Stormwater Management Report

Habitat For Humanity Residential Development

8, 9, and 11 Colby Drive, Ledyard CT

Prepared For:

Town of Ledyard
741 Colonel Ledyard Highway
Ledyard, CT 06339

Prepared By:

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TABLE OF CONTENTS

Benesch
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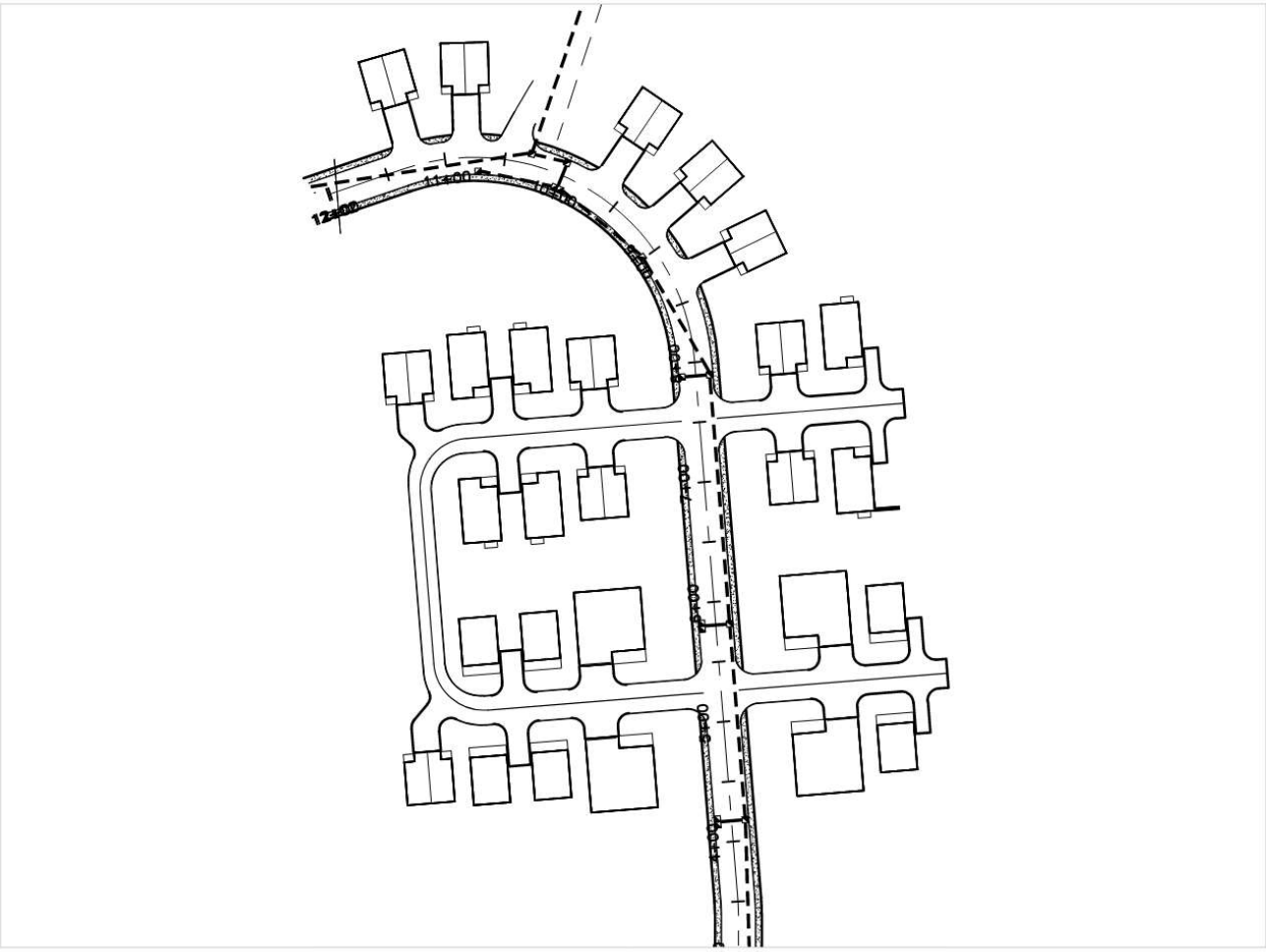

PROPOSED RESIDENTIAL DEVELOPMENT

(Schematic Layout)

8, 9, and 11 Colby Drive

Ledyard, CT 06339

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1 INTRODUCTION

1.1 General Information

The subject parcels addressed 8, 9, and 11 Colby Drive, Ledyard, CT consist of approximately 15.71 acres and are located at the end of Colby drive, where it curves and extends down to Colonel Ledyard Highway. It is situated in the MFDD (Multi Family Development District) Zone and the subject parcels are denoted as and owned by:

- 8 Colby Drive – Book 560 / Page 433 G - Habitat for Humanity of Eastern CT Inc.
- 9 Colby Drive – Book 560 / Page 436 G - Habitat for Humanity of Eastern CT Inc.
- 11 Colby Drive – Book 560 / Page 436 G - Habitat for Humanity of Eastern CT Inc.

The project proposes the development of the existing parcels along with a full roadway construction to town standards. The proposed development will consist of twenty-seven (27) housing structures and the following site features:

- New Bituminous Pavement and Curbing
- New Concrete Walks
- Utilities and Storm Drainage system. (including detention)
- Revised Site Landscaping
- Single and Multi-Family Residential Buildings

The existing site is comprised of approximately 15.7 acres that is predominately wooded. Work was started on the previously approved Colby Drive from the cul-de-sac to Colonel Ledyard Highway including tree clearing, preliminary grading, and drainage installation. A detention basin located in the northern portion of the site was constructed to manage the stormwater from the existing Colby Drive as well as the previously approved development of 8, 9, and 11 Colby Drive with the associated portion of the incomplete Colby Drive. The previously improved impervious surface area is considered as existing for the purposes of calculating the required detention and water quality for this development.

