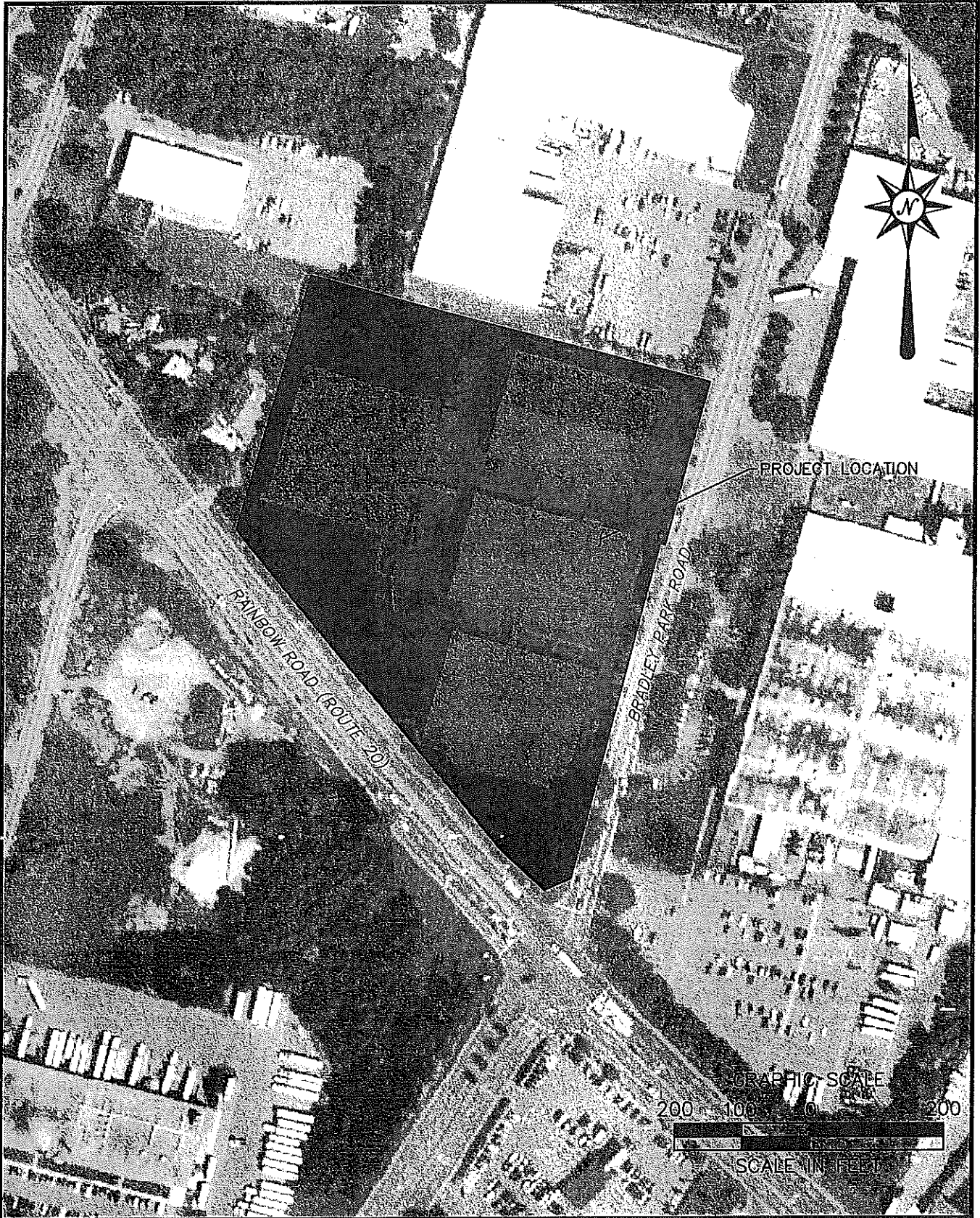
ARCHITECTURE
ENGINEERING
ENVIRONMENTAL
LAND SURVEYING

PROPOSED
PARKING LOT EXTENSION

7,11,15,&17 BRADLEY PARK ROAD
EAST GRANBY, CONNECTICUT

|	
Designed	R.M.D.
Drawn	R.M.D.
Checked	S.M.K.
Approved	S.M.K.
Scale	1"=200'
Project No.	2200330
Date	04/22/2022
CAD File	EXH220033001

FIGURE 2

AERIAL LOCATION MAP

USDA 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
State of Connecticut
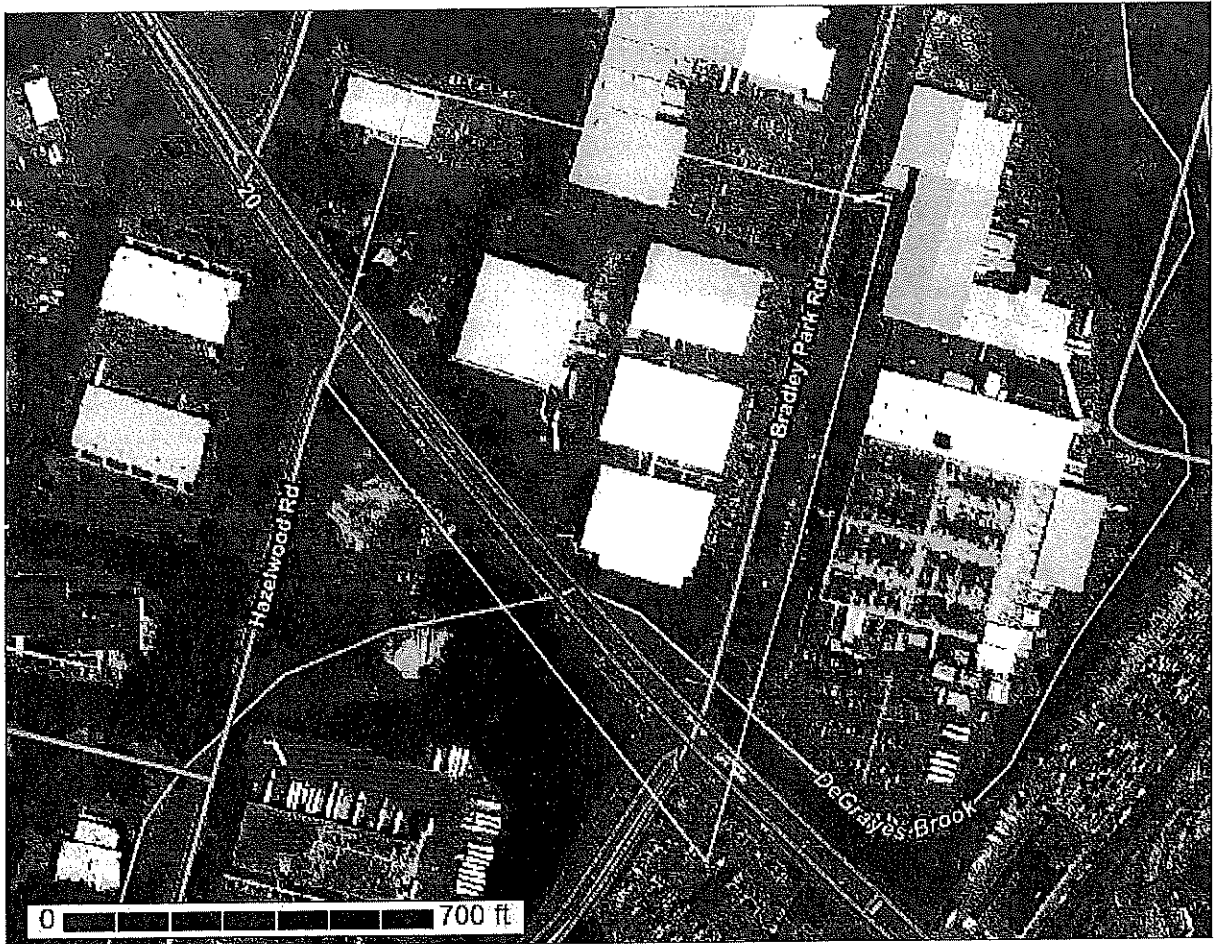
April 12, 2022

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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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Contents

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.
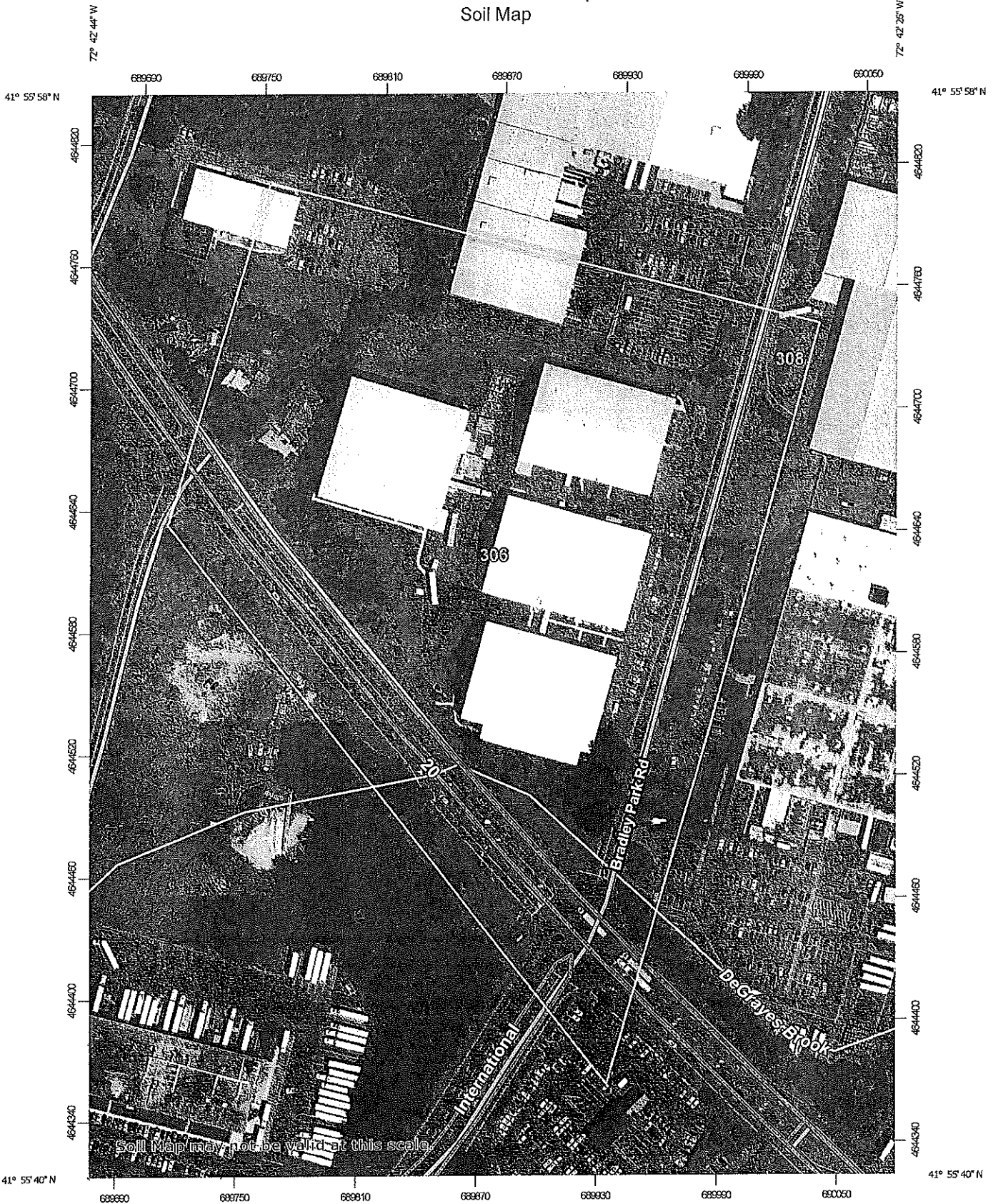
8

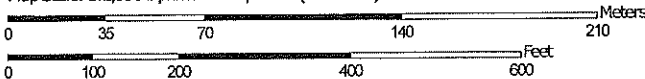Map Scale: 1:2,590 if printed on A portrait (8.5" x 11") sheet.

Meters
0   35   70   140   210

Feet
0 100   200   400   600

Map projection: Web Mercator   Corner coordinates: WGS84   Edge tics: UTM Zone 18N WGS84

MAP LEGEND

MAP INFORMATION

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: State of Connecticut
Survey Area Data: Version 21, Sep 7, 2021

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

Date(s) aerial images were photographed: Aug 24, 2019—Oct 24, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
306	Udorthents-Urban land complex	19.7	98.9%
308	Udorthents, smoothed	0.2	1.1%
Totals for Area of Interest		19.9	100.0%

Map Unit Descriptions

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

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

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

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

State of Connecticut

306—Udorthents-Urban land complex

Map Unit Setting

National map unit symbol: 9lmg
Elevation: 0 to 2,000 feet
Mean annual precipitation: 43 to 56 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 120 to 185 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 50 percent
Urban land: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting

Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Drift

Typical profile

A - 0 to 5 inches: loam
C1 - 5 to 21 inches: gravelly loam
C2 - 21 to 80 inches: very gravelly sandy loam

Properties and qualities

Slope: 0 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00
    to 1.98 in/hr)
Depth to water table: About 54 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

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

Description of Urban Land

Typical profile

H - 0 to 6 inches: material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8

Hydrologic Soil Group: D
Hydric soil rating: Unranked

Minor Components

Unnamed, undisturbed soils
Percent of map unit: 8 percent
Hydric soil rating: No

Udorthents, wet substratum
Percent of map unit: 5 percent
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Rock outcrop
Percent of map unit: 2 percent
Hydric soil rating: No

308—Udorthents, smoothed

Map Unit Setting
National map unit symbol: 9lmj
Elevation: 0 to 2,000 feet
Mean annual precipitation: 43 to 56 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 120 to 185 days
Farmland classification: Not prime farmland

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

Description of Udorthents

Setting
Down-slope shape: Convex
Across-slope shape: Linear

Typical profile
A - 0 to 5 inches: loam
C1 - 5 to 21 inches: gravelly loam
C2 - 21 to 80 inches: very gravelly sandy loam

Properties and qualities
Slope: 0 to 35 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 1.98 in/hr)

Depth to water table: About 24 to 54 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Udorthents, wet substratum

Percent of map unit: 7 percent

Hydric soil rating: No

Unnamed, undisturbed soils

Percent of map unit: 7 percent

Hydric soil rating: No

Urban land

Percent of map unit: 5 percent

Hydric soil rating: No

Rock outcrop

Percent of map unit: 1 percent

Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

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

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

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

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

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

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.
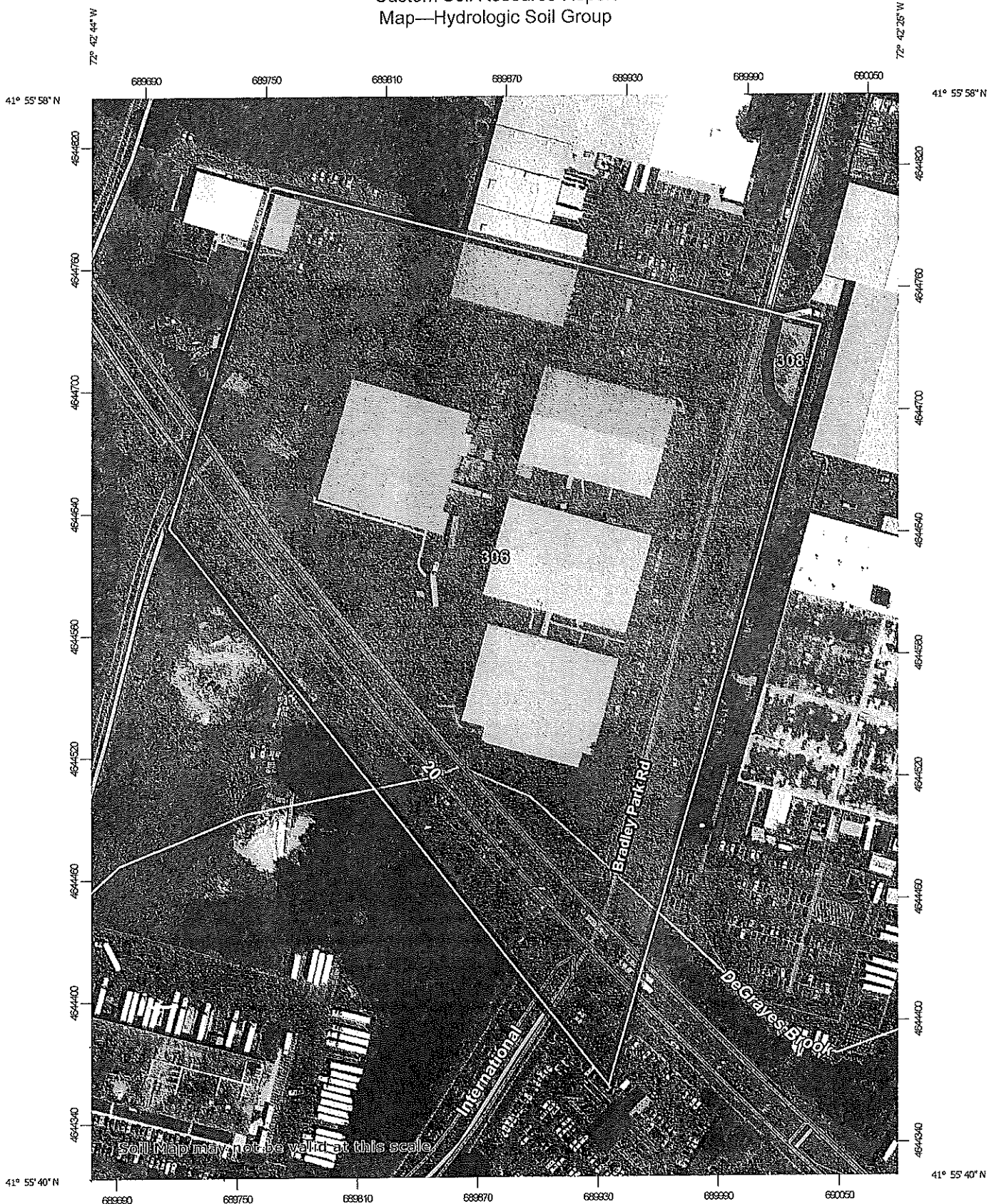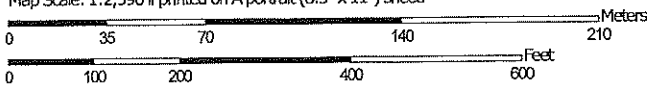
Map Scale: 1:2,590 if printed on A portrait (8.5" x 11") sheet.

Meters
0   35   70   140   210

Feet
0   100   200   400   600

Map projection: Web Mercator   Corner coordinates: WGS84   Edge tics: UTM Zone 18N WGS84

18

MAP LEGEND

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

Soils
Soil Rating Polygons
A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines
A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points
A
A/D
B
B/D

C
C/D
D
Not rated or not available

Water Features
Streams and Canals

Transportation
Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background
Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: State of Connecticut
Survey Area Data: Version 21, Sep 7, 2021

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

Date(s) aerial images were photographed: Aug 24, 2019—Oct 24, 2019

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.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
306	Udorthents-Urban land complex	B	19.7	98.9%
308	Udorthents, smoothed	C	0.2	1.1%
Totals for Area of Interest			19.9	100.0%

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Water Features

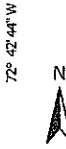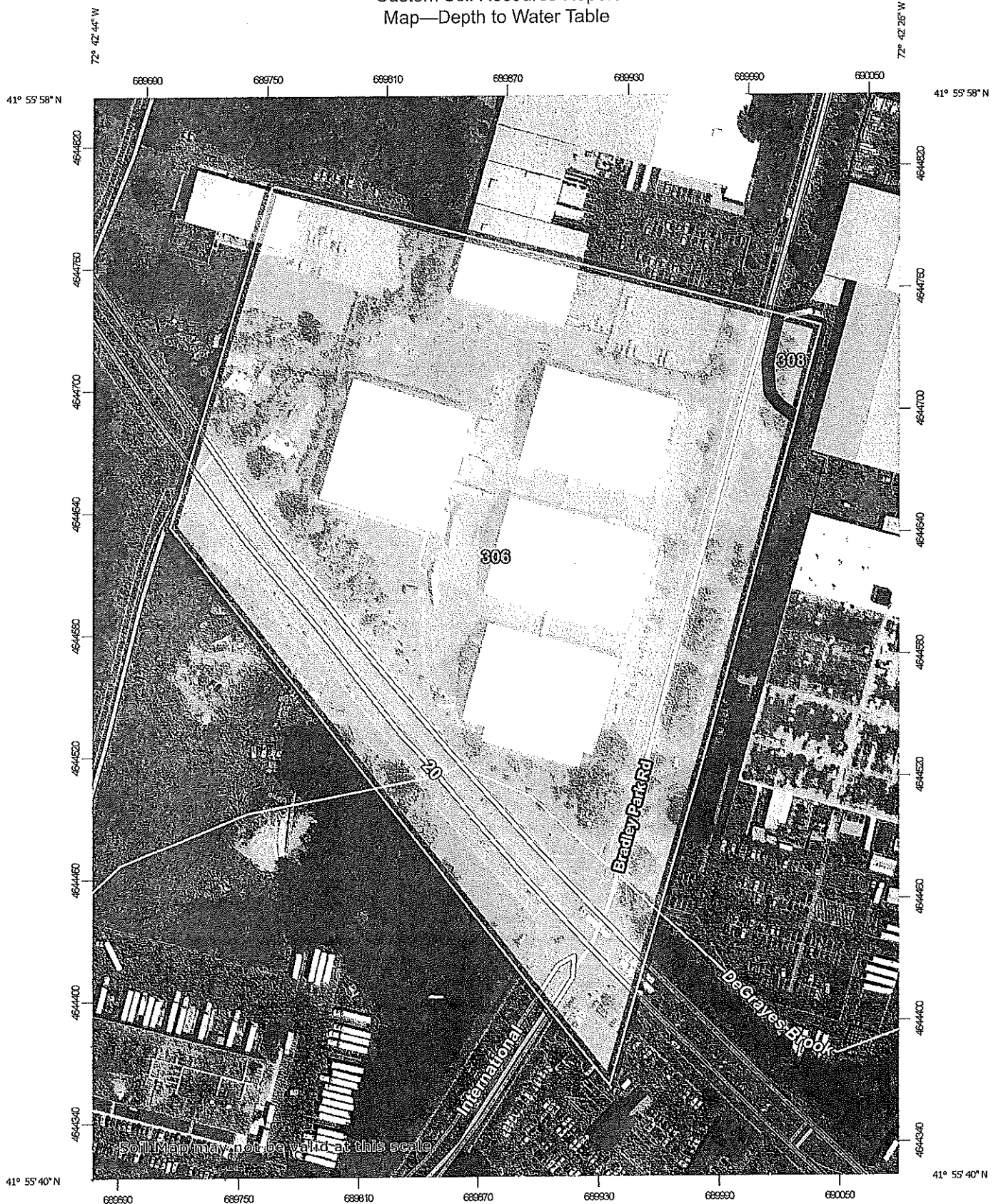Water Features include ponding frequency, flooding frequency, and depth to water table.

Depth to Water Table

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Map Scale: 1:2,590 if printed on A portrait (8.5" x 11") sheet.

Meters
0   35   70   140   210

Feet
0   100   200   400   600

Map projection: Web Mercator   Corner coordinates: WGS84   Edge tics: UTM Zone 18N WGS84

MAP LEGEND

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

Soils
Soil Rating Polygons
0 - 25
25 - 50
50 - 100
100 - 150
150 - 200
> 200
Not rated or not available

Soil Rating Lines
0 - 25
25 - 50
50 - 100
100 - 150
150 - 200
> 200
Not rated or not available

Soil Rating Points
0 - 25
25 - 50
50 - 100
100 - 150
150 - 200
> 200

Not rated or not available

Water Features
Streams and Canals

Transportation
Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background
Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: State of Connecticut
Survey Area Data: Version 21, Sep 7, 2021

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

Date(s) aerial images were photographed: Aug 24, 2019—Oct 24, 2019

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.

Table—Depth to Water Table

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
306	Udorthents-Urban land complex	150	19.7	98.9%
308	Udorthents, smoothed	100	0.2	1.1%
Totals for Area of Interest			19.9	100.0%

Rating Options—Depth to Water Table

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

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National Flood Hazard Layer FIRMette

FEMA

72°42'55"W 41°56'5"N

AREA OF MINIMAL FLOOD HAZARD
Zone X

09003C0212F
eff 9/26/2008

72°42'17"W 41°55'38"N

N

Feet   1:6,000

0   250   500   1,000   1,500   2,000
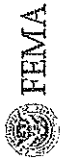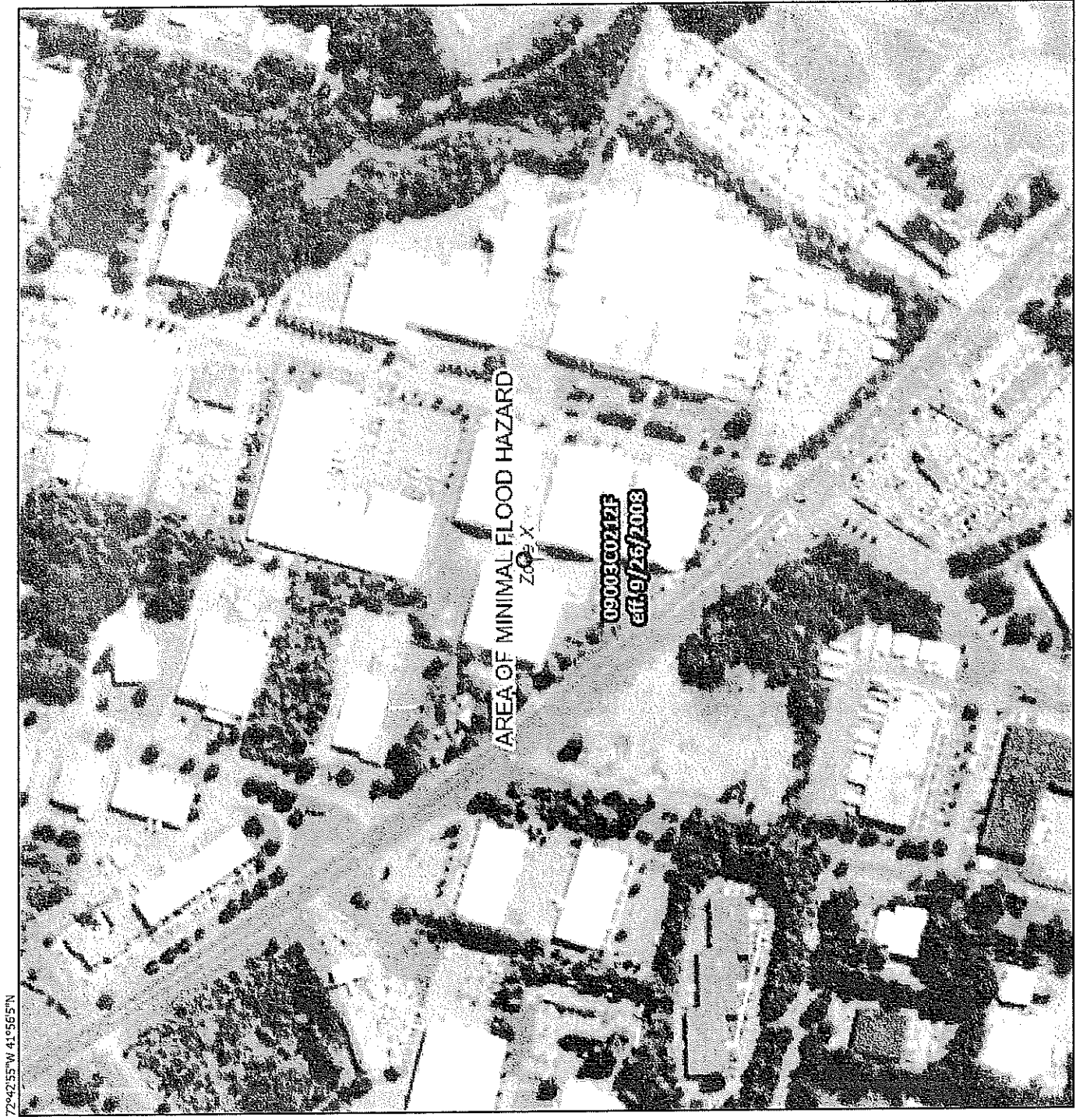
Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

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

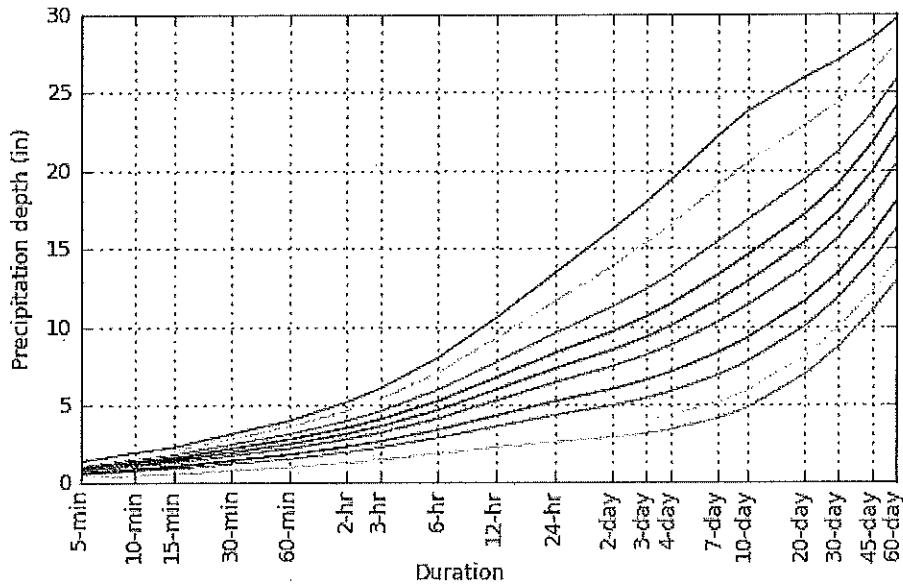| Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.348 (0.266-0.453)	0.417 (0.319-0.544)	0.530 (0.404-0.693)	0.623 (0.472-0.820)	0.752 (0.554-1.03)	0.849 (0.614-1.19)	0.950 (0.669-1.39)	1.06 (0.713-1.59)	1.23 (0.793-1.90)	1.36 (0.860-2.15)
10-min	0.493 (0.377-0.642)	0.591 (0.452-0.770)	0.751 (0.573-0.983)	0.883 (0.669-1.16)	1.07 (0.784-1.47)	1.20 (0.869-1.69)	1.35 (0.948-1.96)	1.51 (1.01-2.25)	1.74 (1.12-2.69)	1.93 (1.22-3.04)
15-min	0.580 (0.444-0.756)	0.695 (0.531-0.906)	0.883 (0.673-1.16)	1.04 (0.787-1.37)	1.25 (0.923-1.72)	1.41 (1.02-1.99)	1.58 (1.12-2.31)	1.77 (1.19-2.65)	2.04 (1.32-3.16)	2.27 (1.43-3.58)
30-min	0.779 (0.596-1.01)	0.938 (0.717-1.22)	1.20 (0.914-1.57)	1.42 (1.07-1.86)	1.71 (1.26-2.36)	1.94 (1.40-2.72)	2.17 (1.53-3.17)	2.44 (1.63-3.64)	2.81 (1.82-4.35)	3.11 (1.97-4.92)
60-min	0.978 (0.748-1.27)	1.18 (0.903-1.54)	1.52 (1.16-1.98)	1.79 (1.36-2.36)	2.17 (1.60-2.99)	2.46 (1.78-3.46)	2.76 (1.95-4.03)	3.10 (2.08-4.63)	3.57 (2.31-5.53)	3.96 (2.51-6.25)
2-hr	1.26 (0.972-1.63)	1.52 (1.17-1.97)	1.94 (1.49-2.52)	2.28 (1.74-2.99)	2.76 (2.05-3.78)	3.12 (2.27-4.37)	3.50 (2.49-5.10)	3.94 (2.65-5.85)	4.59 (2.98-7.06)	5.13 (3.26-8.06)
3-hr	1.45 (1.12-1.87)	1.75 (1.35-2.26)	2.23 (1.72-2.89)	2.63 (2.01-3.43)	3.18 (2.37-4.35)	3.59 (2.63-5.03)	4.03 (2.88-5.88)	4.56 (3.07-6.75)	5.35 (3.47-8.20)	6.02 (3.83-9.41)
6-hr	1.82 (1.42-2.34)	2.21 (1.72-2.83)	2.84 (2.20-3.66)	3.37 (2.59-4.36)	4.09 (3.07-5.57)	4.62 (3.41-6.45)	5.20 (3.75-7.58)	5.92 (4.00-8.71)	7.02 (4.57-10.7)	7.97 (5.08-12.4)
12-hr	2.23 (1.75-2.84)	2.74 (2.14-3.49)	3.58 (2.79-4.58)	4.28 (3.32-5.50)	5.23 (3.95-7.09)	5.94 (4.41-8.25)	6.71 (4.88-9.76)	7.68 (5.21-11.2)	9.20 (6.02-14.0)	10.5 (6.74-16.3)
24-hr	2.58 (2.04-3.26)	3.23 (2.54-4.09)	4.30 (3.37-5.45)	5.18 (4.04-6.61)	6.39 (4.86-8.63)	7.28 (5.45-10.1)	8.26 (6.07-12.0)	9.53 (6.49-13.9)	11.6 (7.59-17.5)	13.4 (8.59-20.6)
2-day	2.87 (2.28-3.60)	3.65 (2.89-4.58)	4.92 (3.89-6.20)	5.98 (4.69-7.58)	7.43 (5.70-10.0)	8.48 (6.41-11.7)	9.66 (7.18-14.1)	11.3 (7.68-16.3)	13.9 (9.12-20.8)	16.2 (10.4-24.8)
3-day	3.13 (2.49-3.91)	3.99 (3.17-4.99)	5.39 (4.27-6.77)	6.55 (5.16-8.27)	8.15 (6.28-10.9)	9.31 (7.06-12.9)	10.6 (7.92-15.5)	12.4 (8.47-17.9)	15.3 (10.1-22.9)	18.0 (11.6-27.4)
4-day	3.38 (2.70-4.21)	4.30 (3.43-5.36)	5.80 (4.61-7.26)	7.95 (5.57-8.88)	8.76 (6.77-11.7)	10.0 (7.61-13.8)	11.4 (8.53-16.6)	13.3 (9.12-19.2)	16.5 (10.9-24.6)	19.3, (12.5-29.3)
7-day	4.07 (3.27-5.04)	5.12 (4.11-6.35)	6.84 (5.47-8.51)	8.26 (6.57-10.3)	10.2 (7.92-13.6)	11.6 (8.88-15.9)	13.2 (9.93-19.1)	15.4 (10.6-22.0)	18.9 (12.5-28.1)	22.1 (14.3-33.4)
10-day	4.75 (3.83-5.87)	5.87 (4.72-7.26)	7.70 (6.17-9.55)	9.21 (7.34-11.5)	11.3 (8.78-14.9)	12.8 (9.79-17.4)	14.5 (10.9-20.7)	16.8 (11.6-23.9)	20.4 (13.6-30.2)	23.7 (15.4-35.7)
20-day	6.87 (5.57-8.43)	8.05 (6.52-9.88)	9.97 (8.05-12.3)	11.6 (9.28-14.3)	13.8 (10.7-17.9)	15.4 (11.7-20.6)	17.1 (12.8-24.0)	19.4 (13.4-27.4)	22.9 (15.2-33.5)	25.9 (16.9-38.8)
30-day	8.67 (7.06-10.6)	9.87 (8.03-12 1)	11.8 (9.58-14.5)	13.4 (10.8-16.6)	15.7 (12.2-20.3)	17.3 (13.2-22.9)	19.1 (14.2-26.4)	21.2 (14.8-29.9)	24.4 (16.3-35.6)	27.1 (17.6-40.3)
45-day	10.9 (8.94-13.3)	12.2 (9.93-14.8)	14.2 (11.5-17.3)	15.9 (12.8-19.5)	18.2 (14.2-23.2)	19.9 (15.2-26.0)	21.7 (16.0-29.4)	23.6 (16.5-33.1)	26.3 (17.6-38.2)	28.4 (18.5-42.2)
60-day	12.8 (10.5-15.6)	14.1 (11.6-17.1)	16.2 (13.2-19.8)	18.0 (14.6-22.0)	20.4 (15.9-25.9)	22.2 (16.9-28.8)	24.0 (17.6-32.2)	25.8 (18.1-36.0)	28.1 (18.9-40.6)	29.7 (19.4-44.0)

[1] 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

PDS-based depth-duration-frequency (DDF) curves
Latitude: 41.9293°, Longitude: -72.7093°

Average recurrence interval (years)
- 1
- 2
- 5
- 10
- 25
- 50
- 100
- 200
- 500
- 1000
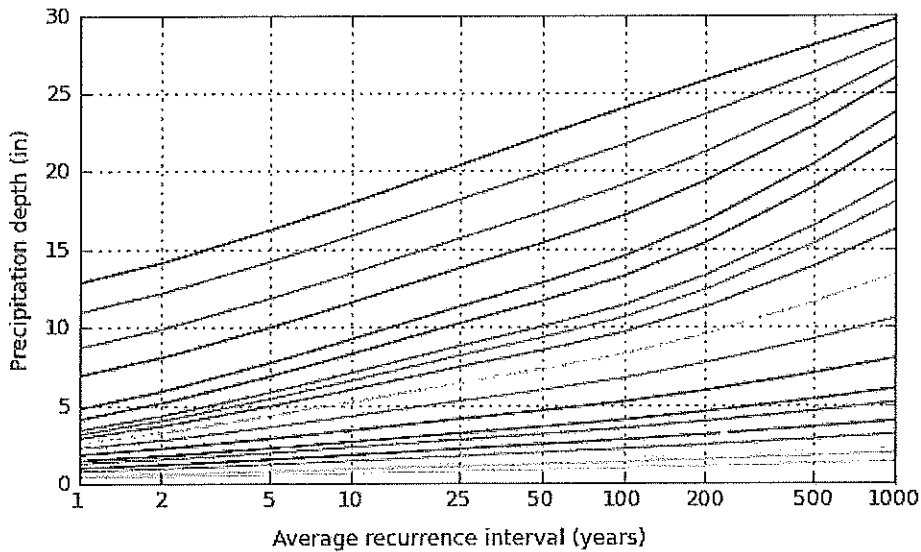
Duration

5-min	2-day
10-min	3-day
15-min	4-day
30-min	7-day
60-min	10-day
2-hr	20-day
3-hr	30-day
6-hr	45-day
12-hr	60-day
24-hr	

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Created (GMT): Tue Apr 12 13:53:21 2022

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Maps & aerials

Small scale terrain
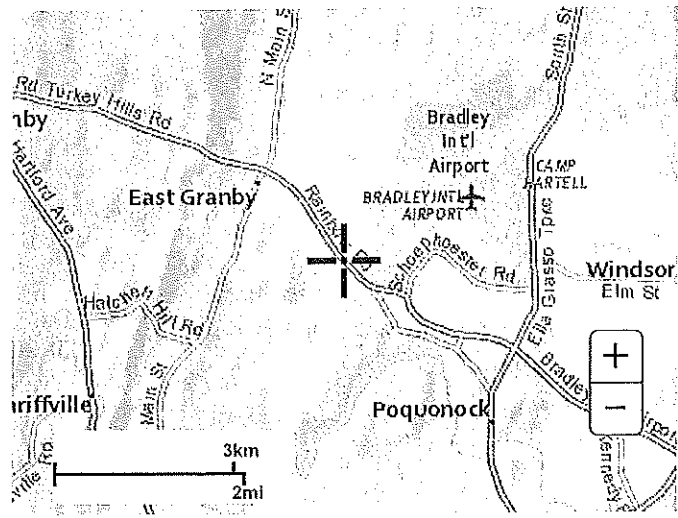
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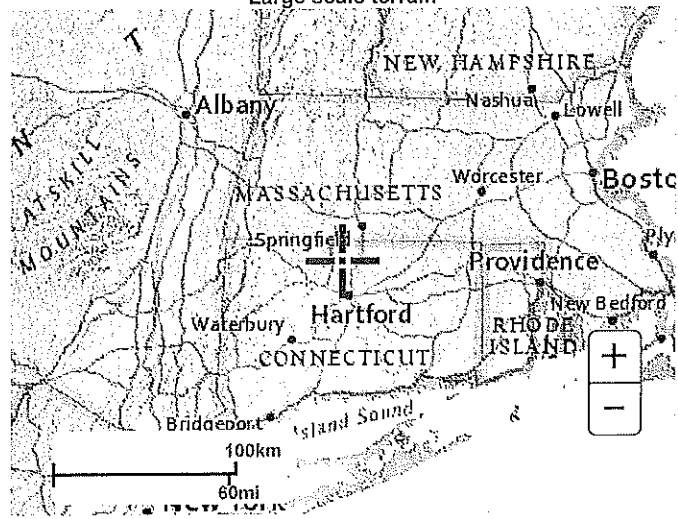
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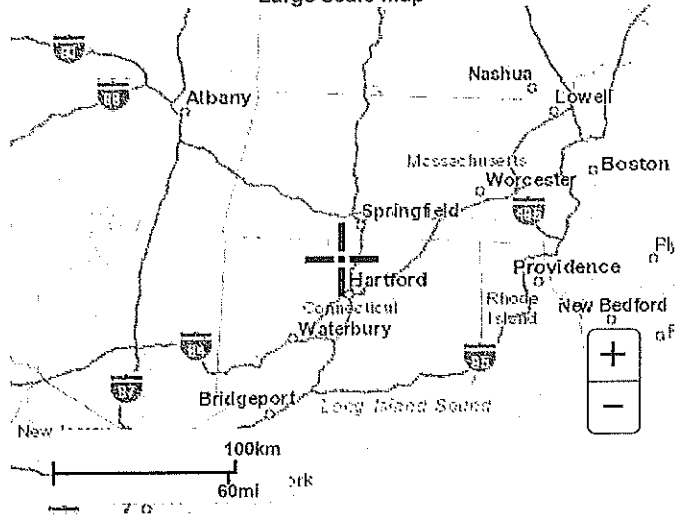
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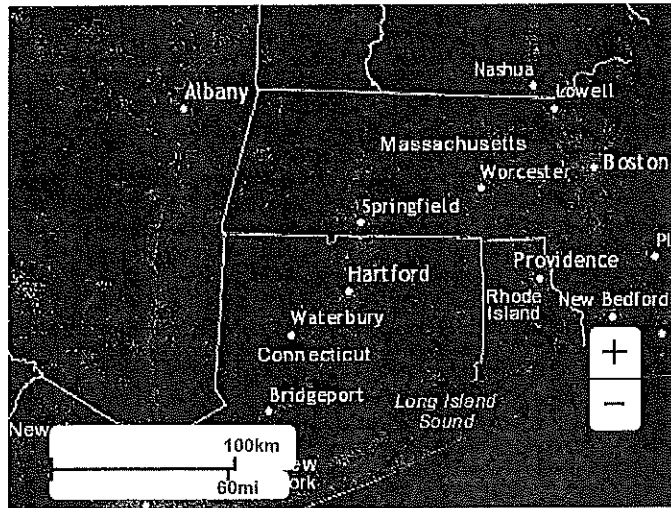
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APPENDIX B

PRE-DEVELOPMENT HYDROLOGY
(2-, 10-, 25-, and 100-year storms)
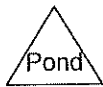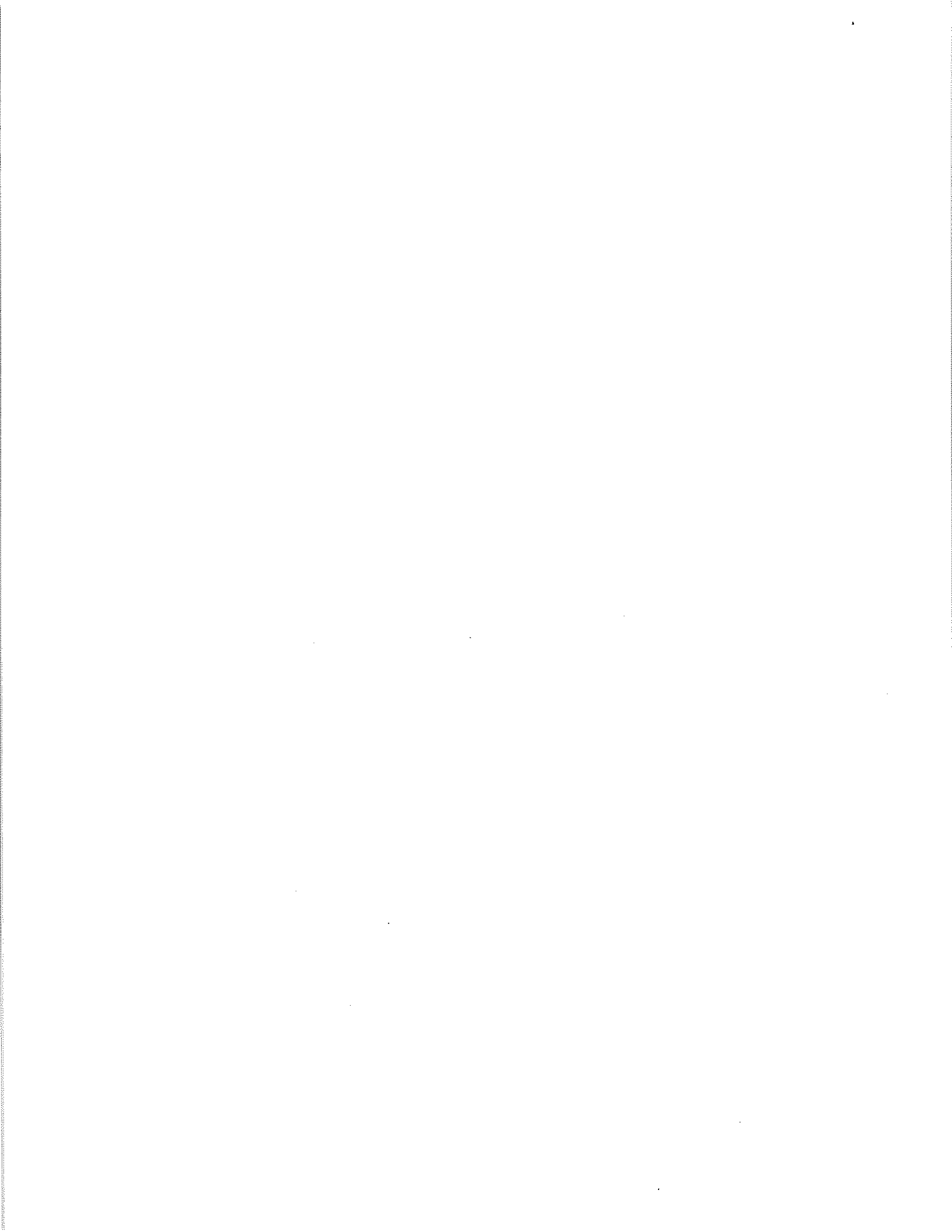
EDA-1
PARKING LOT 1

EDA-2
PARKING LOT 2

DP-1

MUNICIPAL DRAINAGE
NETWORK

Subcat   Reach   Pond   Link

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EDA-1: PARKING LOT 1   Runoff Area=63,925 sf 44.95% Impervious Runoff Depth=1.30"
Flow Length=289' Tc=9.6 min CN=78 Runoff=2.15 cfs 6,901 cf