The proposed development includes an additional detention/infiltration basin and French drain to meet the 2024 CT DEEP Stormwater Quality Manual requirements for water quality and provide zero increase in runoff rate. Previously installed structures and pipes will be used if feasible after inspection and verification of suitability,

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Site Location Map

The project was designed utilizing the Town of Ledyard Zoning Regulations, the 2002 Connecticut Department of Transportation (ConnDOT) Drainage Manual for pipe sizing, the latest Connecticut Guidelines for Soil Erosion and Sediment Control, and the latest Connecticut Department of Energy and Environmental (CT DEEP) Water Quality Manual.

1.2 Project Summary

This project proposes to:

- Construct a new roadway for the town of Ledyard
- Construct multiple private driveways
- Construct multiple housing units
- Provide adequate site drainage and water quality.
- Provide ADA accessibility
- Construct utility connections to the buildings and site.

The project will disturb approximately 9.20 acres between the subject parcels and the ROW.

1.3 Existing Site Conditions

1.3.1 Topography

The project site slopes generally from south to north, with flow being directed to wetlands northeast of the site. The proposed extension of Colby Drive is located within the previously approved right-of-way in approximately the same location as previous. A portion of the drainage was previously constructed and will be inspected and reused to the extent possible. Elevations (NAVD 88) range from approximately 318 ft at the southern property border to 218 located at the northeaster property corner.

1.3.2 Soils

NRCS soils mapping indicates 4 soil types located within the project limits; defined as:

- 47C – Woodbridge Fine Sandy Loam – Hydrologic Soil Group C
- 84B – Paxton Montauk Fine Sandy Loam – Hydrologic Soil Group C
- 85B – Paxton Montauk Fine Sandy Loam – Hydrologic Soil Group C
- 86B – Paxton Montauk Fine Sandy Loam – Hydrologic Soil Group C

Exploratory borings and test pits were completed onsite on October 24, 2024 and November 5, 2024 supervised by Down to Earth Consulting LLC. Groundwater was found to be 5-10.5 ft below the existing grade at ±257 and ±254 (NAVD 88). Infiltration testing was performed using the Falling Head Test. And revealed the pond location can infiltrate at a rate of 0.21in/hr, and a rate of 0.94in/hr at the location of the proposed French Drain.

The locations of Boring and Infiltration tests and results are included in Appendix G.

1.3.3 On-site and Adjacent Waterbody Information

There are wetlands adjacent to this project site. All flow from this site under existing conditions, both sheet flow and concentrated pipe flow, discharges to wetlands. This site is not located within an aquifer protection area, per Ledyard, CT Map (June 2024)

1.3.4 Additional Site Considerations

- The site is currently undeveloped, except for the roughed in roadway, detention basin and catch basins which were installed for the previously approved roadway.
- A majority of existing soils have limiting exfiltration characteristics
- The site is not located within a Natural Diversity Database Area, per Ledyard, CT Map, (June 2024)

2 HYDROLOGY

2.1 Methodology

The analysis to determine peak flows generated from the site was prepared using TR-55 procedures for calculating peak rates of runoff resulting from precipitation events and procedures for developing runoff hydrographs. HydroCAD software was utilized to perform hydrologic computations. Rainfall Frequency Estimates for precipitation frequency, based on National Oceanic and Atmospheric Administration (NOAA) data from Colby Drive, Ledyard, CT, were utilized to generate the flows. The following 24-hour, precipitation estimates were utilized:

2-Year	3.46 inches
10-Year	5.11 inches
25-Year	6.15 inches
50-Year	6.92 inches
100-Year	7.74 inches

Design Storm Type: NOAA, 24-hour Type D

Project Type: New Construction

2.2 Existing Conditions

2.2.1 Watershed Boundaries and Design Points.

Drainage from the existing site is contained within one (1) watershed for analysis.

- **Watershed E1 (To Wetlands):** This watershed consists of the entirety of the existing site. There is a previously graded, but unconstructed roadway designed directly through the middle of the site. The roadway was analyzed as constructed, along with the water which comes down the hill from outside the property onto the site. The majority of the existing site is a heavily wooded area, with some impervious cover. All flow from this watershed discharges through the existing detention pond to the wetlands or directly to the wetlands located northeast of the project site.

  Existing Watershed Data (Existing Cover Characteristics, Existing Watershed Area Map, and Hydrologic Computations) have been included in Appendix A.

2.3 Proposed Conditions

2.3.1 Watershed Boundaries and Design Points

This project proposes to provide stormwater management in the form of a detention pond. Peak flow reduction is achieved using an outlet control structure to control stormwater discharge from the pond. The elevation of the bottom orifice and pond size have been calculated to meet the water quality requirement for the entire site. Drainage from the proposed site consists of four (4) subwatersheds for analysis.

- **Watershed 1:** This watershed has been further divided into subwatersheds for further analysis

    - **Watershed P1-1 (Direct to Wetlands):** This watershed consists of the area along the Eastern and northern borders on the downslope of the roadway, including a portion of the roadway, and a minor section of the slope from the pond. There is impervious cover from thirteen (13) Single and multi-family residential buildings, two (2) private drives and a portion of the proposed Colby Drive extension. There is proposed grass around all areas in this watershed which have been designed to be disturbed and regraded.
    - **Watershed P1-2 (To Detention Pond):** The majority of Colby Drive is within this watershed. Along with Colby Drive, there is a proposed private drive loop, fourteen (14) proposed residential buildings and, pavement from offsite which sheet flows downhill from the west, to make up the proposed impervious cover of this watershed. The

proposed detention pond and all disturbed areas around the proposed residential buildings make up the grass cover for this watershed. There is woodland offsite to the west which remains undisturbed and remains the same condition as existing.

- **Watershed P1-2A (To French Drain):** The majority of this watershed is undisturbed wooded area, there is a small area in the north of the watershed, where the French Drain is proposed, which will be disturbed and replaced with grass. Test pits in the area showed an infiltration rate of 0.94 in/hour within the French drain. Minimal water will infiltrate and the majority will be collected by a catch basin at the end of the French Drain and pipe flow to the detention pond.
- **Watershed P1-3 (Bypass to Wetlands):** This watershed consists of a small area on the western portion of the site, less than an acre, of offsite flow which is collected by a singular catch basin to then be directed offsite to the wetlands. There is impervious cover within this watershed, which consists of offsite paved area. The remaining offsite area is undisturbed woodland. A small portion of the eastern watershed boundary will consist of grass cover type.