Subcatchment EDA-2: PARKING LOT 2   Runoff Area=43,294 sf 16.63% Impervious Runoff Depth=0.70"
Flow Length=306' Tc=8.4 min CN=67 Runoff=0.69 cfs 2,536 cf

Link DP-1: MUNICIPAL DRAINAGE NETWORK   Inflow=2.84 cfs 9,436 cf
Primary=2.84 cfs 9,436 cf

Total Runoff Area = 107,219 sf   Runoff Volume = 9,436 cf   Average Runoff Depth = 1.06"
66.48% Pervious = 71,283 sf   33.52% Impervious = 35,936 sf

Summary for Subcatchment EDA-1: PARKING LOT 1

Runoff   =   2.15 cfs @ 12.09 hrs, Volume=   6,901 cf, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
East Granby, CT NOAA Rainfall 24-hr S1 2-yr Rainfall=3.23"

Area (sf)	CN	Description
35,189	61	>75% Grass cover, Good, HSG B
28,736	98	Paved parking, HSG B
63,925	78	Weighted Average
35,189		55.05% Pervious Area
28,736		44.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	100	0.0400	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.22"
1.8	121	0.0247	1.10		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	68	0.0220	3.01		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.6	289	Total			

Subcatchment EDA-1: PARKING LOT 1

Hydrograph

East Granby
CT NOAA Rainfall 24-hr S1 2-yr
Rainfall=3.23"
Runoff Area=63,925 sf
Runoff Volume=6,901 cf
Runoff Depth=1.30"
Flow Length=289'
Tc=9.6 min
CN=78

Summary for Subcatchment EDA-2: PARKING LOT 2

Runoff   =   0.69 cfs @ 12.08 hrs, Volume=   2,536 cf, Depth= 0.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
East Granby, CT NOAA Rainfall 24-hr S1 2-yr Rainfall=3.23"

Area (sf)	CN	Description
36,094	61	>75% Grass cover, Good, HSG B
7,200	98	Paved parking, HSG B
43,294	67	Weighted Average
36,094		83.37% Pervious Area
7,200		16.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.0450	0.24		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.22"
0.3	35	0.0570	1.67		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.9	132	0.0227	2.43		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	39	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.4	306				Total

Subcatchment EDA-2: PARKING LOT 2

Hydrograph

East Granby
CT NOAA Rainfall 24-hr S1 2-yr
Rainfall=3.23"
Runoff Area=43,294 sf
Runoff Volume=2,536 cf
Runoff Depth=0.70"
Flow Length=306'
Tc=8.4 min
CN=67

Summary for Link DP-1: MUNICIPAL DRAINAGE NETWORK

Inflow Area =   107,219 sf, 33.52% Impervious, Inflow Depth = 1.06"   for 2-yr event
Inflow   =   2.84 cfs @   12.08 hrs, Volume=   9,436 cf
Primary   =   2.84 cfs @   12.08 hrs, Volume=   9,436 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link DP-1: MUNICIPAL DRAINAGE NETWORK

Hydrograph
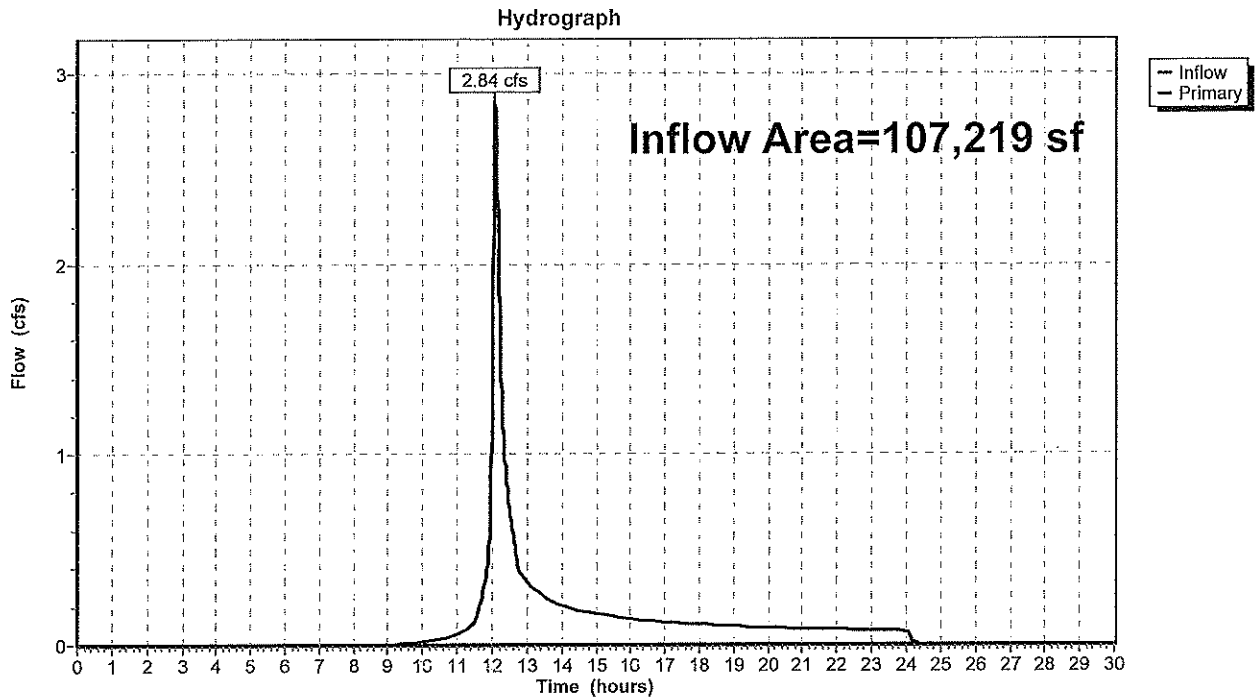
Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EDA-1: PARKING LOT 1   Runoff Area=63,925 sf 44.95% Impervious Runoff Depth=2.87"
Flow Length=289' Tc=9.6 min CN=78 Runoff=4.61 cfs 15,263 cf

Subcatchment EDA-2: PARKING LOT 2   Runoff Area=43,294 sf 16.63% Impervious Runoff Depth=1.93"
Flow Length=306' Tc=8.4 min CN=67 Runoff=2.14 cfs 6,961 cf

Link DP-1: MUNICIPAL DRAINAGE NETWORK   Inflow=6.72 cfs 22,224 cf
Primary=6.72 cfs 22,224 cf

Total Runoff Area = 107,219 sf   Runoff Volume = 22,224 cf   Average Runoff Depth = 2.49"
66.48% Pervious = 71,283 sf   33.52% Impervious = 35,936 sf

Summary for Subcatchment EDA-1: PARKING LOT 1

Runoff   =   4.61 cfs @ 12.08 hrs, Volume=   15,263 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
East Granby, CT NOAA Rainfall 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
35,189	61	>75% Grass cover, Good, HSG B
28,736	98	Paved parking, HSG B
63,925	78	Weighted Average
35,189		55.05% Pervious Area
28,736		44.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	100	0.0400	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.22"
1.8	121	0.0247	1.10		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	68	0.0220	3.01		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.6	289	Total			

Subcatchment EDA-1: PARKING LOT 1

Hydrograph

East Granby
CT NOAA Rainfall 24-hr S1 10-yr
Rainfall=5.18"
Runoff Area=63,925 sf
Runoff Volume=15,263 cf
Runoff Depth=2.87"
Flow Length=289'
Tc=9.6 min
CN=78

Summary for Subcatchment EDA-2: PARKING LOT 2
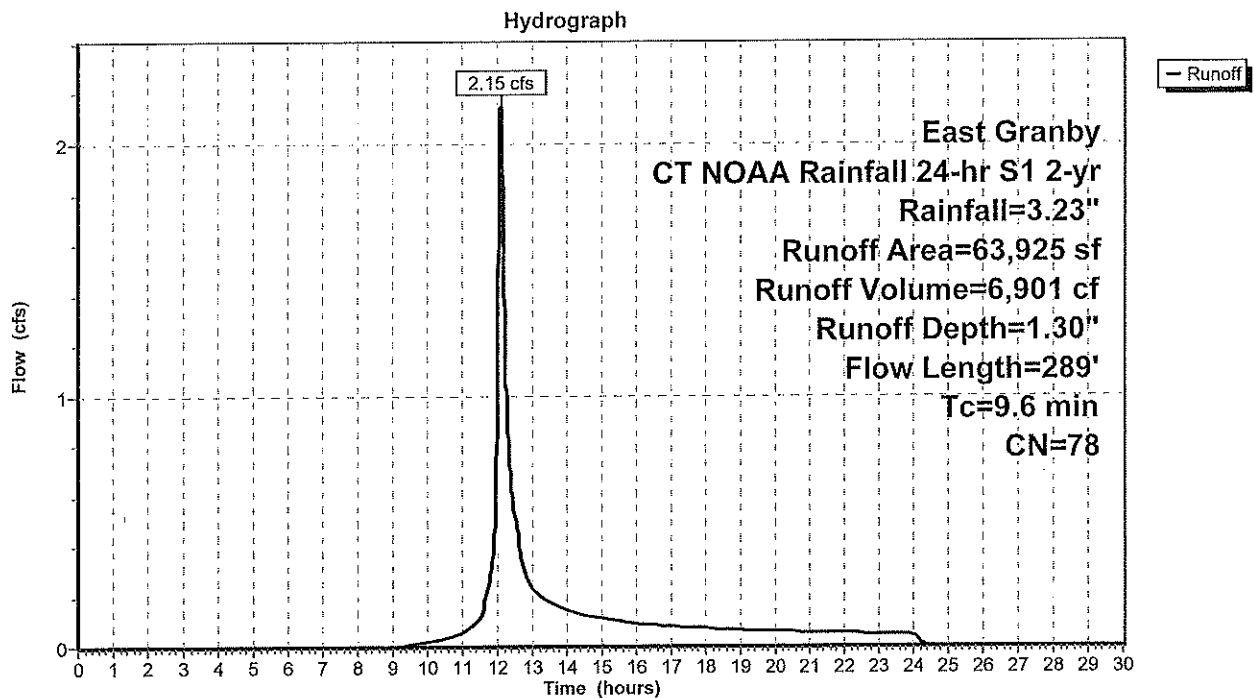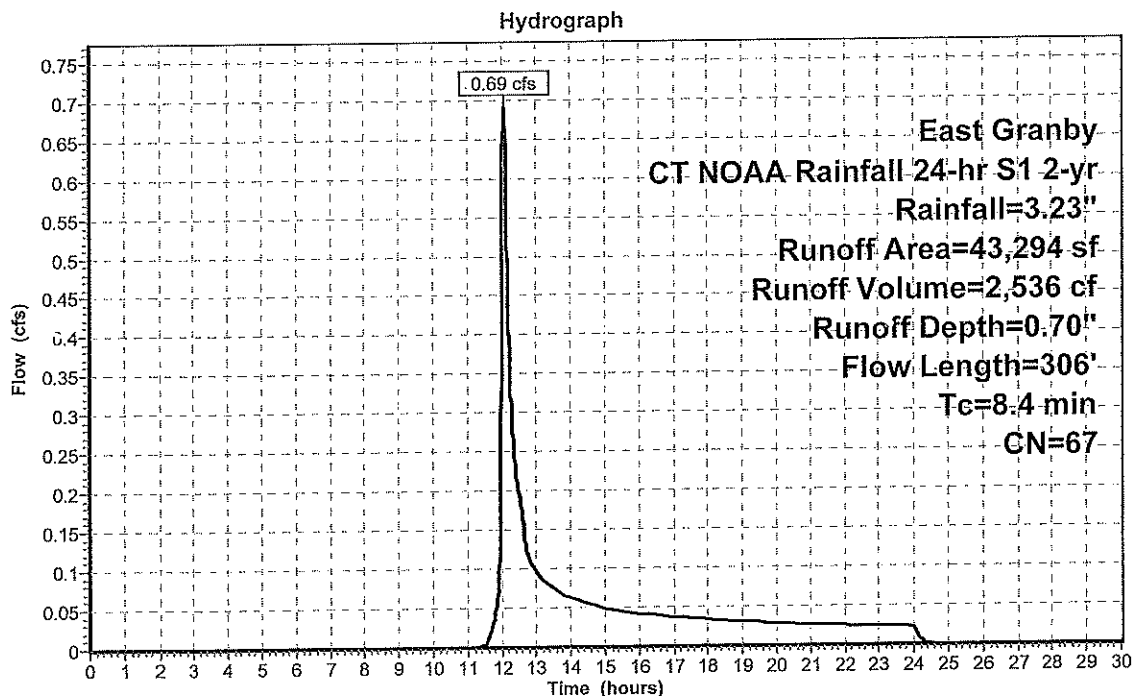
Runoff   =   2.14 cfs @   12.07 hrs, Volume=   6,961 cf, Depth= 1.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
East Granby, CT NOAA Rainfall 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
36,094	61	>75% Grass cover, Good, HSG B
7,200	98	Paved parking, HSG B
43,294	67	Weighted Average
36,094		83.37% Pervious Area
7,200		16.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.0450	0.24		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.22"
0.3	35	0.0570	1.67		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.9	132	0.0227	2.43		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	39	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.4	306	Total			

Subcatchment EDA-2: PARKING LOT 2

Hydrograph

East Granby
CT NOAA Rainfall 24-hr S1 10-yr
Rainfall=5.18"
Runoff Area=43,294 sf
Runoff Volume=6,961 cf
Runoff Depth=1.93"
Flow Length=306'
Tc=8.4 min
CN=67

Summary for Link DP-1: MUNICIPAL DRAINAGE NETWORK

Inflow Area =   107,219 sf, 33.52% Impervious, Inflow Depth = 2.49"   for 10-yr event
Inflow   =   6.72 cfs @   12.08 hrs, Volume=   22,224 cf
Primary   =   6.72 cfs @   12.08 hrs, Volume=   22,224 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link DP-1: MUNICIPAL DRAINAGE NETWORK

Hydrograph
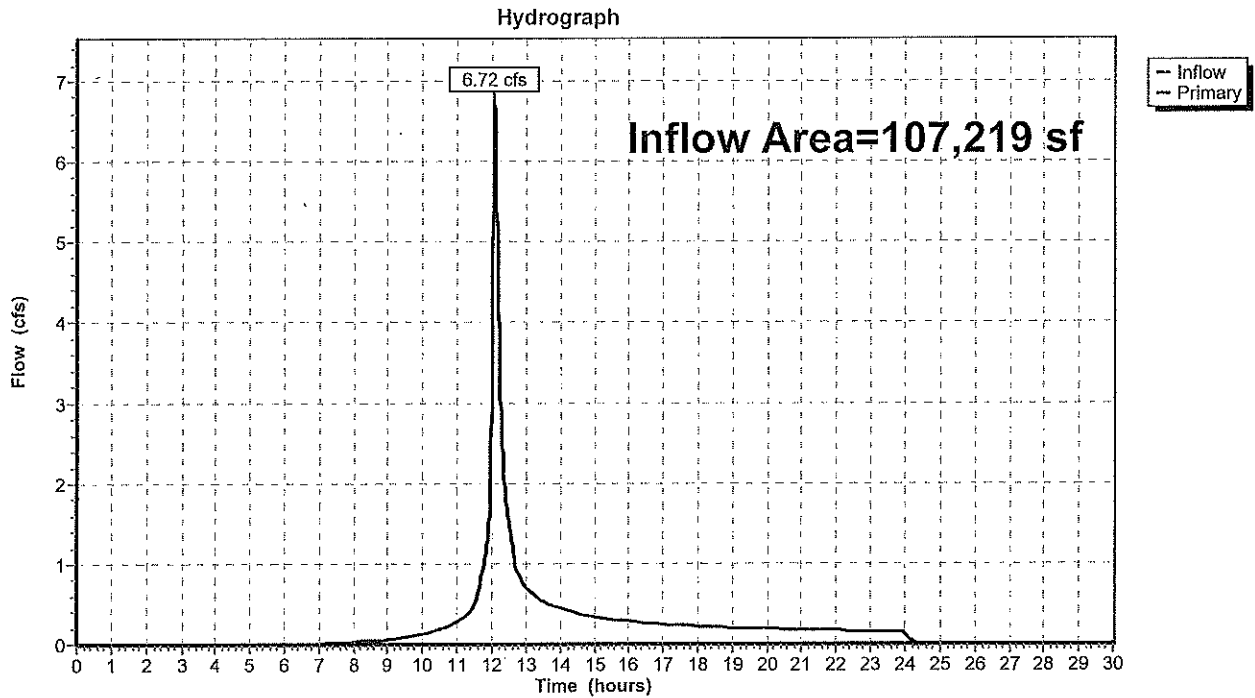
Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EDA-1: PARKING LOT 1   Runoff Area=63,925 sf 44.95% Impervious Runoff Depth=3.93"
Flow Length=289' Tc=9.6 min CN=78 Runoff=6.20 cfs 20,911 cf

Subcatchment EDA-2: PARKING LOT 2   Runoff Area=43,294 sf 16.63% Impervious Runoff Depth=2.83"
Flow Length=306' Tc=8.4 min CN=67 Runoff=3.16 cfs 10,203 cf

Link DP-1: MUNICIPAL DRAINAGE NETWORK   Inflow=9.32 cfs 31,114 cf
Primary=9.32 cfs 31,114 cf

Total Runoff Area = 107,219 sf   Runoff Volume = 31,114 cf   Average Runoff Depth = 3.48"
66.48% Pervious = 71,283 sf   33.52% Impervious = 35,936 sf

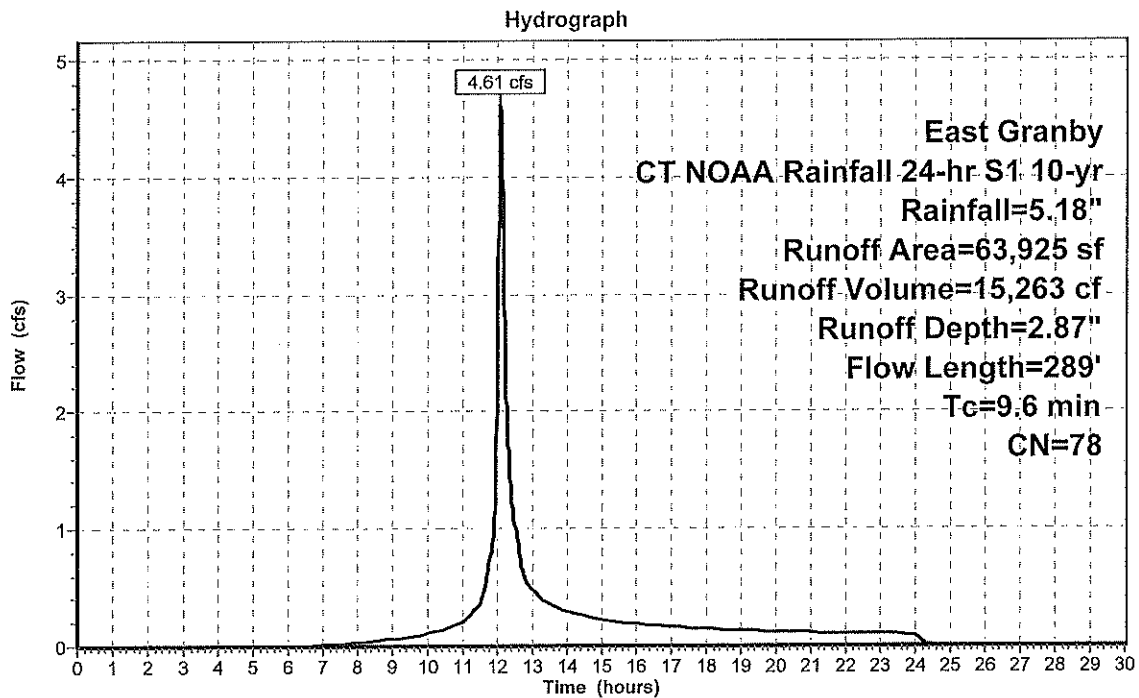## Summary for Subcatchment EDA-1: PARKING LOT 1

Runoff   =   6.20 cfs @ 12.08 hrs, Volume=   20,911 cf, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
East Granby, CT NOAA Rainfall 24-hr S1 25-yr Rainfall=6.39"

Area (sf)	CN	Description
35,189	61	>75% Grass cover, Good, HSG B
28,736	98	Paved parking, HSG B
63,925	78	Weighted Average
35,189		55.05% Pervious Area
28,736		44.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	100	0.0400	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.22"
1.8	121	0.0247	1.10		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	68	0.0220	3.01		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.6	289	Total			

Subcatchment EDA-1: PARKING LOT 1

Hydrograph

East Granby
CT NOAA Rainfall 24-hr S1 25-yr
Rainfall=6.39"
Runoff Area=63,925 sf
Runoff Volume=20,911 cf
Runoff Depth=3.93"
Flow Length=289'
Tc=9.6 min
CN=78

6.20 cfs

— Runoff

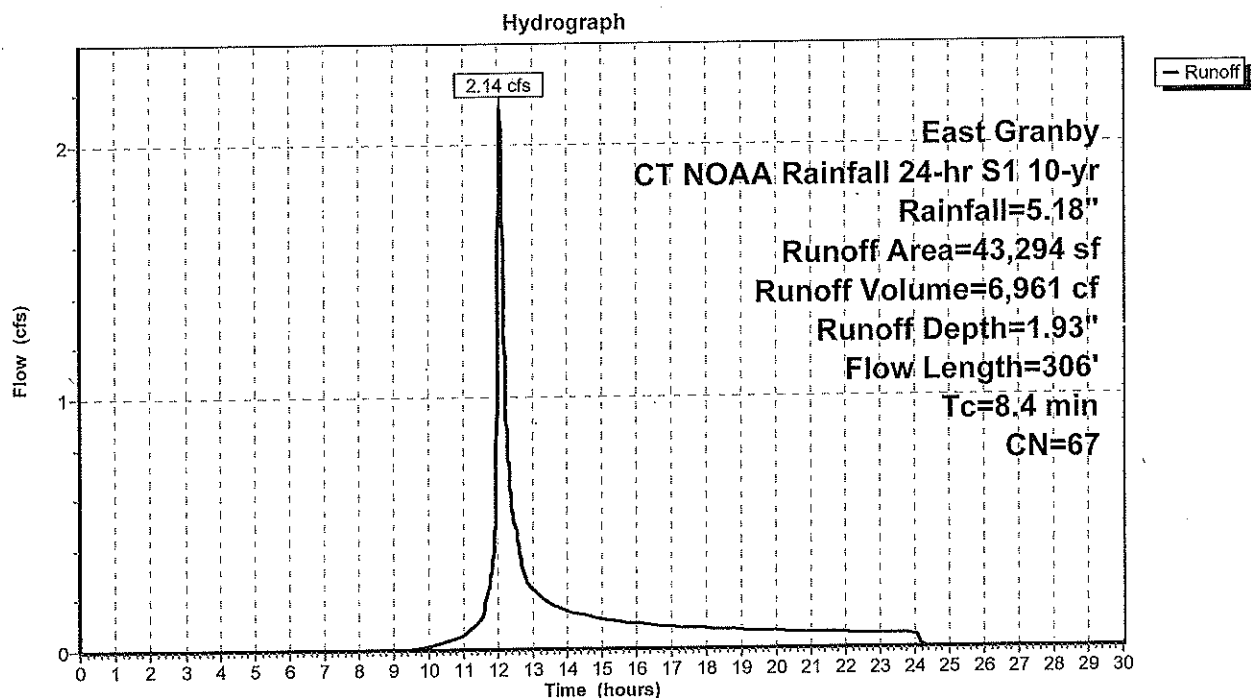## Summary for Subcatchment EDA-2: PARKING LOT 2

Runoff   =   3.16 cfs @ 12.07 hrs, Volume=   10,203 cf, Depth= 2.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
East Granby, CT NOAA Rainfall 24-hr S1 25-yr Rainfall=6.39"

Area (sf)	CN	Description
36,094	61	>75% Grass cover, Good, HSG B
7,200	98	Paved parking, HSG B
43,294	67	Weighted Average
36,094		83.37% Pervious Area
7,200		16.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.0450	0.24		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.22"
0.3	35	0.0570	1.67		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.9	132	0.0227	2.43		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	39	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.4	306	Total			

Subcatchment EDA-2: PARKING LOT 2

Hydrograph

East Granby
CT NOAA Rainfall 24-hr S1 25-yr
Rainfall=6.39"
Runoff Area=43,294 sf
Runoff Volume=10,203 cf
Runoff Depth=2.83"
Flow Length=306'
Tc=8.4 min
CN=67

Summary for Link DP-1: MUNICIPAL DRAINAGE NETWORK

Inflow Area =		107,219 sf, 33.52% Impervious, Inflow Depth = 3.48" for 25-yr event		
Inflow	=	9.32 cfs @ 12.08 hrs, Volume=	31,114 cf	
Primary	=	9.32 cfs @ 12.08 hrs, Volume=	31,114 cf, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link DP-1: MUNICIPAL DRAINAGE NETWORK

Hydrograph
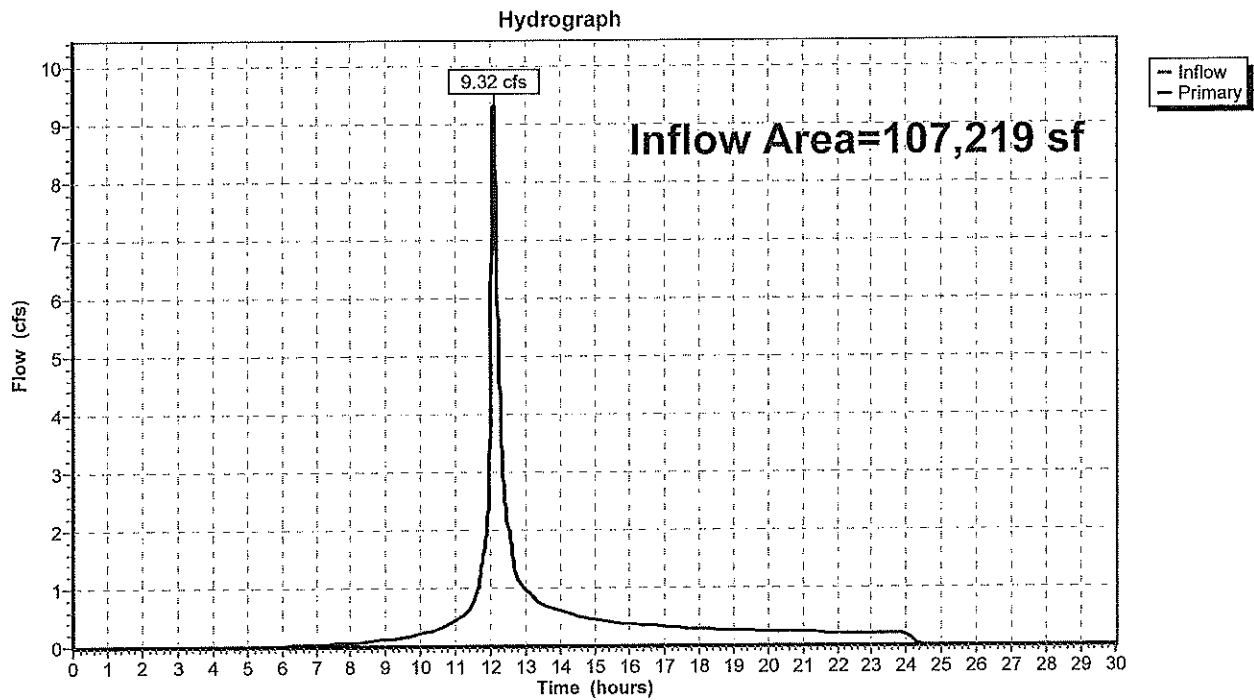
Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EDA-1: PARKING LOT 1   Runoff Area=63,925 sf 44.95% Impervious Runoff Depth=5.63"
Flow Length=289' Tc=9.6 min CN=78 Runoff=8.65 cfs 30,001 cf

Subcatchment EDA-2: PARKING LOT 2   Runoff Area=43,294 sf 16.63% Impervious Runoff Depth=4.34"
Flow Length=306' Tc=8.4 min CN=67 Runoff=4.82 cfs 15,651 cf

Link DP-1: MUNICIPAL DRAINAGE NETWORK   Inflow=13.41 cfs 45,652 cf
Primary=13.41 cfs 45,652 cf

Total Runoff Area = 107,219 sf   Runoff Volume = 45,652 cf   Average Runoff Depth = 5.11"
66.48% Pervious = 71,283 sf   33.52% Impervious = 35,936 sf

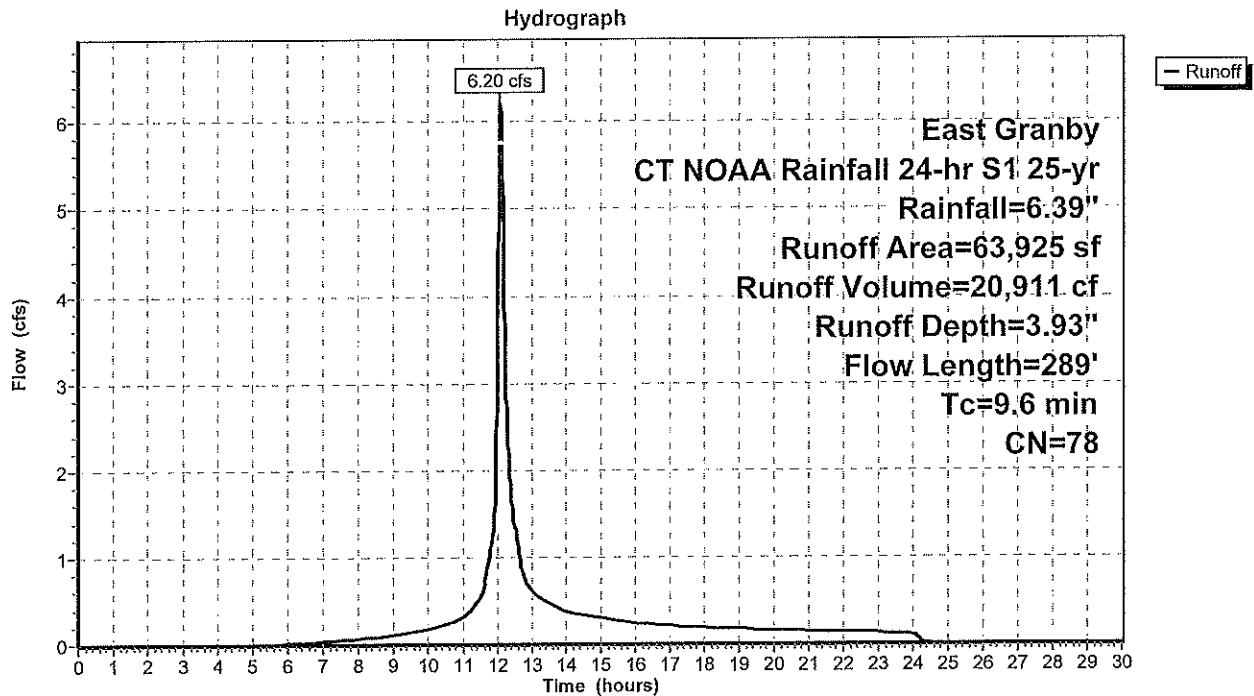## Summary for Subcatchment EDA-1: PARKING LOT 1

Runoff   =   8.65 cfs @ 12.08 hrs, Volume=   30,001 cf, Depth= 5.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
East Granby, CT NOAA Rainfall 24-hr S1 100-yr Rainfall=8.26"

Area (sf)	CN	Description
35,189	61	>75% Grass cover, Good, HSG B
28,736	98	Paved parking, HSG B
63,925	78	Weighted Average
35,189		55.05% Pervious Area
28,736		44.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	100	0.0400	0.23		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.22"
1.8	121	0.0247	1.10		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.4	68	0.0220	3.01		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.6	289	Total			

Subcatchment EDA-1: PARKING LOT 1

Hydrograph

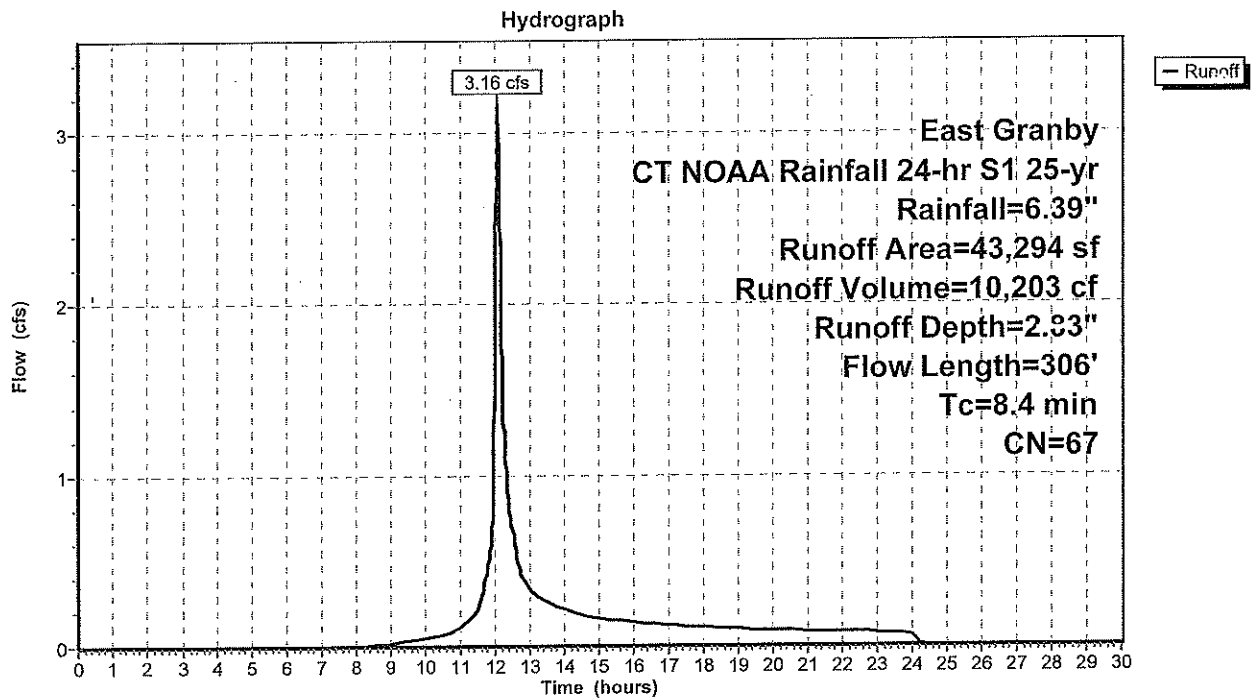## Summary for Subcatchment EDA-2: PARKING LOT 2

Runoff   =   4.82 cfs @ 12.07 hrs, Volume=   15,651 cf, Depth= 4.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
East Granby, CT NOAA Rainfall 24-hr S1 100-yr Rainfall=8.26"

Area (sf)	CN	Description
36,094	61	>75% Grass cover, Good, HSG B
7,200	98	Paved parking, HSG B
43,294	67	Weighted Average
36,094		83.37% Pervious Area
7,200		16.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	100	0.0450	0.24		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.22"
0.3	35	0.0570	1.67		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.9	132	0.0227	2.43		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.1	39	0.1000	6.42		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.4	306	Total			

Subcatchment EDA-2: PARKING LOT 2

Hydrograph

East Granby
CT NOAA Rainfall 24-hr S1 100-yr
Rainfall=8.26"
Runoff Area=43,294 sf
Runoff Volume=15,651 cf
Runoff Depth=4.34"
Flow Length=306'
Tc=8.4 min
CN=67

Summary for Link DP-1: MUNICIPAL DRAINAGE NETWORK

Inflow Area =	107,219 sf, 33.52% Impervious,	Inflow Depth = 5.11"	for 100-yr event
Inflow =	13.41 cfs @ 12.08 hrs, Volume=	45,652 cf	
Primary =	13.41 cfs @ 12.08 hrs, Volume=	45,652 cf, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link DP-1: MUNICIPAL DRAINAGE NETWORK

Architecture
Engineering
Environmental
Land Surveying

Companies

An Employee-Owned Company
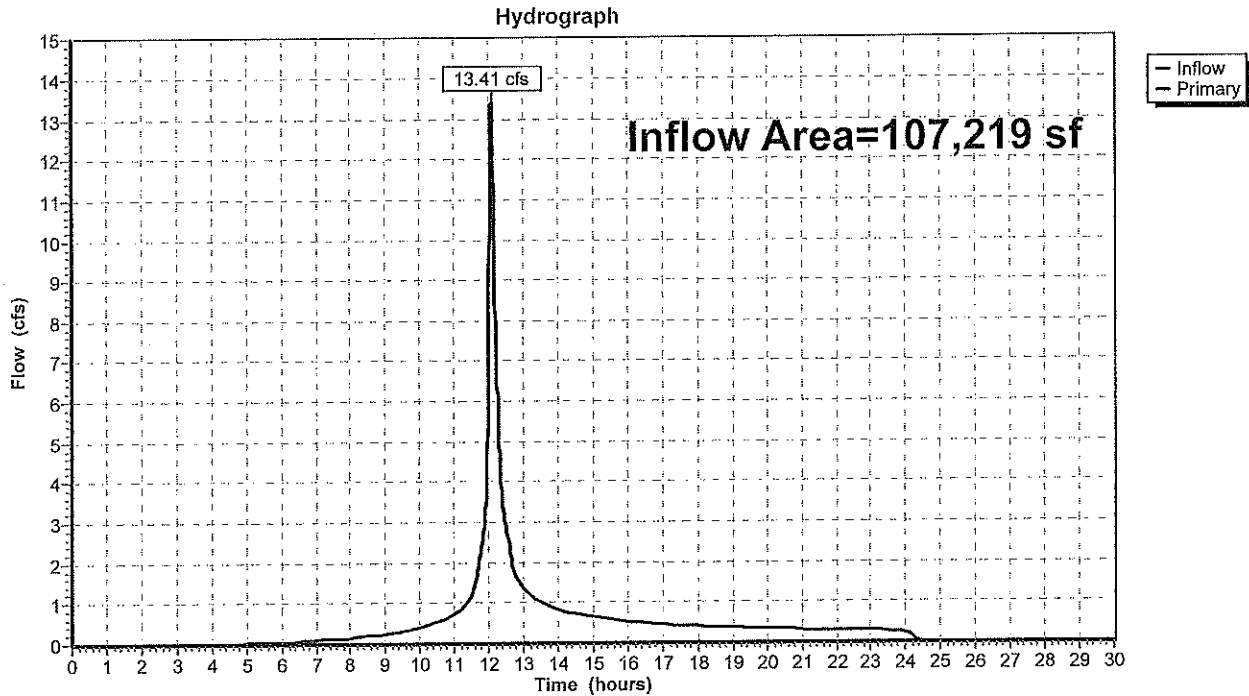
APPENDIX C

POST-DEVELOPMENT HYDROLOGY
(2-, 10-, 25-, and 100-year storms)
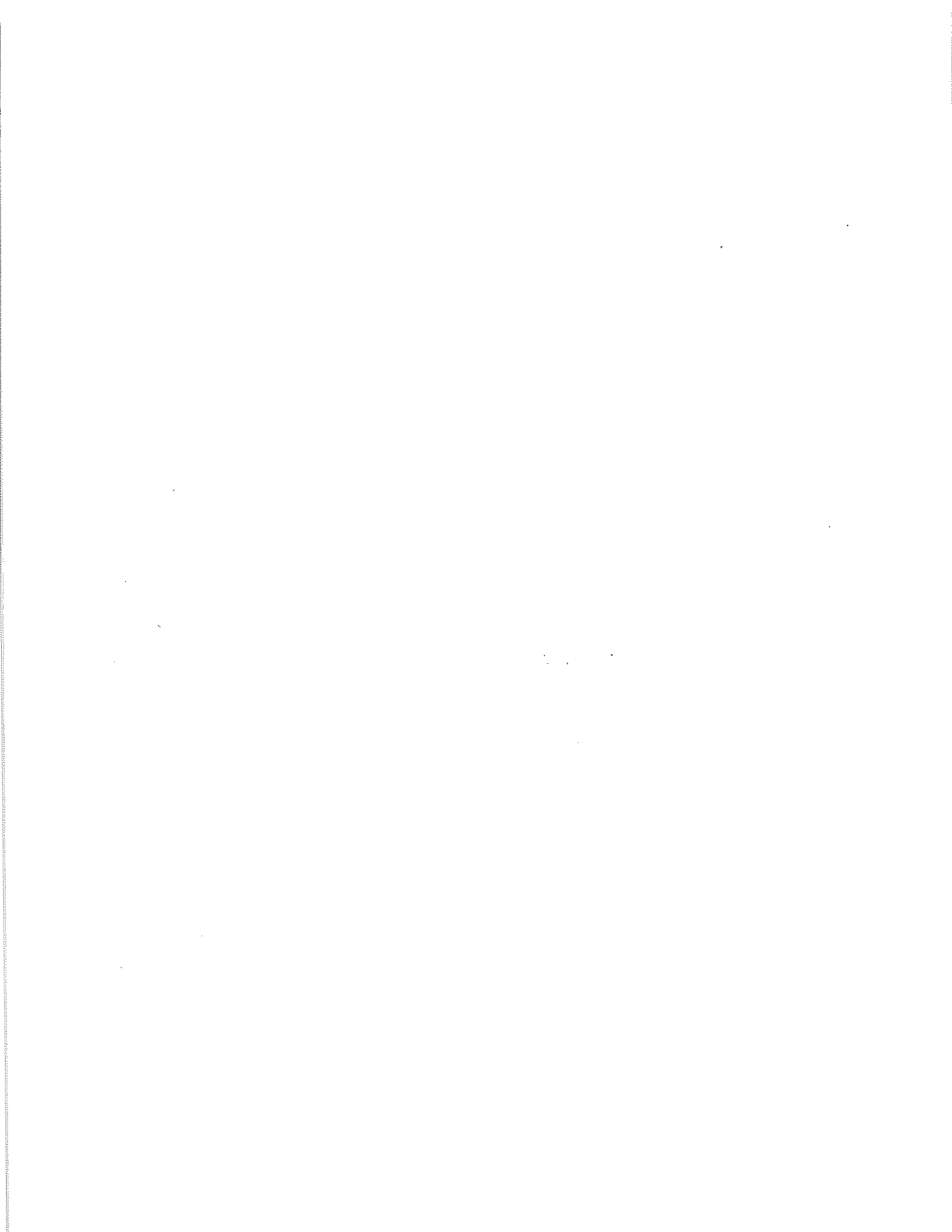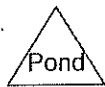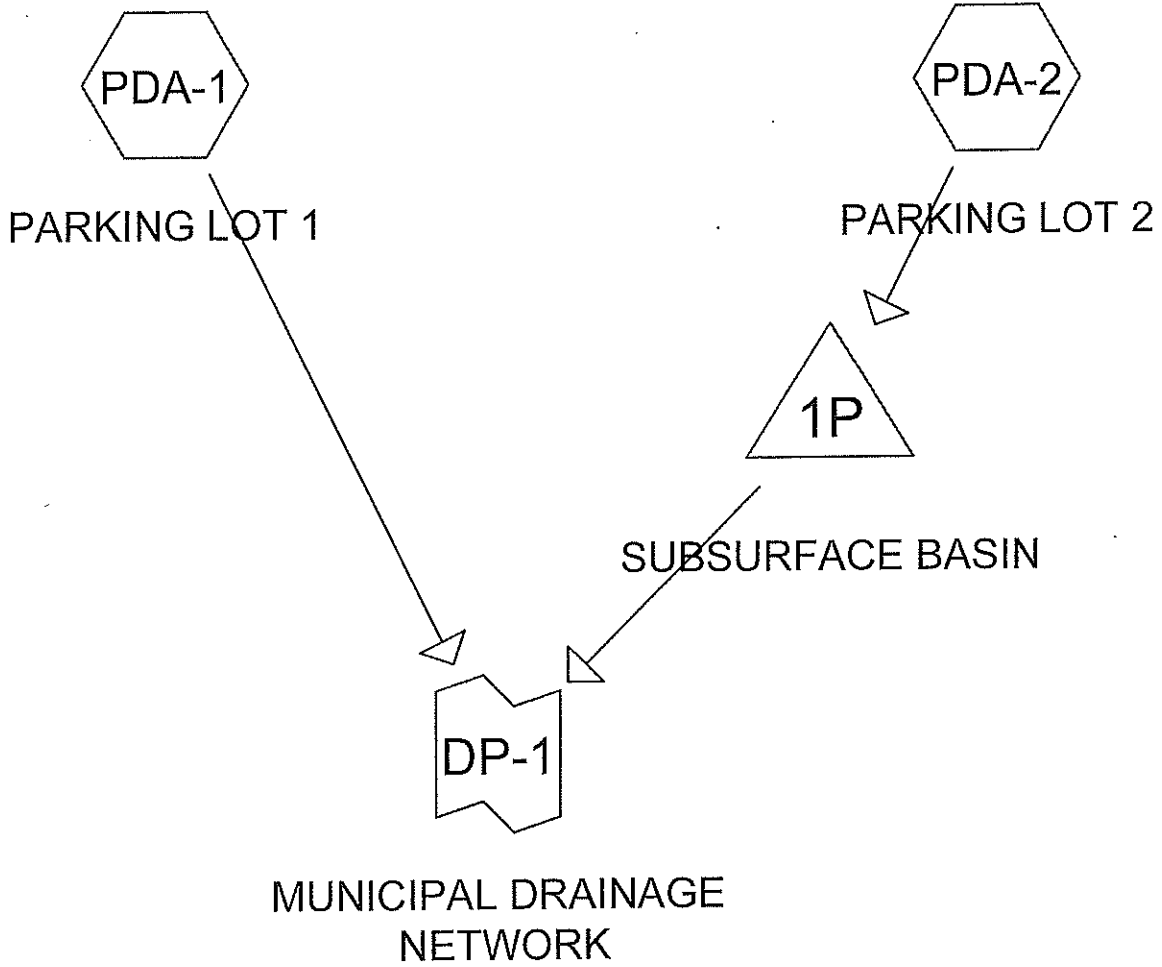
PDA-1