Proposed Watershed Data (Proposed Cover Characteristics, Proposed Watershed Area Map, and Hydrologic Computations) have been included in Appendix B.

2.4 Compliance with Performance Criteria

2.4.1 Compliance with Local Criteria

This project has been designed per the Town of Ledyard's Stormwater Management Regulations.

2.4.2 Compliance with Connecticut Stormwater Quality Manual

2.4.2.1 Standard 1 – Runoff Volume Reduction

The method of analysis for this stormwater management system is providing site specific peak runoff volume reduction for the 2, 10, 25, 50, or 100-year Type NOAA, 24-hr Type D storm.

Low impact development practices have been implemented throughout this stormwater management design utilizing a series of treatment practices to remove temporarily suspended solids from the discharge location. Under existing conditions there are multiple catch basins and double catch basins, none of which receive significant flow as they have been set to the proposed elevation of the previously approved roadway and grading has only been performed to subgrade.

For the proposed detention pond, infiltration testing revealed an infiltration rate of 0.21in/hr. For the proposed French drain, infiltration testing revealed an infiltration rate of 0.94 in/hr. The French Drain has been modeled as a narrow but long infiltration basin to accommodate offsite flow.

Water quality volume calculations are provided in Appendix D.

Peak Flow Comparison

Peak flows at the off-site analysis point are as follows:

Proposed Watershed Hydrologic Characteristics Colby Drive Ledyard, CT Project # 0725-500010.00			
Comparison of Existing to Proposed Peak Flow Rate			
Watershed	**Storm Event (NOAA Type D)**	**Existing Flow (cfs)**	**Proposed Flow (cfs)**
To Wetlands	**2-year**	13.91	9.23
	10-year	28.65	28.53
	25-year	38.94	36.75
	50-year	46.66	42.74
	100-year	54.99	50.49

Conclusion, total site peak flows will be reduced under proposed conditions for all design storms.

2.4.2.2 Standard 2 – Stormwater Runoff Quantity Control

See Peak Flow Comparison above.

3 HYDRAULICS

The intent of the hydraulic analysis is to ensure that proposed on-site drainage facilities are designed to accommodate and safely convey runoff produced up to and including the 25-year storm event.

3.1 Compliance with Performance Criteria

The site has been designed with a series of structural drainage facilities, including twenty (20) catch basins, three (3) double catch basins, four (4) concrete area drains, (1) French Drain, three (3) manholes, one (1) detention pond, three (3) flared end structures, one (1) outlet control structure and one (1) emergency overflow. This drainage system has been designed to remove stormwater from driving surfaces and divert it to the proposed detention pond, or directly to the wetlands.

3.1.1 Compliance with Local Criteria

The proposed storm sewer system has been designed in compliance with Town of Ledyard Drainage Regulations.

3.1.2 Compliance with State Criteria

The proposed storm sewer system has been designed in compliance with the State of Connecticut's drainage regulations per the 2002 ConnDOT Drainage Manual. (as amended)

Computations for the hydraulic analysis can be viewed in Appendix C.

4 WATER QUALITY

4.1 Methodology

The project has been designed to address both short-term and long-term stormwater quality. Short term (during construction) water quality has been provided in the form of erosion control measures and long-term (post construction) water quality has been provided through the use of primary and secondary treatment practices. Erosion control has been designed per the latest Connecticut Erosion Control Guidelines and long-term stormwater quality has been designed per the latest CT DEEP Stormwater Quality Manual.

4.2 Compliance with Performance Criteria

4.2.1 Compliance with Local Criteria

The proposed stormwater management system is designed to provide water quality volume for the entirety of the proposed development and treat the 1.3" storm as required by the 2024 CT DEEP Stormwater Quality Manual.

4.2.2 Compliance with Connecticut Stormwater Quality Manual

4.2.2.1 Standard 1 – Pollutant Reduction

Long Term Stormwater Quality

The project was designed with guidance from the latest Connecticut Stormwater Quality Manual.

The site was designed to divert all surface stormwater to the proposed detention basin, where floatables, debris and other pollutants will be filtered out of the water prior to discharge to the onsite wetlands. The detention pond is designed to provide 100% of the required water quality volume.

Computations for Water Quality can be viewed in Appendix D.

5 SOIL EROSION AND SEDIMENT CONTROL

5.1 Methodology

The proposed soil erosion and sediment controls have been designed in accordance with local regulations, the Connecticut Guidelines for Soil Erosion and Sediment Control, and the requirements of the CTDEEP General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities, as applicable. The proposed design considers the specific site characteristics of the site and anticipated construction activities. See the plan set for location and design of proposed short term soil erosion and sediment control measures to be used throughout construction.

Short Term Erosion Control

The proposed erosion and sedimentation controls consider the specific characteristics of the site and the anticipated construction activities. They have been designed in accordance with the latest CT DEEP Guidelines for Soil Erosion and Sediment Control.

Construction Entrances

Construction entrances will be utilized to remove sediment from construction vehicle tires and prevent it from being tracked onto adjoining paved roadway areas.

Erosion Control Barriers

Prior to any construction activity, hay bales, silt fence, or combination hay bale/silt fence barriers will be placed at the downgradient limits of construction and adjacent to the wetlands. Throughout construction, additional barriers will be installed as necessary at the toe of slopes equal to or in excess of 15 feet. These barriers will be inspected once every seven calendar days

and within 24 hours after every rainfall generating a discharge and replaced as necessary. Collected silt will be removed when one-half the barrier height is reached.

Temporary Seeding

Temporary Seeding will be utilized on portions where the phasing and sequencing require an initial disturbance followed by an extended period of inactivity that is greater than 30 days but less than 1 year. Temporary seeding will be conducted within 7 days after the suspension of grading work in disturbed areas where the suspension of work is expected to be more than 30 days but less than 1 year.