PARKING LOT 1

PDA-2

PARKING LOT 2

1P

SUBSURFACE BASIN

DP-1

MUNICIPAL DRAINAGE
NETWORK

Subcat   Reach   Pond   Link

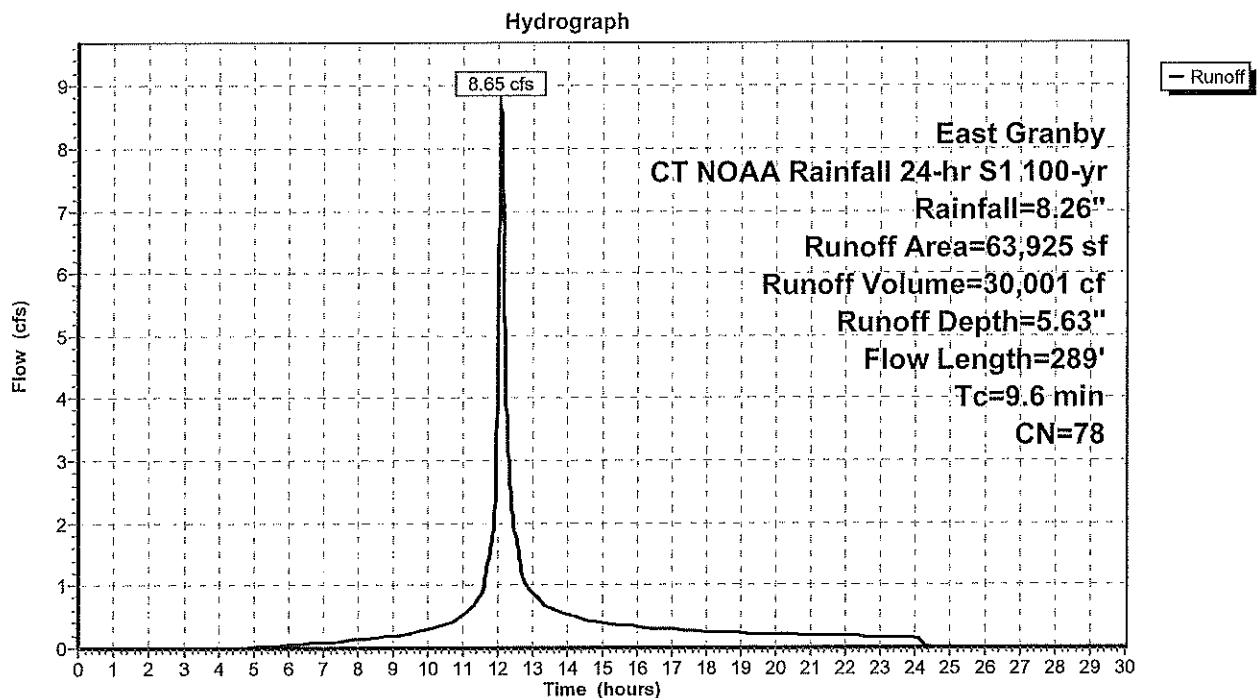## Summary for Subcatchment PDA-1: PARKING LOT 1

Runoff   =   2.79 cfs @ 12.08 hrs, Volume=   8,704 cf, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
East Granby, CT NOAA Rainfall 24-hr S1 2-yr Rainfall=3.23"

Area (sf)	CN	Description
25,499	61	>75% Grass cover, Good, HSG B
38,426	98	Paved parking, HSG B
63,925	83	Weighted Average
25,499		39.89% Pervious Area
38,426		60.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	100	0.0350	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.22"
1.0	60	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.8	128	0.0195	2.83		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.6	288	Total			

Subcatchment PDA-1: PARKING LOT 1

Hydrograph

East Granby
CT NOAA Rainfall 24-hr S1 2-yr
Rainfall=3.23"
Runoff Area=63,925 sf
Runoff Volume=8,704 cf
Runoff Depth=1.63"
Flow Length=288'
Tc=9.6 min
CN=83

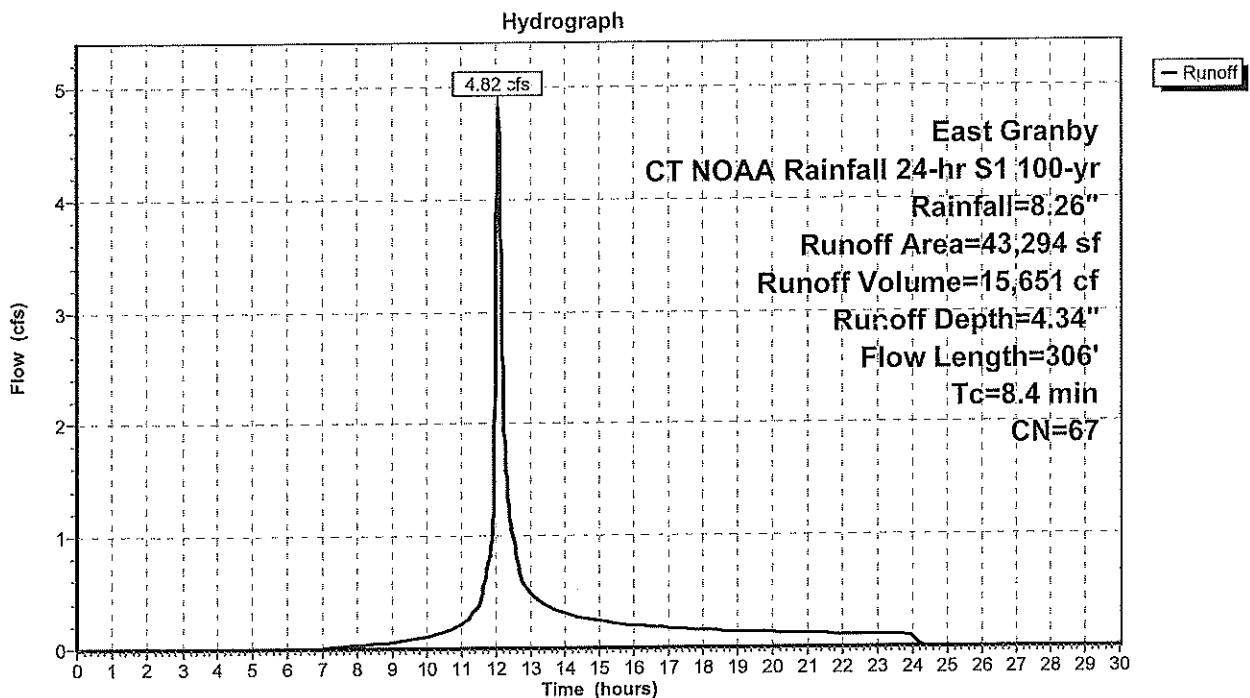## Summary for Subcatchment PDA-2: PARKING LOT 2

Runoff   =   3.56 cfs @ 12.03 hrs, Volume=   8,744 cf, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
East Granby, CT NOAA Rainfall 24-hr S1 2-yr Rainfall=3.23"

Area (sf)	CN	Description
6,858	61	>75% Grass cover, Good, HSG B
36,093	98	Paved parking, HSG B
1,153	96	Gravel surface, HSG B
44,104	92	Weighted Average
8,011		18.16% Pervious Area
36,093		81.84% Impervious Area

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

Subcatchment PDA-2: PARKING LOT 2

Hydrograph

East Granby
CT NOAA Rainfall 24-hr S1 2-yr
Rainfall=3.23"
Runoff Area=44,104 sf
Runoff Volume=8,744 cf
Runoff Depth=2.38"
Tc=5.0 min
CN=92

Summary for Pond 1P: SUBSURFACE BASIN

Inflow Area =		44,104 sf, 81.84% Impervious,	Inflow Depth = 2.38" for 2-yr event	
Inflow	=	3.56 cfs @ 12.03 hrs,	Volume=	8,744 cf
Outflow	=	0.53 cfs @ 12.45 hrs,	Volume=	8,744 cf, Atten= 85%, Lag= 25.3 min
Discarded =		0.53 cfs @ 12.45 hrs,	Volume=	8,744 cf
Primary	=	0.00 cfs @ 0.00 hrs,	Volume=	0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 163.51' @ 12.45 hrs   Surf.Area= 2,316 sf   Storage= 1,980 cf

Plug-Flow detention time= 20.8 min calculated for 8,741 cf (100% of inflow)
Center-of-Mass det. time= 20.8 min (828.1 - 807.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	162.10'	3,287 cf	**29.92'W x 77.40'L x 5.50'H Field A** 12,736 cf Overall - 4,517 cf Embedded = 8,218 cf x 40.0% Voids
#2A	162.85'	4,517 cf	**ADS_StormTech MC-3500 d +Cap** x 40 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 40 Chambers in 4 Rows Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf
		7,805 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	165.60'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	162.10'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 155.00'

Discarded OutFlow Max=0.53 cfs @ 12.45 hrs HW=163.51' (Free Discharge)
└─**2=Exfiltration** (Controls 0.53 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=162.10' (Free Discharge)
└─**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: SUBSURFACE BASIN - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

10 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 75.40' Row Length +12.0" End Stone x 2 = 77.40' Base Length
4 Rows x 77.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 29.92' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

40 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 4 Rows = 4,517.3 cf Chamber Storage

12,735.5 cf Field - 4,517.3 cf Chambers = 8,218.2 cf Stone x 40.0% Voids = 3,287.3 cf Stone Storage

Chamber Storage + Stone Storage = 7,804.6 cf = 0.179 af
Overall Storage Efficiency = 61.3%
Overall System Size = 77.40' x 29.92' x 5.50'

40 Chambers
471.7 cy Field
304.4 cy Stone

C-DATA-2200330-POST-CONSTR *East Granby, CT NOAA Rainfall 24-hr S1 2-yr Rainfall=3.23"*

Prepared by BL Companies

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Pond 1P: SUBSURFACE BASIN

Hydrograph

Inflow Area=44,104 sf
Peak Elev=163.51'
Storage=1,980 cf

3.56 cfs

0.53 cfs

0.00 cfs

Legend:
- Inflow
- Outflow
- Discarded
- Primary

Summary for Link DP-1: MUNICIPAL DRAINAGE NETWORK

Inflow Area =   108,029 sf, 68.98% Impervious, Inflow Depth = 0.97"   for 2-yr event
Inflow   =   2.79 cfs @ 12.08 hrs, Volume=   8,704 cf
Primary   =   2.79 cfs @ 12.08 hrs, Volume=   8,704 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link DP-1: MUNICIPAL DRAINAGE NETWORK

Hydrograph

Post-Construction

C-DATA-2200330-POST-CONST *East Granby, CT NOAA Rainfall 24-hr S1 10-yr Rainfall=5.18"*

Prepared by BL Companies

Printed 8/11/2022

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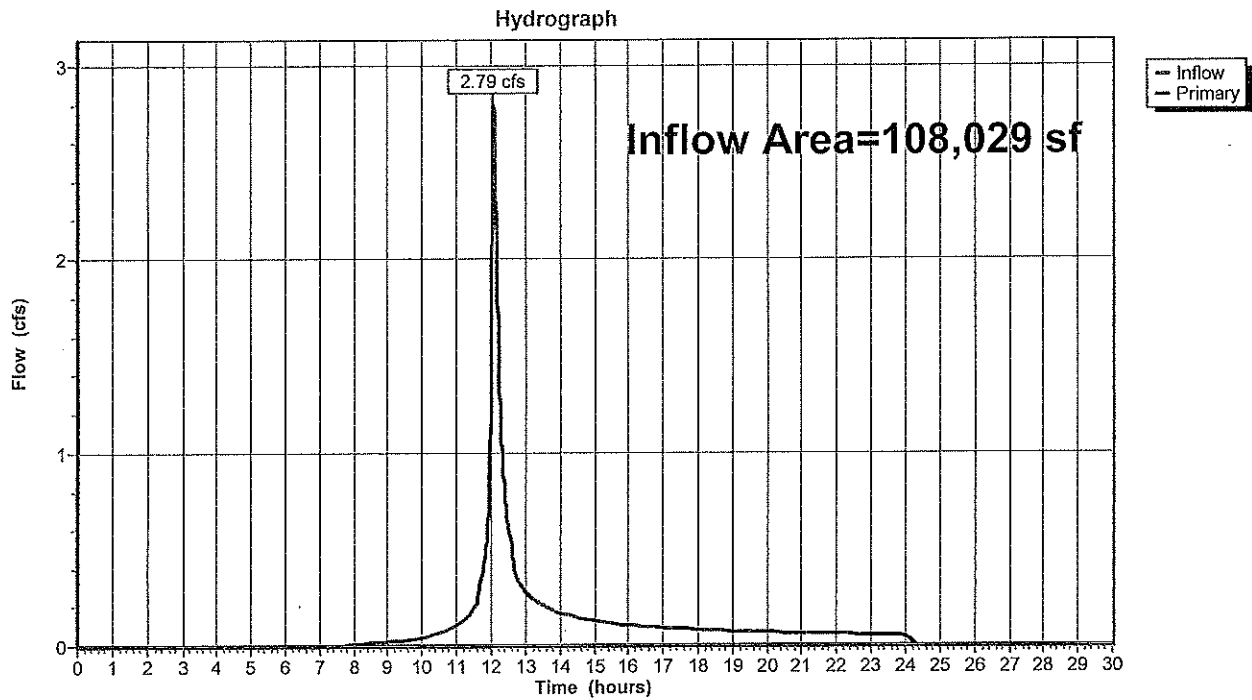
Summary for Subcatchment PDA-1: PARKING LOT 1

Runoff   =   5.36 cfs @ 12.08 hrs, Volume=   17,779 cf, Depth= 3.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
East Granby, CT NOAA Rainfall 24-hr S1 10-yr Rainfall=5.18"

Area (sf)	CN	Description
25,499	61	>75% Grass cover, Good, HSG B
38,426	98	Paved parking, HSG B
63,925	83	Weighted Average
25,499		39.89% Pervious Area
38,426		60.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	100	0.0350	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.22"
1.0	60	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.8	128	0.0195	2.83		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.6	288	Total			

Subcatchment PDA-1: PARKING LOT 1

Hydrograph

East Granby
CT NOAA Rainfall 24-hr S1 10-yr
Rainfall=5.18"
Runoff Area=63,925 sf
Runoff Volume=17,779 cf
Runoff Depth=3.34"
Flow Length=288'
Tc=9.6 min
CN=83

Post-Construction
C-DATA-2200330-POST-CONST *East Granby, CT NOAA Rainfall 24-hr S1 10-yr Rainfall=5.18"*
Prepared by BL Companies
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Summary for Subcatchment PDA-2: PARKING LOT 2

Runoff   =   5.79 cfs @ 12.03 hrs, Volume=   15,676 cf, Depth= 4.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
East Granby, CT NOAA Rainfall 24-hr S1 10-yr Rainfall=5.18"

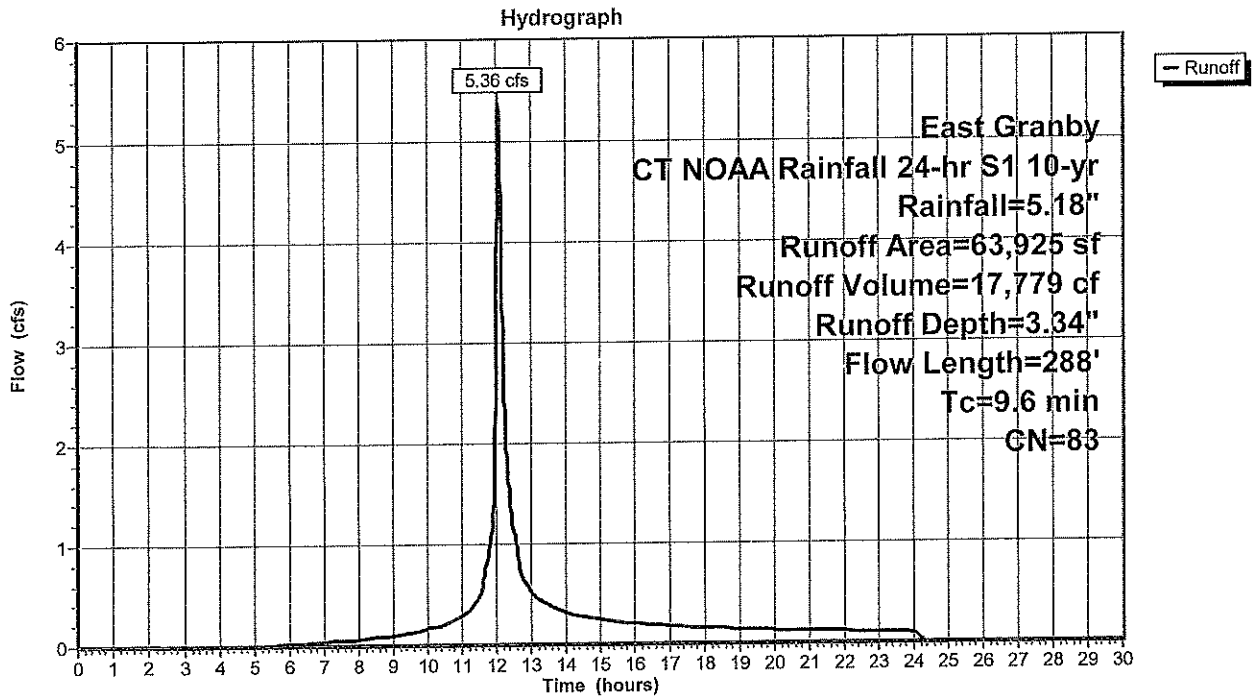| Area (sf)	CN	Description
6,858	61	>75% Grass cover, Good, HSG B
36,093	98	Paved parking, HSG B
1,153	96	Gravel surface, HSG B
44,104	92	Weighted Average
8,011		18.16% Pervious Area
36,093		81.84% Impervious Area

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

Subcatchment PDA-2: PARKING LOT 2

Hydrograph

East Granby
CT NOAA Rainfall 24-hr S1 10-yr
Rainfall=5.18"
Runoff Area=44,104 sf
Runoff Volume=15,676 cf
Runoff Depth=4.27"
Tc=5.0 min
CN=92

5.79 cfs

Summary for Pond 1P: SUBSURFACE BASIN

Inflow Area =	44,104 sf, 81.84% Impervious, Inflow Depth = 4.27" for 10-yr event	
Inflow =	5.79 cfs @ 12.03 hrs, Volume=	15,676 cf
Outflow =	0.61 cfs @ 12.59 hrs, Volume=	15,676 cf, Atten= 90%, Lag= 33.7 min
Discarded =	0.61 cfs @ 12.59 hrs, Volume=	15,676 cf
Primary =	0.00 cfs @ 0.00 hrs, Volume=	0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 164.72' @ 12.59 hrs   Surf.Area= 2,316 sf   Storage= 4,209 cf

Plug-Flow detention time= 43.6 min calculated for 15,671 cf (100% of inflow)
Center-of-Mass det. time= 43.6 min (832.9 - 789.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	162.10'	3,287 cf	**29.92'W x 77.40'L x 5.50'H Field A**
			12,736 cf Overall - 4,517 cf Embedded = 8,218 cf x 40.0% Voids
#2A	162.85'	4,517 cf	**ADS_StormTech MC-3500 d +Cap** x 40 Inside #1
			Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
			Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
			40 Chambers in 4 Rows
			Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf
		7,805 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	165.60'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	162.10'	**8.270 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 155.00'

Discarded OutFlow Max=0.61 cfs @ 12.59 hrs HW=164.72' (Free Discharge)
└—**2=Exfiltration** (Controls 0.61 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=162.10' (Free Discharge)
└—**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Post-Construction
C-DATA-2200330-POST-CONST *East Granby, CT NOAA Rainfall 24-hr S1 10-yr Rainfall=5.18"*
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Pond 1P: SUBSURFACE BASIN - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

10 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 75.40' Row Length +12.0" End Stone x 2 = 77.40' Base Length
4 Rows x 77.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 29.92' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

40 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 4 Rows = 4,517.3 cf Chamber Storage

12,735.5 cf Field - 4,517.3 cf Chambers = 8,218.2 cf Stone x 40.0% Voids = 3,287.3 cf Stone Storage

Chamber Storage + Stone Storage = 7,804.6 cf = 0.179 af
Overall Storage Efficiency = 61.3%
Overall System Size = 77.40' x 29.92' x 5.50'

40 Chambers
471.7 cy Field
304.4 cy Stone

Pond 1P: SUBSURFACE BASIN

Hydrograph

Inflow Area=44,104 sf
Peak Elev=164.72'
Storage=4,209 cf

Legend: Inflow, Outflow, Discarded, Primary

5.79 cfs

0.61 cfs

0.00 cfs

Flow (cfs) vs Time (hours)

Summary for Link DP-1: MUNICIPAL DRAINAGE NETWORK

Inflow Area =   108,029 sf, 68.98% Impervious, Inflow Depth = 1.97"   for 10-yr event
Inflow   =   5.36 cfs @ 12.08 hrs, Volume=   17,779 cf
Primary   =   5.36 cfs @ 12.08 hrs, Volume=   17,779 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link DP-1: MUNICIPAL DRAINAGE NETWORK

Hydrograph

Summary for Subcatchment PDA-1: PARKING LOT 1

Runoff   =   6.98 cfs @ 12.08 hrs, Volume=   23,731 cf, Depth= 4.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
East Granby, CT NOAA Rainfall 24-hr S1 25-yr Rainfall=6.39"

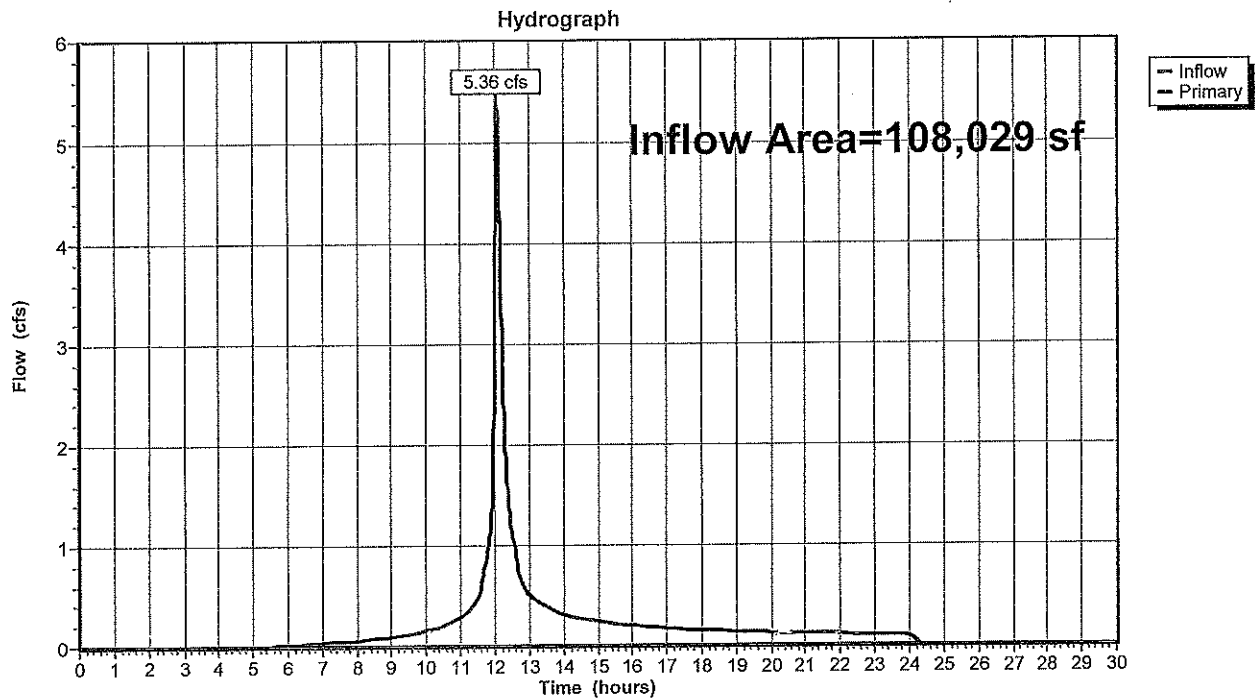| Area (sf)	CN	Description
25,499	61	>75% Grass cover, Good, HSG B
38,426	98	Paved parking, HSG B
63,925	83	Weighted Average
25,499		39.89% Pervious Area
38,426		60.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	100	0.0350	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.22"
1.0	60	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.8	128	0.0195	2.83		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.6	288	Total			

Subcatchment PDA-1: PARKING LOT 1

Hydrograph

East Granby
CT NOAA Rainfall 24-hr S1 25-yr
Rainfall=6.39"
Runoff Area=63,925 sf
Runoff Volume=23,731 cf
Runoff Depth=4.45"
Flow Length=288'
Tc=9.6 min
CN=83

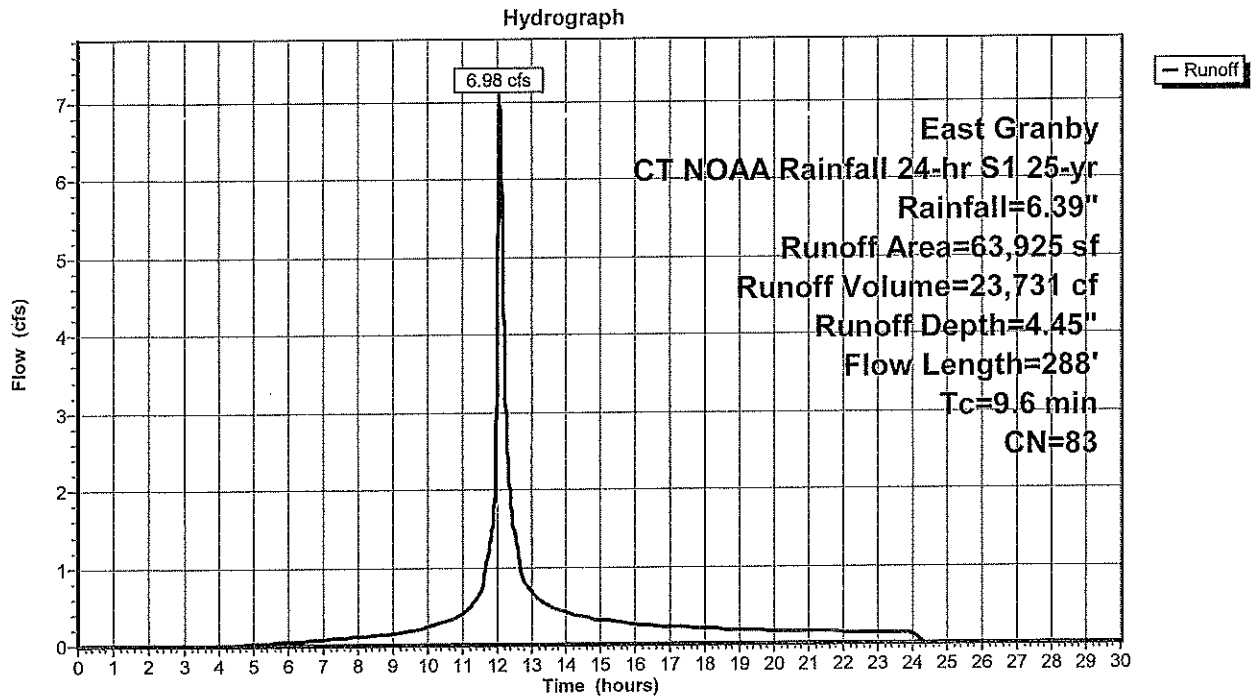## Summary for Subcatchment PDA-2: PARKING LOT 2

Runoff   =   7.15 cfs @ 12.03 hrs, Volume=   20,042 cf, Depth= 5.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
East Granby, CT NOAA Rainfall 24-hr S1 25-yr Rainfall=6.39"

Area (sf)	CN	Description
6,858	61	>75% Grass cover, Good, HSG B
36,093	98	Paved parking, HSG B
1,153	96	Gravel surface, HSG B
44,104	92	Weighted Average
8,011		18.16% Pervious Area
36,093		81.84% Impervious Area

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

Subcatchment PDA-2: PARKING LOT 2

Summary for Pond 1P: SUBSURFACE BASIN

Inflow Area =	44,104 sf, 81.84% Impervious,	Inflow Depth = 5.45" for 25-yr event
Inflow =	7.15 cfs @ 12.03 hrs, Volume=	20,042 cf
Outflow =	0.78 cfs @ 12.58 hrs, Volume=	20,042 cf, Atten= 89%, Lag= 33.2 min
Discarded =	0.66 cfs @ 12.58 hrs, Volume=	19,983 cf
Primary =	0.12 cfs @ 12.58 hrs, Volume=	60 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 165.63' @ 12.58 hrs   Surf.Area= 2,316 sf   Storage= 5,698 cf

Plug-Flow detention time= 58.1 min calculated for 20,036 cf (100% of inflow)
Center-of-Mass det. time= 58.0 min (839.7 - 781.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	162.10'	3,287 cf	**29.92'W x 77.40'L x 5.50'H Field A**
			12,736 cf Overall - 4,517 cf Embedded = 8,218 cf x 40.0% Voids
#2A	162.85'	4,517 cf	**ADS_StormTech MC-3500 d +Cap** x 40 Inside #1
			Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
			Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
			40 Chambers in 4 Rows
			Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf
		7,805 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	165.60'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	162.10'	**8.270 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 155.00'

Discarded OutFlow Max=0.66 cfs @ 12.58 hrs HW=165.63' (Free Discharge)
└─**2=Exfiltration** (Controls 0.66 cfs)

Primary OutFlow Max=0.10 cfs @ 12.58 hrs HW=165.63' (Free Discharge)
└─**1=Sharp-Crested Rectangular Weir** (Weir Controls 0.10 cfs @ 0.60 fps)

Pond 1P: SUBSURFACE BASIN - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

10 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 75.40' Row Length +12.0" End Stone x 2 = 77.40' Base Length
4 Rows x 77.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 29.92' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

40 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 4 Rows = 4,517.3 cf Chamber Storage

12,735.5 cf Field - 4,517.3 cf Chambers = 8,218.2 cf Stone x 40.0% Voids = 3,287.3 cf Stone Storage

Chamber Storage + Stone Storage = 7,804.6 cf = 0.179 af
Overall Storage Efficiency = 61.3%
Overall System Size = 77.40' x 29.92' x 5.50'

40 Chambers
471.7 cy Field
304.4 cy Stone

Pond 1P: SUBSURFACE BASIN

Hydrograph

Inflow Area=44,104 sf
Peak Elev=165.63'
Storage=5,698 cf

7.15 cfs

0.66 cfs

0.12 cfs

Legend:
- Inflow
- Outflow
- Discarded
- Primary

Flow (cfs)

Time (hours)

Summary for Link DP-1: MUNICIPAL DRAINAGE NETWORK

Inflow Area =   108,029 sf, 68.98% Impervious, Inflow Depth = 2.64"   for 25-yr event
Inflow   =   6.98 cfs @ 12.08 hrs, Volume=   23,790 cf
Primary   =   6.98 cfs @ 12.08 hrs, Volume=   23,790 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link DP-1: MUNICIPAL DRAINAGE NETWORK

Hydrograph
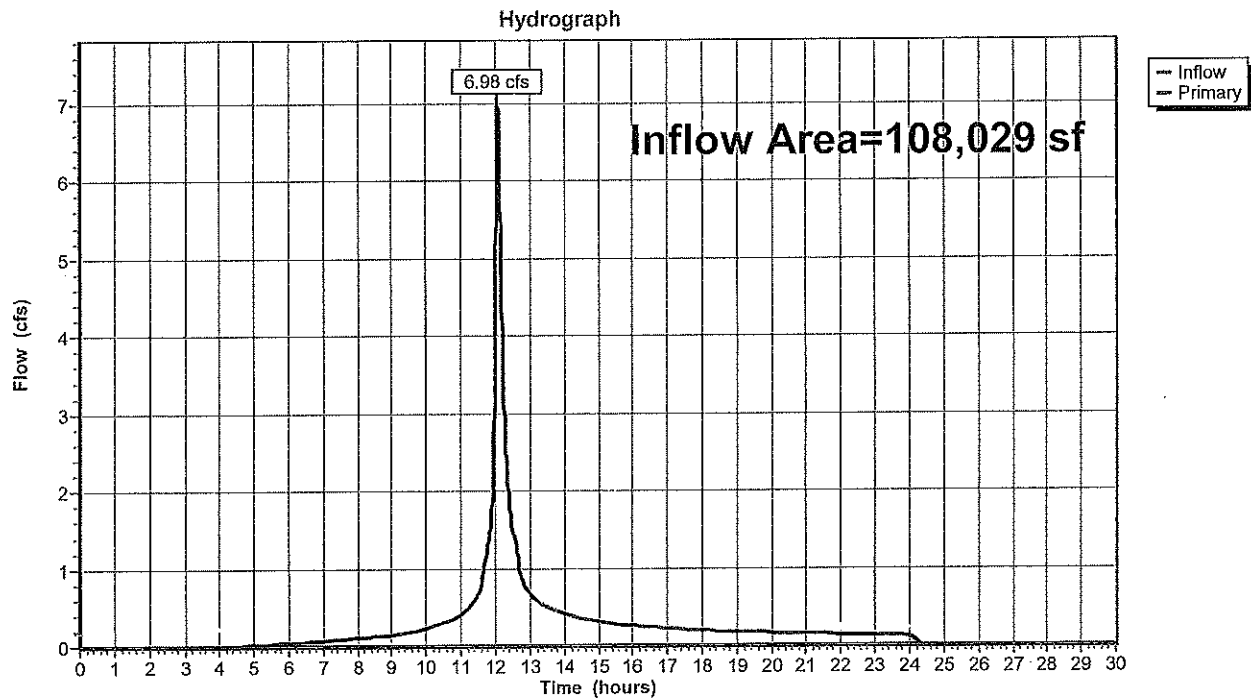
Summary for Subcatchment PDA-1: PARKING LOT 1

Runoff   =   9.43 cfs @ 12.08 hrs, Volume=   33,166 cf, Depth= 6.23"

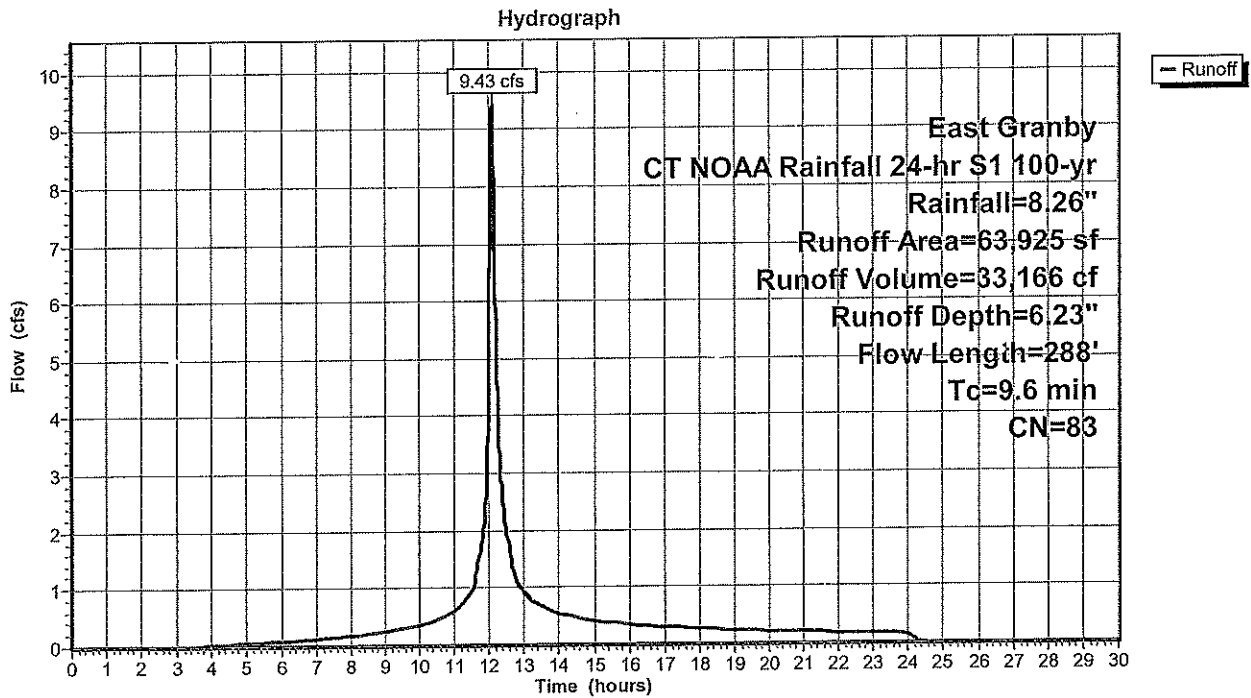Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
East Granby, CT NOAA Rainfall 24-hr S1 100-yr Rainfall=8.26"

Area (sf)	CN	Description
25,499	61	>75% Grass cover, Good, HSG B
38,426	98	Paved parking, HSG B
63,925	83	Weighted Average
25,499		39.89% Pervious Area
38,426		60.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	100	0.0350	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.22"
1.0	60	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.8	128	0.0195	2.83		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.6	288	Total			

Subcatchment PDA-1: PARKING LOT 1

Hydrograph

East Granby
CT NOAA Rainfall 24-hr S1 100-yr
Rainfall=8.26"
Runoff Area=63,925 sf
Runoff Volume=33,166 cf
Runoff Depth=6.23"
Flow Length=288'
Tc=9.6 min
CN=83

Post-Construction
C-DATA-2200330-POST-CONS *East Granby, CT NOAA Rainfall 24-hr S1 100-yr Rainfall=8.26"*
Prepared by BL Companies
Printed 8/11/2022
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Summary for Subcatchment PDA-2: PARKING LOT 2
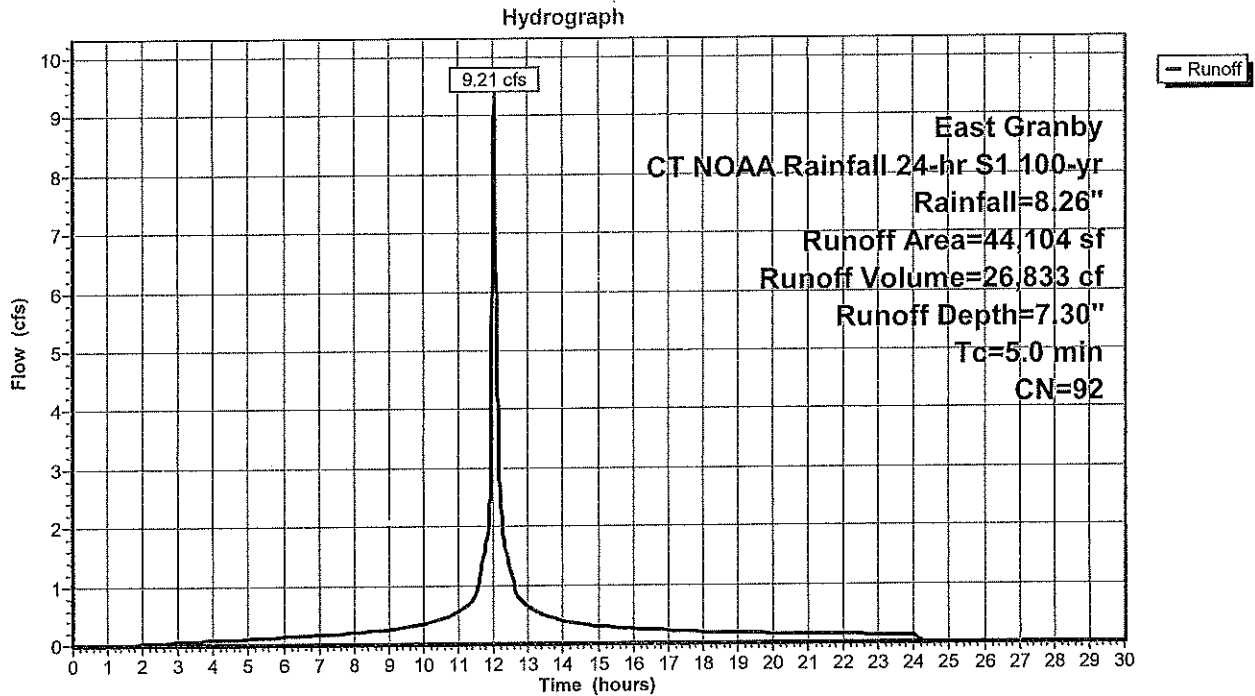
Runoff   =   9.21 cfs @ 12.03 hrs, Volume=   26,833 cf, Depth= 7.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
East Granby, CT NOAA Rainfall 24-hr S1 100-yr Rainfall=8.26"

Area (sf)	CN	Description
6,858	61	>75% Grass cover, Good, HSG B
36,093	98	Paved parking, HSG B
1,153	96	Gravel surface, HSG B
44,104	92	Weighted Average
8,011		18.16% Pervious Area
36,093		81.84% Impervious Area

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

Subcatchment PDA-2: PARKING LOT 2

Hydrograph

Hydrograph showing Runoff. Peak labeled 9.21 cfs. Flow (cfs) on y-axis from 0 to 10, Time (hours) on x-axis from 0 to 30.

East Granby
CT NOAA Rainfall 24-hr S1 100-yr
Rainfall=8.26"
Runoff Area=44,104 sf
Runoff Volume=26,833 cf
Runoff Depth=7.30"
Tc=5.0 min
CN=92

Post-Construction
C-DATA-2200330-POST-CONS *East Granby, CT NOAA Rainfall 24-hr S1 100-yr Rainfall=8.26"*
Prepared by BL Companies
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Summary for Pond 1P: SUBSURFACE BASIN

Inflow Area =		44,104 sf, ·81.84% Impervious, Inflow Depth = 7.30" for 100-yr event		
Inflow	=	9.21 cfs @ 12.03 hrs, Volume=	26,833 cf	
Outflow	=	3.53 cfs @ 12.15 hrs, Volume=	26,833 cf, Atten= 62%, Lag= 7.5 min	
Discarded	=	0.68 cfs @ 12.15 hrs, Volume=	24,138 cf	
Primary	=	2.85 cfs @ 12.15 hrs, Volume=	2,695 cf	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 165.91' @ 12.15 hrs Surf.Area= 2,316 sf Storage= 6,104 cf

Plug-Flow detention time= 54.0 min calculated for 26,824 cf (100% of inflow)
Center-of-Mass det. time= 54.0 min (827.1 - 773.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	162.10'	3,287 cf	**29.92'W x 77.40'L x 5.50'H Field A**
			12,736 cf Overall - 4,517 cf Embedded = 8,218 cf x 40.0% Voids
#2A	162.85'	4,517 cf	**ADS_StormTech MC-3500 d +Cap** x 40 Inside #1
			Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
			Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
			40 Chambers in 4 Rows
			Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf
		7,805 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	165.60'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	162.10'	**8.270 in/hr Exfiltration over Surface area**
			Conductivity to Groundwater Elevation = 155.00'

Discarded OutFlow Max=0.68 cfs @ 12.15 hrs HW=165.91' (Free Discharge)
└─**2=Exfiltration** (Controls 0.68 cfs)

Primary OutFlow Max=2.85 cfs @ 12.15 hrs HW=165.91' (Free Discharge)
└─**1=Sharp-Crested Rectangular Weir** (Weir Controls 2.85 cfs @ 1.83 fps)

Pond 1P: SUBSURFACE BASIN - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-3500 d +Cap (ADS StormTech® MC-3500 d rev 03/14 with Cap volume)
Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf

77.0" Wide + 9.0" Spacing = 86.0" C-C Row Spacing

10 Chambers/Row x 7.17' Long +1.85' Cap Length x 2 = 75.40' Row Length +12.0" End Stone x 2 = 77.40' Base Length
4 Rows x 77.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 29.92' Base Width
9.0" Base + 45.0" Chamber Height + 12.0" Cover = 5.50' Field Height

40 Chambers x 110.0 cf + 14.9 cf Cap Volume x 2 x 4 Rows = 4,517.3 cf Chamber Storage

12,735.5 cf Field - 4,517.3 cf Chambers = 8,218.2 cf Stone x 40.0% Voids = 3,287.3 cf Stone Storage

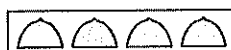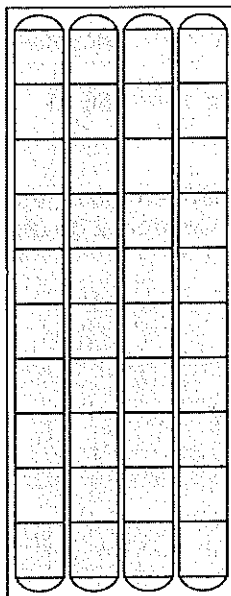Chamber Storage + Stone Storage = 7,804.6 cf = 0.179 af
Overall Storage Efficiency = 61.3%
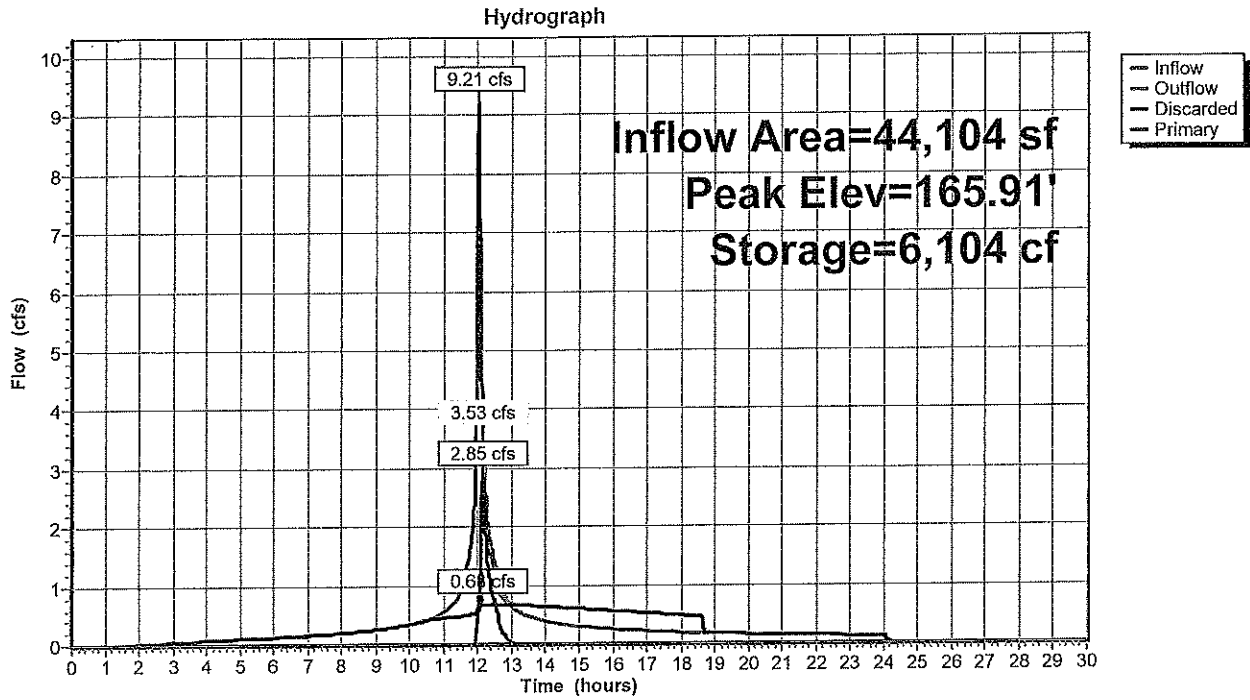Overall System Size = 77.40' x 29.92' x 5.50'

40 Chambers
471.7 cy Field
304.4 cy Stone

Post-Construction

C-DATA-2200330-POST-CONS *East Granby, CT NOAA Rainfall 24-hr S1 100-yr Rainfall=8.26"*
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Pond 1P: SUBSURFACE BASIN

Hydrograph

Inflow Area=44,104 sf
Peak Elev=165.91'
Storage=6,104 cf

Legend:
- Inflow
- Outflow
- Discarded
- Primary

Values shown on graph: 9.21 cfs, 3.53 cfs, 2.85 cfs, 0.66 cfs

X-axis: Time (hours), 0 to 30
Y-axis: Flow (cfs), 0 to 10

Summary for Link DP-1: MUNICIPAL DRAINAGE NETWORK

Inflow Area =   108,029 sf, 68.98% Impervious, Inflow Depth = 3.98"   for 100-yr event
Inflow   =   10.77 cfs @ 12.12 hrs, Volume=   35,861 cf
Primary   =   10.77 cfs @ 12.12 hrs, Volume=   35,861 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link DP-1: MUNICIPAL DRAINAGE NETWORK