Soil Stabilization- Mulches

Structural (non-living) soil stabilization will be utilized to protect the soil surface on a temporary basis without the intention of promoting plant growth. When grading of the disturbed area will be suspended for a period of 30 or more consecutive days, but less than 5 months, disturbed areas will be stabilized within 7 days of the suspension of grading through the use of mulch, non-bituminous tackifiers, erosion control netting, or other approved materials appropriate for use as a temporary soil protector. For surfaces that are not to be reworked within 5 months but will be reworked within 1 year, use temporary seeding, seeding-type mulch (hay, straw, or cellulose fiber) or when slopes are less than 3:1, wood chips, bark chips or shredded bark.

Temporary Filter Inserts

Temporary Filter Inserts will be placed in each existing catch basin and yard drains prior to the start of construction, and in each new catch basin or yard drain during construction. These devices will be removed upon final site stabilization. Filter inserts will be inspected once every seven (7) calendar days and within 24 hours after every rainfall generating a discharge. Replacement of the inserts will be as often as necessary to maintain function of the drainage structure and prevent excessive ponding due to clogged fabric. Ripped or otherwise damaged inserts will be replaced immediately.

Stockpile Management

The topsoil stockpiles which will be idle for at least 30 days will be stabilized with temporary seed and mulch no later than 7 days from the last use. Small stockpiles may be covered with impervious tarps or erosion control matting in lieu of seeding and mulching.

A geotextile silt fence or hay bale barrier will be installed around the stockpile area approximately 10 feet from the proposed toe of the slope.

6 OPERATION AND MAINTENANCE

6.1 Inspection Frequency and Criteria

Maintenance and operation will be provided as follows.

During Construction

- **Dust Control:** Moisten disturbed soil areas with water periodically, or use a non-asphaltic soil tacifier to minimize dust.
- **Temporary Soil Protection:** Inspect seeded areas weekly and within 24 hours after a storm generating a discharge.
- **Catch Basin Filter Inserts:** Inspect the fabric at least once a week and within 24 hours after the end of a storm generating a discharge. Check the fabric for structural soundness (i.e. tears), proper anchoring/alignment within the grate and ability to drain runoff (i.e. percent of clogging by sediment). Remove the sediment every week, or sooner if ponding is excessive. Each time the sediment is removed, replace the section of fabric removed with a new section. Do not remove the sediment and reuse the same section of fabric.
- **Hay Bale/ Silt Fence Barrier:** Inspect the barrier at least once a week and within 24 hours after the end of a storm generating a discharge. For dewatering operations, inspect frequently before, during and after pumping operations. Remove the sediment deposits when the depth reaches one half the barrier's height. Repair or replace a barrier within 24 hours of observed failure. Maintain the barrier until the contributing disturbed area is stabilized.
- **Construction Entrance/Exit Pad:** Maintain the pad in a condition that will prevent tracking and washing of sediment onto paved surfaces. Place additional clean gravel on top of gravel that has become silted, or remove the silted gravel and replace the gravel to the depth removed with clean gravel, as conditions warrant. Remove immediately all sediment spilled, dropped, washed or tracked onto paved surfaces. Roads adjacent to the construction site shall be cleaned at the end of each day by hand sweeping or sweeper truck.
- **Existing Catch Basins and Sumps:** Inspect the filter baskets as specified above. After final removal of the filter baskets at the end of construction, clean the sump of all silt and debris.
- **New Catch Basins and Sumps:** As new catch basins are constructed, a sediment trap shall be installed in the unit and a sediment barrier installed around the grate. Inspect the

trap and barrier weekly and within 24 hours after a storm generating a discharge. After stabilization of the drainage area entering the catch basin, remove the trap and barrier and clean the basin sump of all silt and debris.

- **Temporary Stockpiles:** Inspect temporary stockpiles at the end of each workday to ensure that tarps are in place and secured. Temporary stockpiles that are expected to be inactive for more than 30 days should be temporarily seeded (see above).

After Construction

- **Driveway Sweeping:** At least twice a year, with the first occurring as soon as possible after snowmelt and the second not less than 90 days following the first.
- **Catch Basins and Sumps:** Maintenance includes removal of trash from the grate and the sump, as well as sediment from the sump. They shall be inspected semi-annually and cleaned when the sump is one half full of sediment. One of the inspections shall be after the snow and ice removal season is over, and prior to the spring rainfall events. If the sumps is filled more than half-filled with sediment at the semi-annual inspections, they shall be inspected quarterly.
- **Landscaped Areas:** Inspect semi-annually for erosion or dying vegetation. Repair and stabilize any bare or eroded areas and replace vegetation as soon as possible.
- **Detention Pond:** Inspect several times during the first few months to ensure that grass cover is established. Inspect the basin semi-annually and after major rain events for the first year, then annually after the first year. Trash should be removed as accumulated. Sediment building up should be removed when it's depth is greater than four (4) inches. Grass should be reseeded if the side slope or bottom exhibit erosion. Grass should be mowed once per month (depending on species) and should be cut to leave at least two (2) inches of height. Mowing should not occur when the ground is soft, to avoid rutting.
- **French Drain:** Inspect for sediment and debris build up on top of stone trench annually, if degradation of function is noticed and overflow flow is not contained within the drain, inspect pipe manually using a snake or camera equipment.

APPENDIX A

Existing Watershed Data

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Prepared for:

Habitat for Humanity®
of Eastern Connecticut

HABITAT FOR HUMANITY RESIDENTIAL DEVELOPMENT LOTS 8, 9 & 11

LEDYARD, CT

COLBY DRIVE

DATE:	REVISION:

KEY PLAN

PROJECT NO.: **0725 500010.00**
SCALE: **1" = 50'**
DATE: **12/20/2024**

DRAWN BY: **CLM**
CHECKED BY: **WGW**

EXISTING WATERSHED AREA MAP

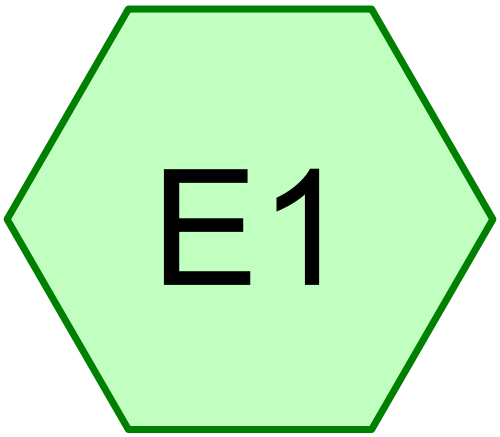
DRAWING NO.:

EWAM

Existing Watershed Cover Characteristics
Colby Drive Ledyard, CT
Project # 0725-500010.00

Watershed	Description	Total Area (AC)	Woods C Good	Impervious	CN	Tc (min)
			70	98		
E1	**To Wetlands**	13.46	11.30	2.16	74	14.2

* 2.16 acres of impervious accounts for previously approved impervious surface discharge into existing detention basin



To Wetlands

Subcat Reach Pond Link

Routing Diagram for 0725-500010.00 EWAM
Prepared by Alfred Benesch & Company, Printed 12/20/2024

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year	NOAA10 24-hr	D	Default	24.00	1	3.46	2
2	10-year	NOAA 24-hr	D	Default	24.00	1	5.11	2
3	25-year	NOAA 24-hr	D	Default	24.00	1	6.15	2
4	50-year	NOAA 24-hr	D	Default	24.00	1	6.92	2
5	100-year	NOAA 24-hr	D	Default	24.00	1	7.74	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.160	98	Paved parking, HSG C (E1)
11.310	70	Woods, Good, HSG C (E1)
13.470	**74**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
13.470	HSG C	E1
0.000	HSG D	
0.000	Other	
13.470		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	2.160	0.000	0.000	2.160	Paved parking	E1
0.000	0.000	11.310	0.000	0.000	11.310	Woods, Good	E1
0.000	**0.000**	**13.470**	**0.000**	**0.000**	**13.470**	**TOTAL AREA**	

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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 E1: To Wetlands Runoff Area=13.470 ac 16.04% Impervious Runoff Depth=1.21"
Flow Length=1,022' Tc=14.2 min CN=74 Runoff=13.91 cfs 1.361 af

Total Runoff Area = 13.470 ac Runoff Volume = 1.361 af Average Runoff Depth = 1.21"
83.96% Pervious = 11.310 ac 16.04% Impervious = 2.160 ac

Summary for Subcatchment E1: To Wetlands

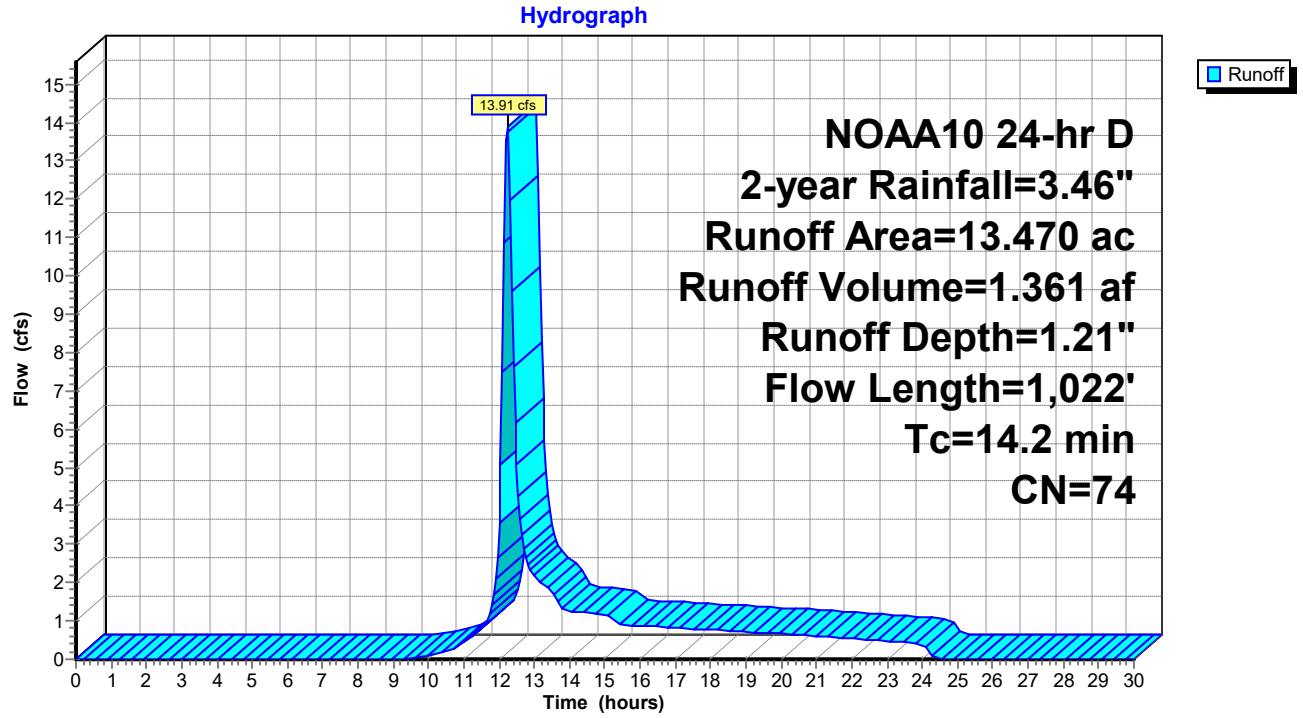
Runoff = 13.91 cfs @ 12.23 hrs, Volume= 1.361 af, Depth= 1.21"
Routed to nonexistent node TS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA10 24-hr D 2-year Rainfall=3.46"