Architecture
Engineering
Environmental
Land Surveying

Companies
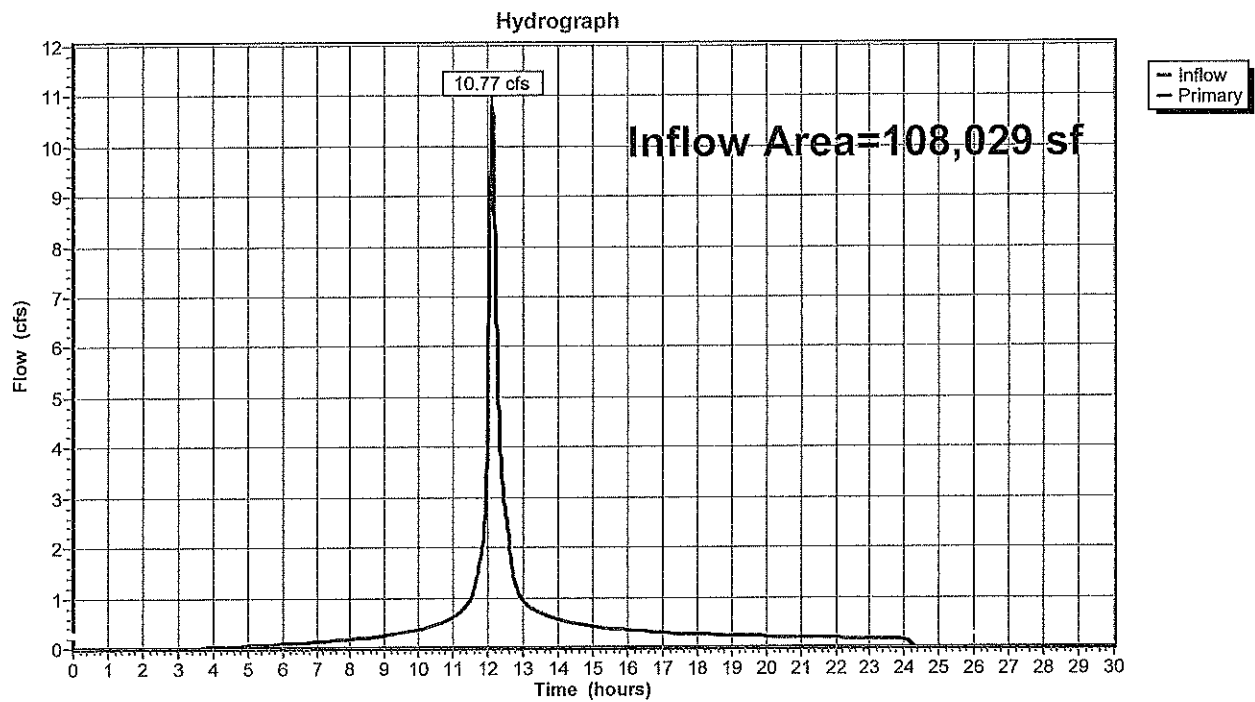
An Employee-Owned Company

Appendix D

Water Quality Calculations
Best Management Practice (BMP) Treatment Train Efficiency Worksheet
Water Quality Calculations – Water Quality Volume (WQV)
Groundwater Recharge Calculations

Best Management Practice (BMP) Treatment Train Efficiency Worksheet

Prepared for:
East Granby Warehouses
7, 11, 15, 17 Bradley Park Road
East Granby, CT

Prepared by:
BL Companies
355 Research Parkway
Meriden, Connecticut

Date prepared:
April 8, 2022

Overall Site Treatment Train Efficiency

$E=[1-(1-E1)(1-E2)(1-E3)(1-E4)(1-E7)]*100$

BMP	BMP Description	Type of Treatment	Efficiency Rate %
E1	Infiltration Basin with grass strip	Primary	80

Overall Treatment Train Efficiency (E)= 80 % Total Suspended Solids (TSS) Removal

* 80% require per CT DEP
** Per manufacturers TSS removal rate
** University of New Hampshire

Overall Site Treatment Train Efficiency

BMP	Type of Treatment	TSS Removal Rate	Starting TSS Load	Amount Removed	Remaining Load
Infiltration Basin with grass strip	Primary	0.80	1.00	0.80	0.20

Overall Treatment Train Efficiency (%)   80

TSS Removal Rates (adapted from Schueler, 1996, & EPA, 1993)

BMP List	Design Rate	Range of Average TSS Removal Rates	Brief Design Requirements
Extended Detention Pond	70%	60-80%	Sediment forebay
Wet Pond (a)	70%	60-80%	Sediment forebay
Constructed Wetland (b)	80%	65-80%	Designed to infiltrate or retain
Water Quality Swale	70%	60-80%	Designed to infiltrate or retain
Infiltration Trench	80%	75-80%	Pretreatment critical
Infiltration Basin	80%	75-80% (predicted)	Pretreatment critical
Dry Well	80%	80% (predicted)	Rooftop runoff (uncontaminated only)
Sand Filter (c)	80%	80%	Pretreatment
Organic Filter (d)	80%	80%+	Pretreatment
Water Quality Inlet	25%	15-35% w/ cleanout	Off-line only; 0.1" minimum Water Quality Volume (WQV) storage
Sediment Trap (Forebay)	25%	25% w/ cleanout	Storm flows for 2-year event must not cause erosion; 0.1" minimum WQV storage
Drainage Channel	25%	25%	Check dams; non-erosive for 2-yr.
Deep Sump and Hooded Catch Basin	25%	25% w/ cleanout	Deep sump general rate = 4 x pipe diameter or 4.0' for pipes 18" or less
Street Sweeping	10%	10%	Discretionary non-structural credit; must be part of approved plan

Water Quality Calculations

Determine Water Quality Volume

From CT 2004 Stormwater Quality Manual:

$$WQV = \frac{(1")(R)(A)}{12}$$

$$R = 0.05 + 0.009(I)$$

WQV = water quality volume (ac-ft)

R = volumetric runoff coefficient

I = percent impervious cover

A = site area in acres

Area		Total Area		Impervious Area		Impervious Cover	Volumetric Runoff Coefficient	Water Quality Volume (WQV)		Water Quality Volume Provided
	ID	ac	ft²	ac	ft²	%	R	acre-feet	ft³	ft³
Total Area East Granby Lot		2.480	108,029	1.757	76,550	70.85	0.688	0.142	6,186	13,498

Notes: The Water Quality Volume is provided by the infiltration basin

G:\JOBS22\02\2200330\ENG-TECH\CIVIL\HYDRO\C-DAT-2200330-CTDEEP WQV Calculations.xls

Groundwater Recharge Volume Calculations

<u>Groundwater Recharge Volume</u>

From CT 2004 Stormwater Quality Manual:

$$GVR = \frac{(D)(A)(I)}{12}$$

GRV Groundwater Recharge Volume (ac-ft)
D = Depth of Runoff to be Recharged (table 7-4)
A = site area in acres
I = impervious cover (decimal)

	Hydrologic Soil Group	Total Site Area (AC)
SITE	B	2.48

	Site Area by NRCS Hydrologic Soil Group				Impervious Cover by NRCS Hydrologic Soil Group				Site Imperviousness (Decimal) by NRCS Hydrologic Soil Group				GRV Required		Potential Recharge Pond Volumes Proposed	
	A	B	C	D	A	B	C	D	A	B	C	D	(ac-ft)	(cu ft)	(ac-ft)	(cu ft)
SITE	0.00	2.48	0.00	0.00	0.00	1.76	0.00	0.00	0.00	0.71	0.00	0.00	0.037	1,597	0.310	13,498

NRCS Hydrologic Soil	Groundwater Recharge
A	0.40
B	0.25
C	0.10
D	0.00

Table from 2004 Connecticut Stormwater Quality Manual

Table 7-4 Groundwater Recharge Depth

NRCS Hydrologic Soil Group	Average Annual Recharge	Groundwater Recharge Depth (D)
A	18 inches/year	0.4 inches
B	12 inches/year	0.25 inches
C	6 inches/year	0.10 inches
D	3 inches/year	0 inches/month

Source: MADEP, 1997.
NRCS = Natural Resources Conservation Service

Architecture
Engineering
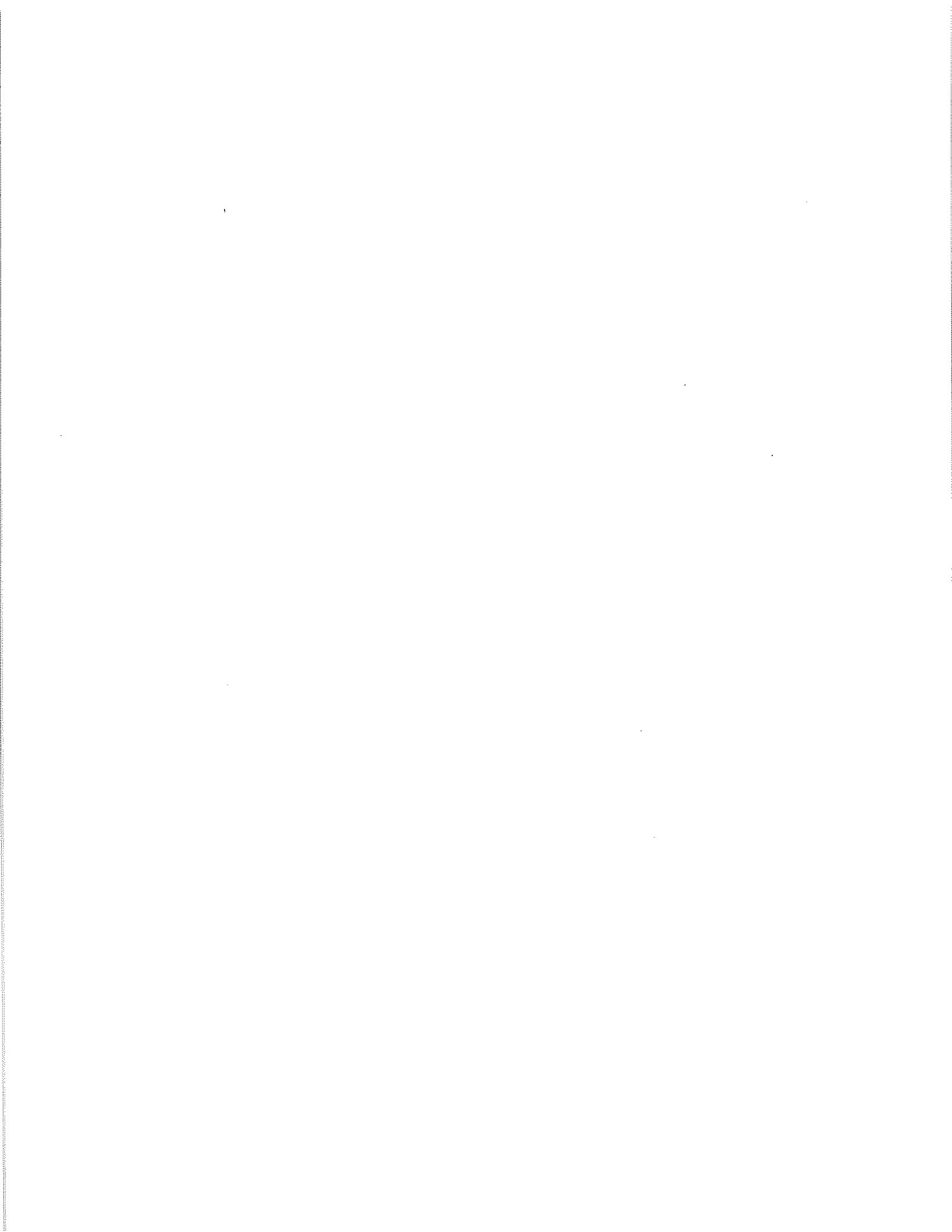Environmental
Land Surveying

Companies

An Employee-Owned Company

Appendix E

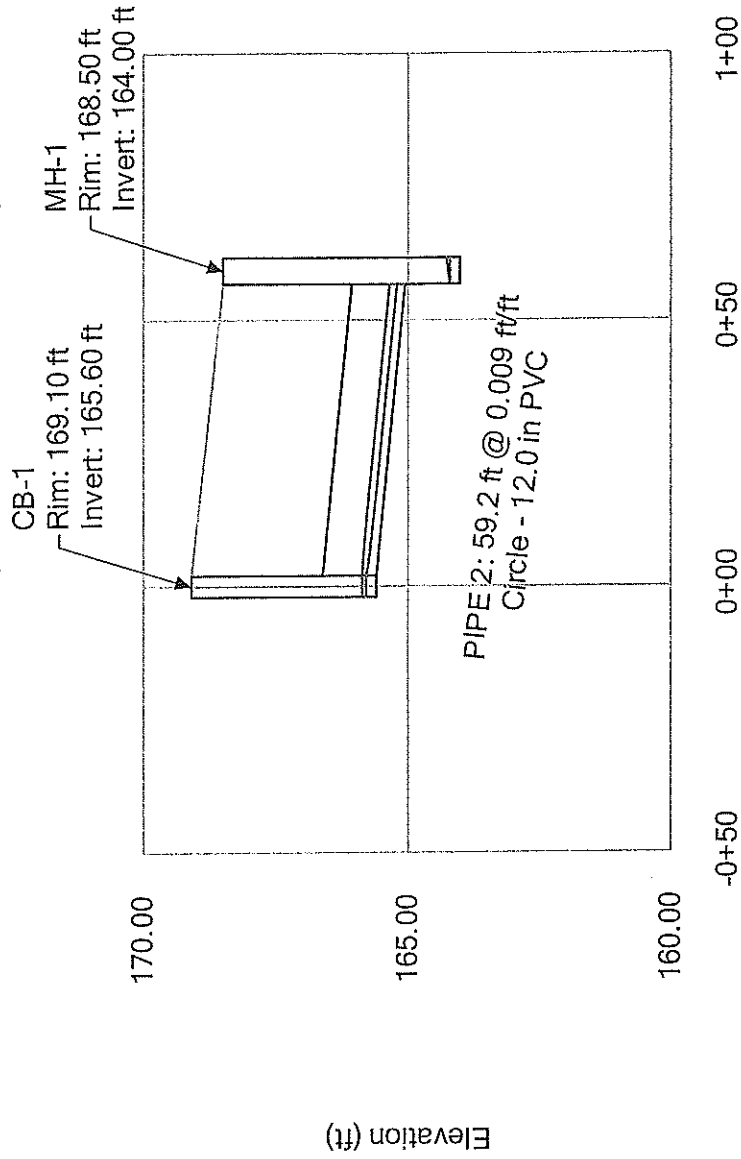POST-DEVLOPMENT HYDRAULIC CALCULATIONS
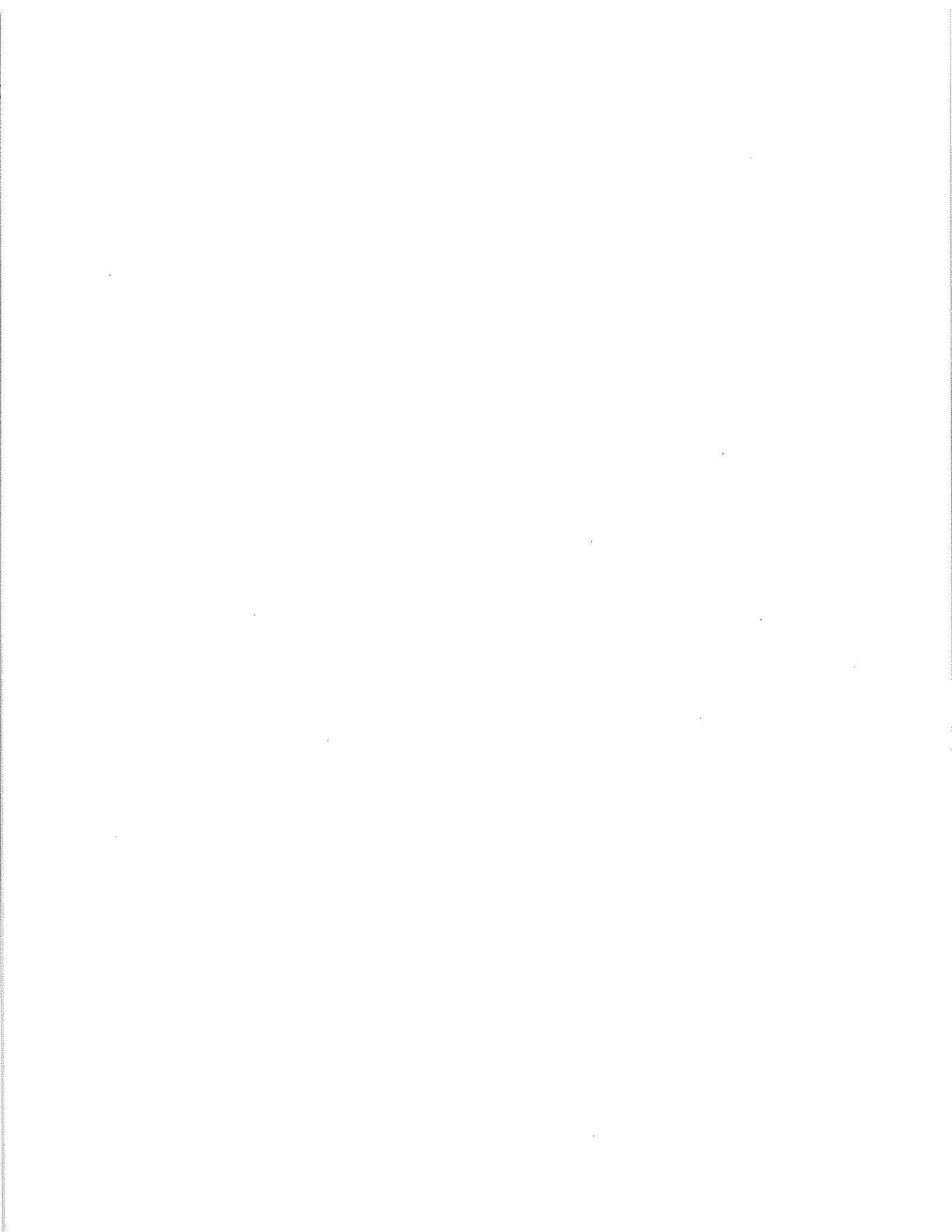
FlexTable: Conduit Table

Label	Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Flow / Capacity (Design) (%)	Cover (Start) (ft)
PIPE 3	MH-1	CB-2	164.00	163.11	60.4	0.015	12.0	0.010	0.22	3.48	5.62	3.9	3.50
PIPE 7	MH-3	MH-4	165.69	164.84	169.5	0.005	12.0	0.010	0.00	0.00	3.28	0.0	2.40
PIPE 8	MH-4	HDS	164.84	164.74	19.4	0.005	12.0	0.010	0.00	0.00	3.32	0.0	3.35
PIPE 1	TRENCH DRAIN-1	MH-1	165.25	164.44	84.2	0.010	6.0	0.010	0.00	0.00	0.72	0.0	2.50
PIPE 2	CB-1	MH-1	165.60	165.06	59.2	0.009	12.0	0.010	0.22	2.94	4.42	5.0	2.50
PIPE 5	CB-2	MC-3500 INLET	163.07	162.85	24.8	0.009	12.0	0.010	0.22	2.91	4.36	5.1	4.40
PIPE 4	TRENCH DRAIN 2	CB-2	164.10	163.52	60.3	0.010	6.0	0.010	0.00	0.00	0.72	0.0	1.50
PIPE 6	MH-2	MH-3	165.79	165.69	18.9	0.005	12.0	0.010	0.00	0.00	3.37	0.0	2.00
PIPE 9	TRENCH DRAIN 3	HDS	162.10	161.14	98.5	0.010	6.0	0.010	0.00	0.00	0.72	0.0	3.46

Cover (Stop) (ft)	Material
4.36	PVC
3.35	PVC
2.88	PVC
3.56	PVC
2.44	PVC
2.75	PVC
4.45	PVC
2.40	PVC
6.98	PVC

StormCAD
[10.03.03.44]
Page 1 of 1

C-DAT-2200330 STORMCAD.stsw
4/13/2022

Bentley Systems, Inc. Haestad Methods Solution Center
27 Siemon Company Drive Suite 200 W Watertown, CT 06795 USA +1-203-755-1666

Profile Report

Engineering Profile - CB-1 to MH-1 (C-DAT-2200330 STORMCAD.stsw)

CB-1
Rim: 169.10 ft
Invert: 165.60 ft

MH-1
Rim: 168.50 ft
Invert: 164.00 ft

PIPE-2: 59.2 ft @ 0.009 ft/ft
Circle - 12.0 in PVC

Elevation (ft)

170.00

165.00

160.00

Station (ft)

-0+50   0+00   0+50   1+00

Profile Report

Engineering Profile - MH-2 to HDS (C-DAT-2200330 STORMCAD.stsw)

MH-2
Rim: 168.79 ft
Invert: 165.79 ft

MH-3
Rim: 169.09 ft
Invert: 165.69 ft

MH-4
Rim: 169.19 ft
Invert: 164.84 ft

HDS
Rim: 168.62 ft
Invert: 161.14 ft

PIPE 6: 18.9 ft @ 0.005 ft/ft
Circle - 12.0 in PVC

PIPE 7: 169.5 ft @ 0.005 ft/ft
Circle - 12.0 in PVC

PIPE 8: 19.4 ft @ 0.005 ft/ft
Circle - 12.0 in PVC

Elevation (ft)

170.00

165.00

160.00

Station (ft)

-0+50   0+00   0+50   1+00   1+50   2+00   2+50
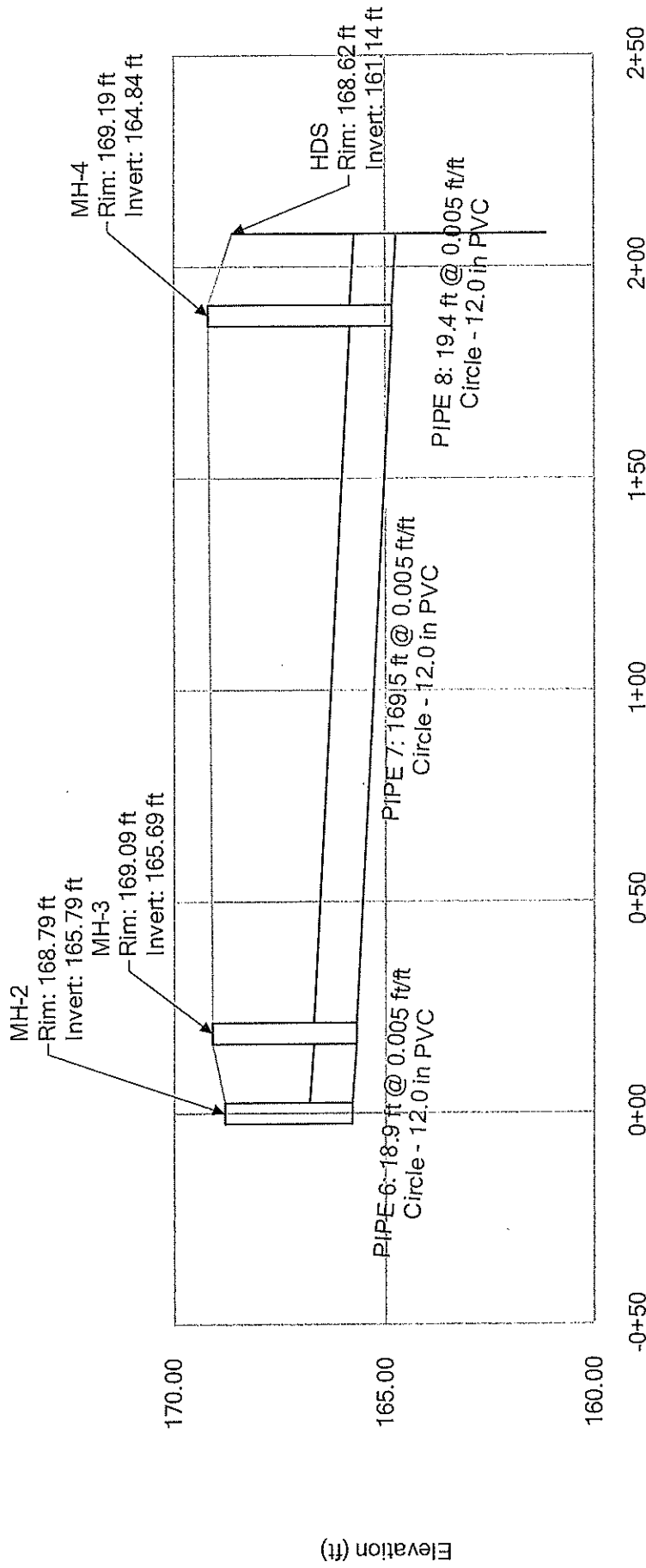
Profile Report

Engineering Profile - TRENCH DRAIN-1 to MC-3500 INLET (C-DAT-2200330 STORMCAD.stsw)

MC-3500 INLET
Rim: 166.60 ft
Invert: 162.85 ft

CB-2
Rim: 168.47 ft
Invert: 163.07 ft

MH-1
Rim: 168.50 ft
Invert: 164.00 ft

TRENCH DRAIN-1
Rim: 168.25 ft
Invert: 165.25 ft

PIPE 5: 24.8 ft @ 0.009 ft/ft
Circle - 12.0 in PVC

PIPE 3: 60.4 ft @ 0.015 ft/ft
Circle - 12.0 in PVC

PIPE 1: 84.2 ft @ 0.010 ft/ft
Circle - 6.0 in PVC

Elevation (ft)

170.00

165.00

160.00

-0+50   0+00   0+50   1+00   1+50   2+00
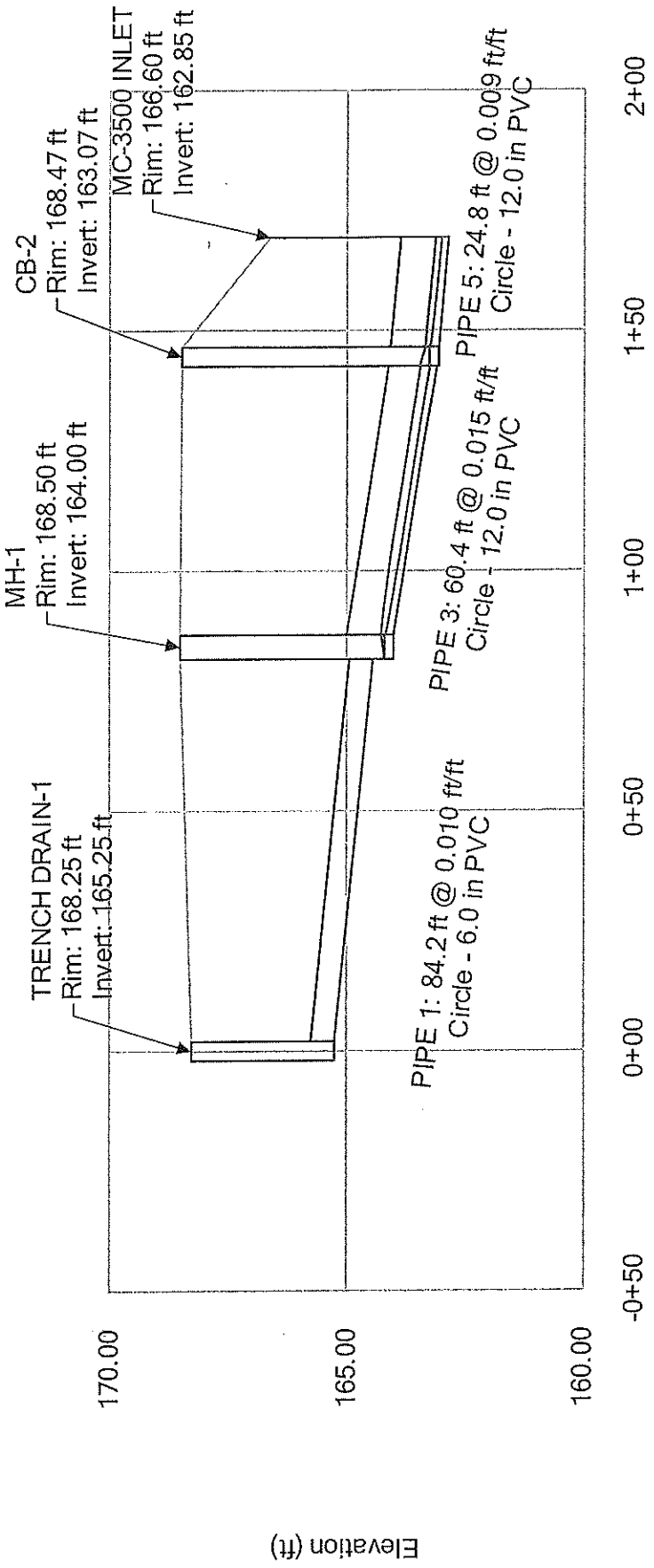
Station (ft)

Profile Report

Engineering Profile - TRENCH DRAIN 2 to CB-2 (C-DAT-2200330 STORMCAD.stsw)

CB-2
Rim: 168.47 ft
Invert: 163.07 ft

TRENCH DRAIN 2
Rim: 166.10 ft
Invert: 164.10 ft

PIPE 4: 60.3 ft @ 0.010 ft/ft
Circle - 6.0 in PVC

170.00

165.00

160.00

Elevation (ft)

-0+50   0+00   0+50   1+00
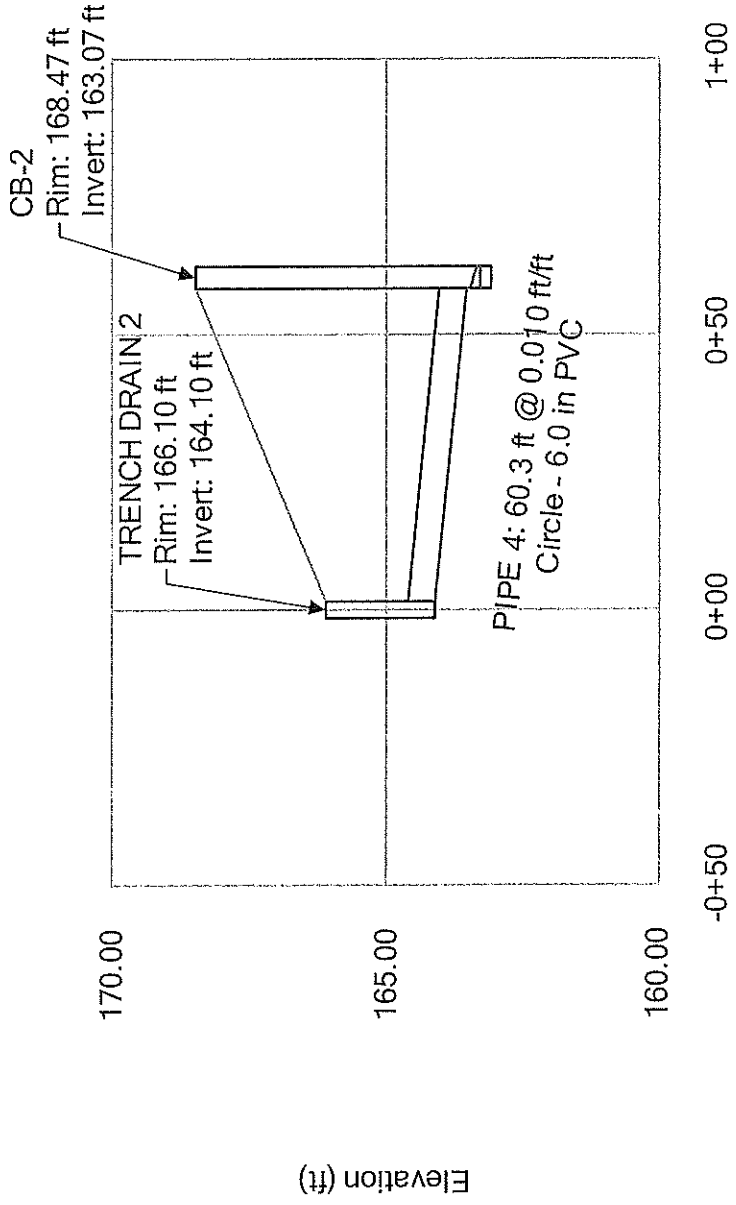
Station (ft)

Profile Report

Engineering Profile - TRENCH DRAIN 3 to HDS (C-DAT-2200330 STORMCAD.stsw)

HDS
Rim: 168.62 ft
Invert: 161.14 ft

TRENCH DRAIN 3
Rim: 166.06 ft
Invert: 162.10 ft

PIPE 9: 98.5 ft @ 0.010 ft/ft
Circle - 6.0 in PVC

Elevation (ft)

170.00

165.00

160.00

-0+50   0+00   0+50   1+00

Station (ft)

Architecture
Engineering
Environmental
Land Surveying

Companies

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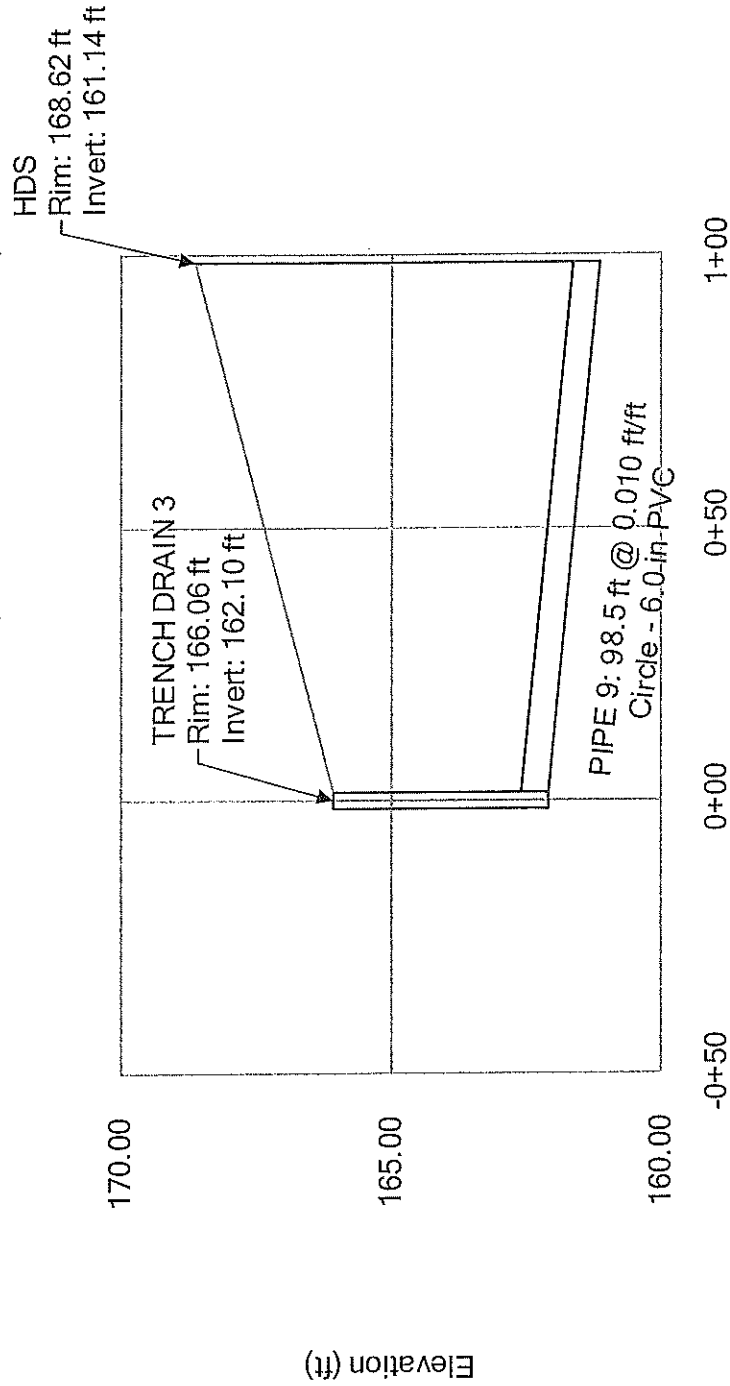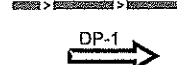
APPENDIX F

DRAINAGE MAPS
ED-1 – Existing Drainage Plan
PD-1 – Proposed Drainage Plan
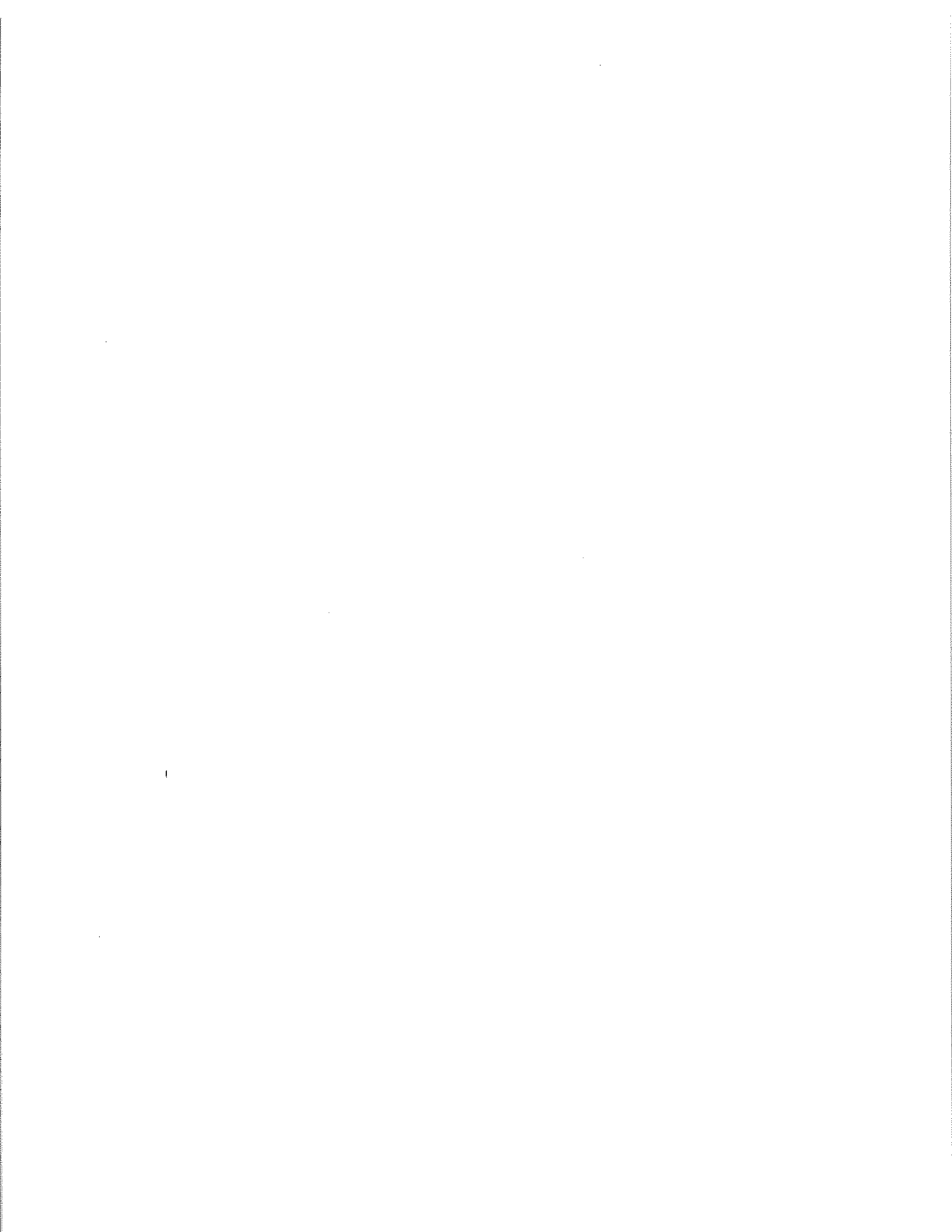
LEGEND

▭▭ ▭▭ ▭▭	EXISTING DRAINAGE AREA BOUNDARY
▬▬▬▬	EXISTING SOIL BOUNDARY
▭>▬>▬>	TIME OF CONCENTRATION PATH
DP-1 →	DESIGN POINT
CN	CURVE NUMBER
Tc	TIME OF CONCENTRATION

NOTES

1. THE FOLLOWING IS CONSIDERED "IMPERVIOUS AREA": GRAVEL ROADS, GRAVEL DRIVEWAYS, BITUMINOUS DRIVEWAYS, BITUMINOUS WALKS, BITUMINOUS CURB, CONCRETE DRIVEWAYS, CONCRETE WALKS, CONCRETE PADS, CONCRETE CURB AND BUILDINGS.
2. ONSITE TOPOGRAPHY BASED ON F.A. HESKETH & ASSOCIATES, INC. FIELD SURVEY PERFORMED ON 11/16/2021 AND OFFSITE TOPOGRAPHY BASED ON STATE LIDAR INFORMATION.

EXISTING HYDROLOGY

DRAINAGE AREA	TOTAL AREA	IMPERVIOUS AREA (S.F.)	PERVIOUS AREA (S.F.)	PERCENT IMPERVIOUS (%)	CN	TC (MIN)
EDA-1	63,925	28,736	35,189	45.0%	78	9.5
EDA-2	44,104	7,200	36,904	16.3%	67	8.5
TOTAL AREA:	108,029	35,936	72,093			

EDA-2

EDA-1

306

DP-1

BRADLEY PARK ROAD (A TOWN MAINTAINED ROAD)

RAINBOW ROAD (ROUTE 20) (STATE MAINTAINED ROAD)

GRAPHIC SCALE
40 20 0   40
SCALE IN FEET

LEGEND

▭ ▭ ▭	EXISTING DRAINAGE AREA BOUNDARY
▬▬▬▬	EXISTING SOIL BOUNDARY
▬▬>▬▬>▬▬	TIME OF CONCENTRATION PATH
DP-1 ➤	DESIGN POINT
CN	CURVE NUMBER
Tc	TIME OF CONCENTRATION

NOTES

1. THE FOLLOWING IS CONSIDERED "IMPERVIOUS AREA": GRAVEL ROADS, GRAVEL DRIVEWAYS, BITUMINOUS DRIVEWAYS, BITUMINOUS WALKS, BITUMINOUS CURB, CONCRETE DRIVEWAYS, CONCRETE WALKS, CONCRETE PADS, CONCRETE CURB AND BUILDINGS.
2. ONSITE TOPOGRAPHY BASED ON F.A. HESKETH & ASSOCIATES, INC. FIELD SURVEY PERFORMED ON 11/16/2021 AND OFFSITE TOPOGRAPHY BASED ON STATE LIDAR INFORMATION.

PROPOSED HYDROLOGY

DRAINAGE AREA	TOTAL AREA	IMPERVIOUS AREA (S.F.)	PERVIOUS AREA (S.F.)	PERCENT IMPERVIOUS (%)	CN	TC (MIN)
PDA-1	63,925	38,426	25,499	60.1%	83	9.6
PDA-2	44,104	36,093	8,011	81.8%	92	9.0
TOTAL AREA:	108,029	74,519	33,510			
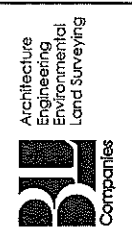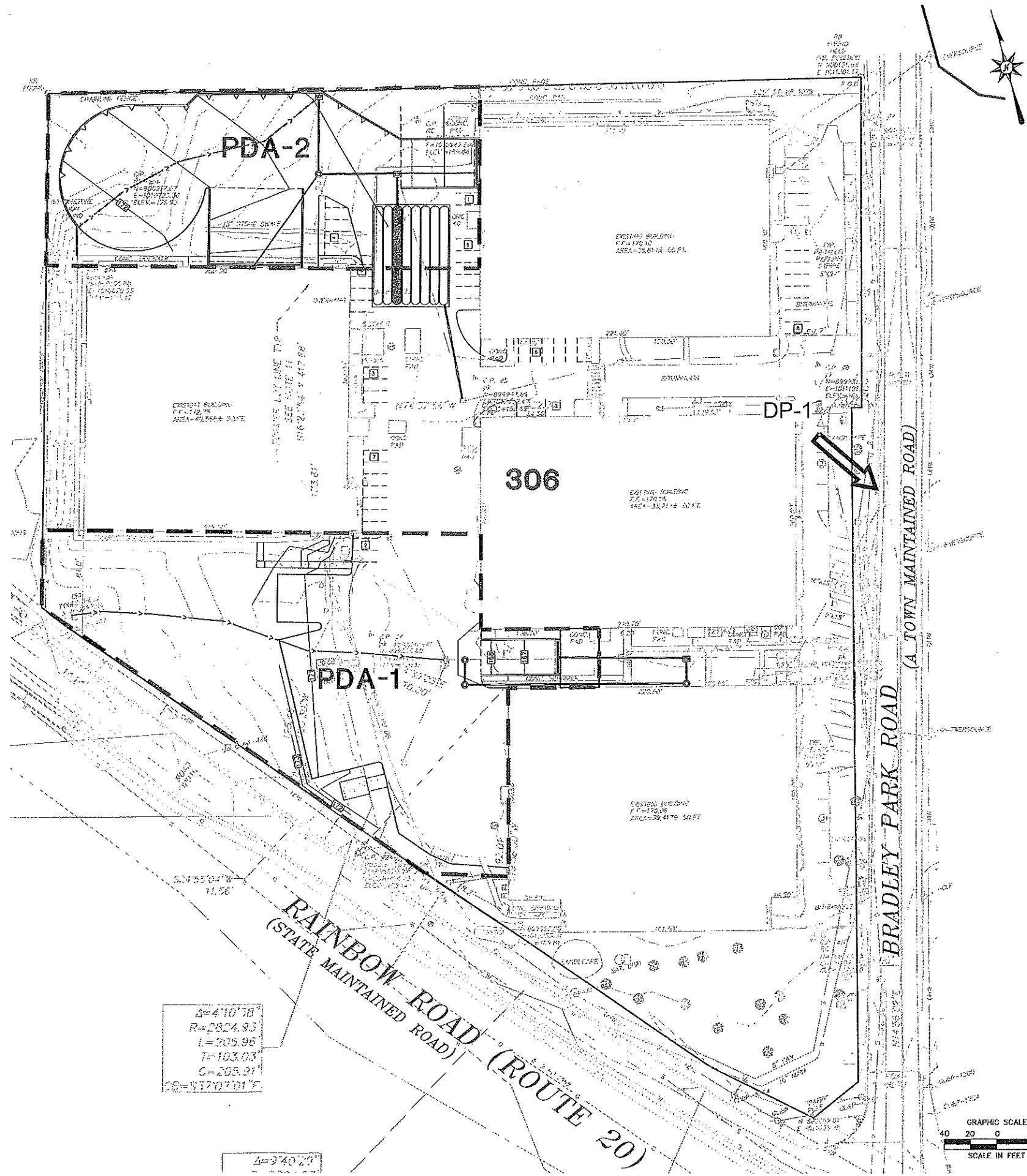
PDA-2

PDA-1

306

DP-1

BRADLEY PARK ROAD (A TOWN MAINTAINED ROAD)

RAINBOW ROAD (ROUTE 20) (STATE MAINTAINED ROAD)

Δ=4°10'38"
R=2824.93
L=205.96
T=103.03
C=205.91
CB=S27°07'01"E

Δ=9°40'23"

GRAPHIC SCALE
40 20 0 40
SCALE IN FEET

EAST GRANBY WAREHOUSES
7, 11, 15 & 17 BRADLEY PARK ROAD
EAST GRANBY, CONNECTICUT

REVISIONS
No. Date Desc.

Designed   R.M.D.
Drawn   R.M.D.
Reviewed   S.M.K.
Scale   1"=40'
Project No. 2200330
Date   04/22/2022
CAD File:
PD220033001

Title
PROPOSED
DRAINAGE
MAP

Sheet No.
PD-1