Area (ac)	CN	Description
11.310	70	Woods, Good, HSG C
2.160	98	Paved parking, HSG C
13.470	74	Weighted Average
11.310		83.96% Pervious Area
2.160		16.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	100	0.0950	0.15		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.46"
1.8	539	0.1000	5.09		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.8	213	0.0470	4.40		**Shallow Concentrated Flow, Road** Paved Kv= 20.3 fps
0.5	170	0.1350	5.92		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
14.2	1,022	Total			

Subcatchment E1: To Wetlands



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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 E1: To Wetlands Runoff Area=13.470 ac 16.04% Impervious Runoff Depth=2.45"
Flow Length=1,022' Tc=14.2 min CN=74 Runoff=28.67 cfs 2.753 af

Total Runoff Area = 13.470 ac Runoff Volume = 2.753 af Average Runoff Depth = 2.45"
83.96% Pervious = 11.310 ac 16.04% Impervious = 2.160 ac

Summary for Subcatchment E1: To Wetlands

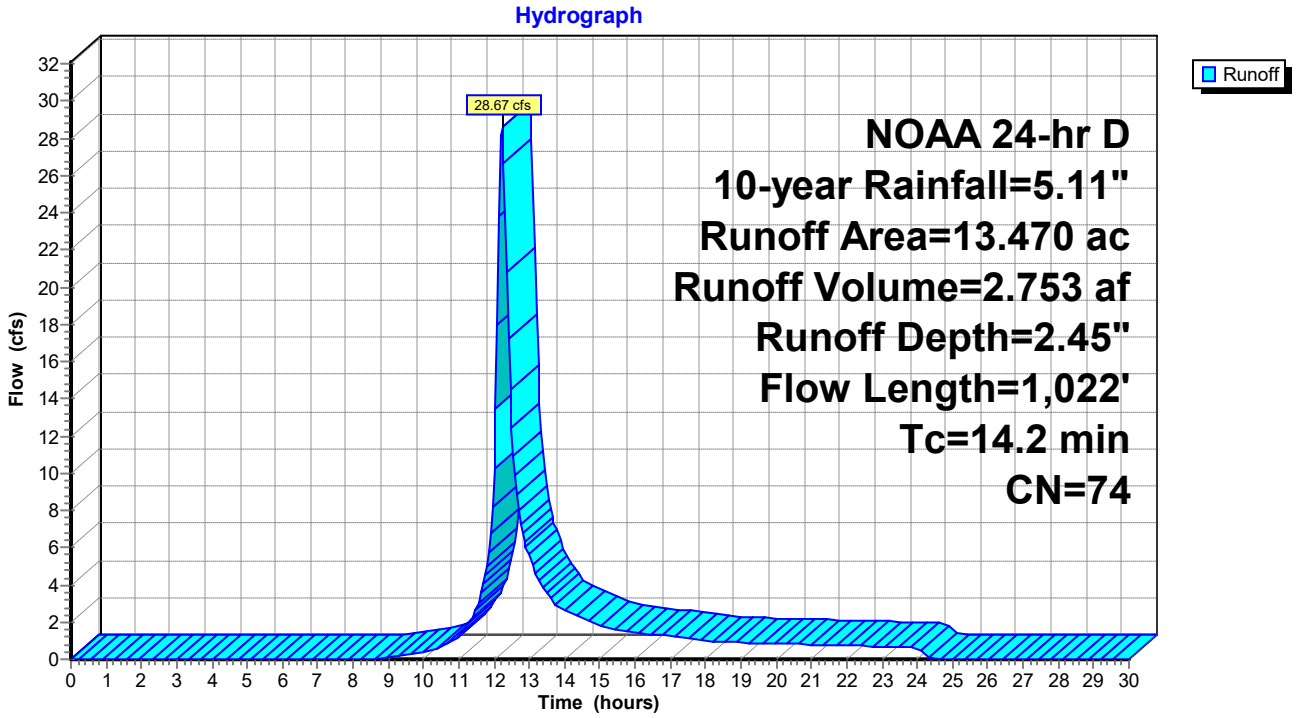
Runoff = 28.67 cfs @ 12.23 hrs, Volume= 2.753 af, Depth= 2.45"
Routed to nonexistent node TS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-year Rainfall=5.11"

Area (ac)	CN	Description
11.310	70	Woods, Good, HSG C
2.160	98	Paved parking, HSG C
13.470	74	Weighted Average
11.310		83.96% Pervious Area
2.160		16.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	100	0.0950	0.15		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.46"
1.8	539	0.1000	5.09		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.8	213	0.0470	4.40		**Shallow Concentrated Flow, Road** Paved Kv= 20.3 fps
0.5	170	0.1350	5.92		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
14.2	1,022	Total			

Subcatchment E1: To Wetlands



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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 E1: To Wetlands Runoff Area=13.470 ac 16.04% Impervious Runoff Depth=3.31"
Flow Length=1,022' Tc=14.2 min CN=74 Runoff=38.94 cfs 3.717 af

Total Runoff Area = 13.470 ac Runoff Volume = 3.717 af Average Runoff Depth = 3.31"
83.96% Pervious = 11.310 ac 16.04% Impervious = 2.160 ac

Summary for Subcatchment E1: To Wetlands

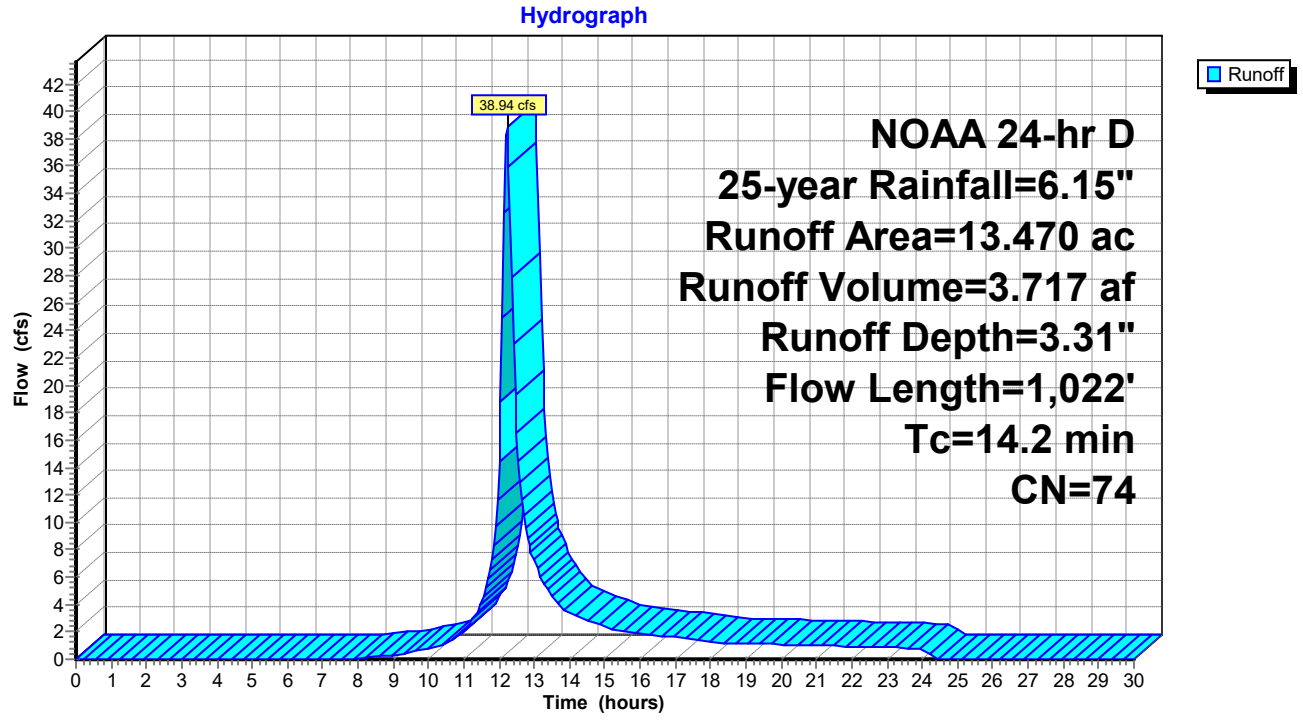
Runoff = 38.94 cfs @ 12.22 hrs, Volume= 3.717 af, Depth= 3.31"
Routed to nonexistent node TS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 25-year Rainfall=6.15"

Area (ac)	CN	Description
11.310	70	Woods, Good, HSG C
2.160	98	Paved parking, HSG C
13.470	74	Weighted Average
11.310		83.96% Pervious Area
2.160		16.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	100	0.0950	0.15		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.46"
1.8	539	0.1000	5.09		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.8	213	0.0470	4.40		**Shallow Concentrated Flow, Road** Paved Kv= 20.3 fps
0.5	170	0.1350	5.92		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
14.2	1,022	Total			

Subcatchment E1: To Wetlands



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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 E1: To Wetlands Runoff Area=13.470 ac 16.04% Impervious Runoff Depth=3.97"
Flow Length=1,022' Tc=14.2 min CN=74 Runoff=46.66 cfs 4.459 af

Total Runoff Area = 13.470 ac Runoff Volume = 4.459 af Average Runoff Depth = 3.97"
83.96% Pervious = 11.310 ac 16.04% Impervious = 2.160 ac

Summary for Subcatchment E1: To Wetlands

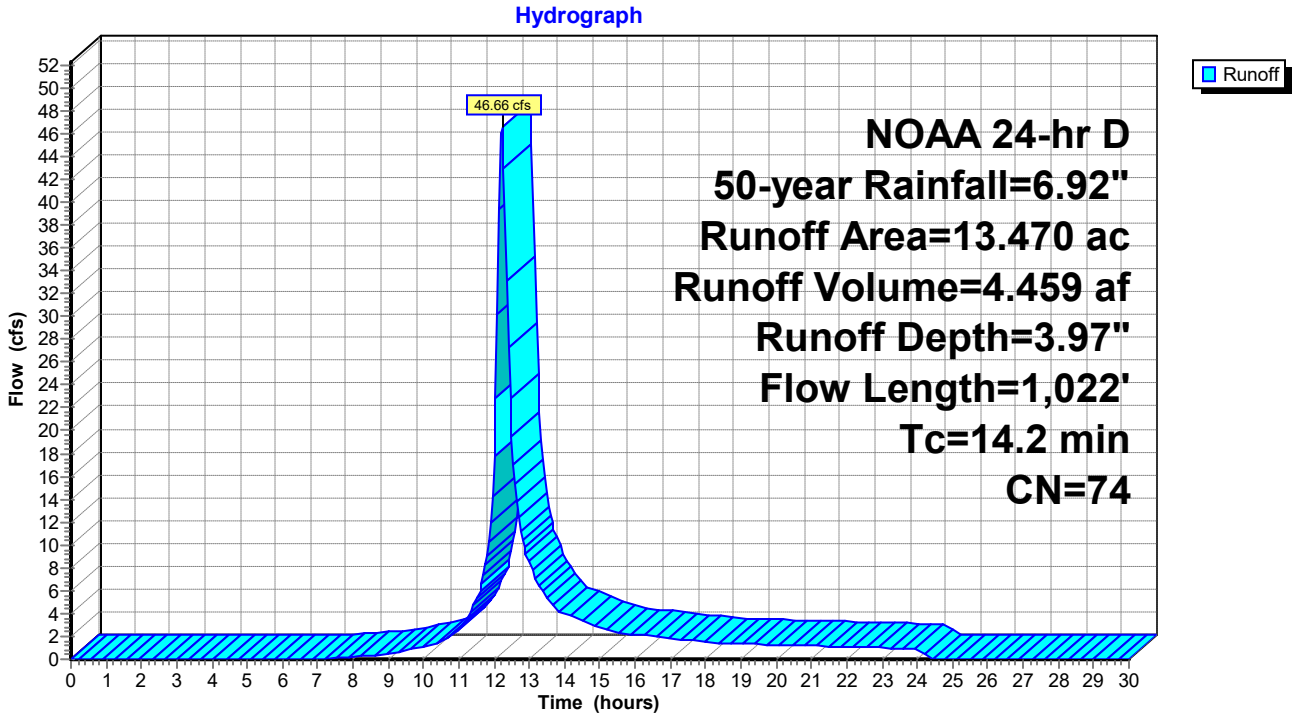
Runoff = 46.66 cfs @ 12.22 hrs, Volume= 4.459 af, Depth= 3.97"
Routed to nonexistent node TS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 50-year Rainfall=6.92"

Area (ac)	CN	Description
11.310	70	Woods, Good, HSG C
2.160	98	Paved parking, HSG C
13.470	74	Weighted Average
11.310		83.96% Pervious Area
2.160		16.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	100	0.0950	0.15		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.46"
1.8	539	0.1000	5.09		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.8	213	0.0470	4.40		**Shallow Concentrated Flow, Road** Paved Kv= 20.3 fps
0.5	170	0.1350	5.92		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
14.2	1,022	Total			

Subcatchment E1: To Wetlands



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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 E1: To Wetlands Runoff Area=13.470 ac 16.04% Impervious Runoff Depth=4.69"
Flow Length=1,022' Tc=14.2 min CN=74 Runoff=54.99 cfs 5.269 af

Total Runoff Area = 13.470 ac Runoff Volume = 5.269 af Average Runoff Depth = 4.69"
83.96% Pervious = 11.310 ac 16.04% Impervious = 2.160 ac

Summary for Subcatchment E1: To Wetlands

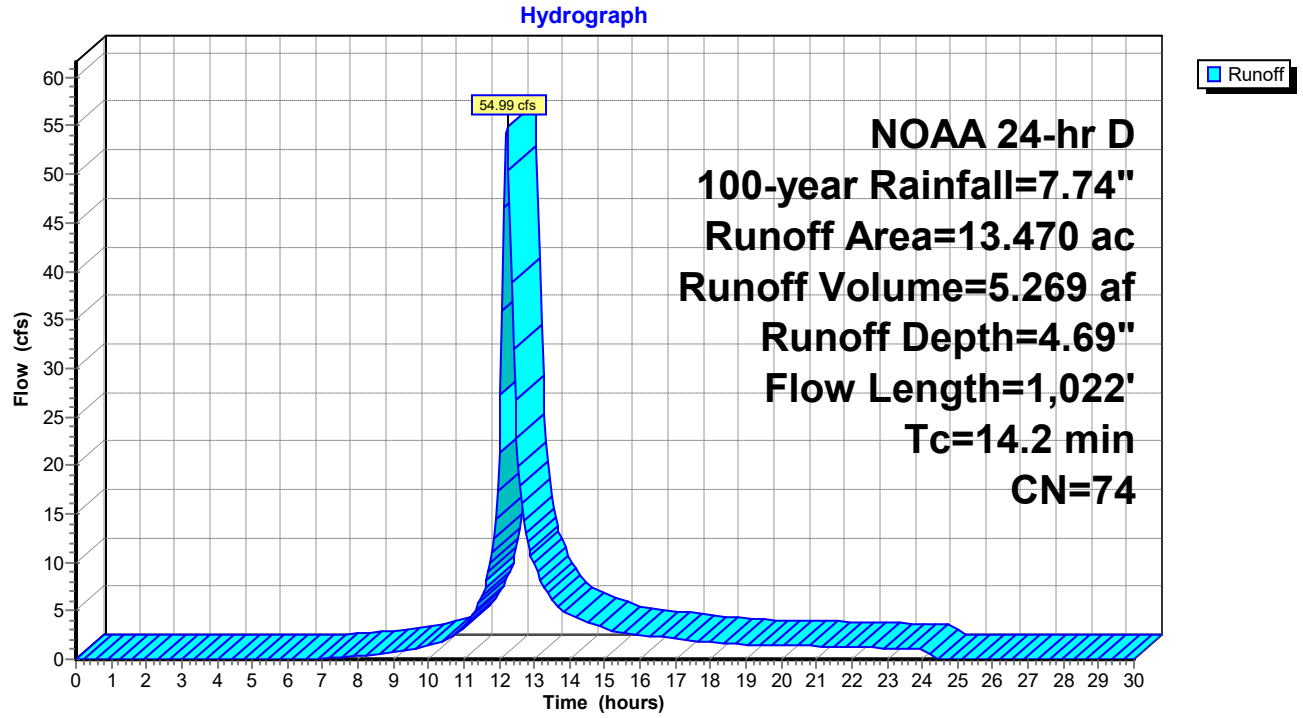
Runoff = 54.99 cfs @ 12.22 hrs, Volume= 5.269 af, Depth= 4.69"
Routed to nonexistent node TS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-year Rainfall=7.74"

Area (ac)	CN	Description
11.310	70	Woods, Good, HSG C
2.160	98	Paved parking, HSG C
13.470	74	Weighted Average
11.310		83.96% Pervious Area
2.160		16.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.1	100	0.0950	0.15		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.46"
1.8	539	0.1000	5.09		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.8	213	0.0470	4.40		**Shallow Concentrated Flow, Road** Paved Kv= 20.3 fps
0.5	170	0.1350	5.92		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
14.2	1,022	Total			

Subcatchment E1: To Wetlands



APPENDIX B

Proposed Watershed Data

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47C - WOODBRIDGE FINE SANDY LOAM
HYDROLOGIC SOIL GROUP: C

85B - PAXTON MONTAUK FINE SANDY LOAMS
HYDROLOGIC SOIL GROUP: C

73C - CHARLTON-CHATFIELD COMPLEX
HYDROLOGIC SOIL GROUP: B

P1-3 - OFFSITE TO POND
AREA: 0.61 AC
CN: 82
TC: 5 MINS

P1-2 - TO DETENTION POND
AREA: 5.57 AC
CN: 79
TC: 12.5 MINS

P1-1 - DIRECT TO WETLANDS
AREA: 5.94 AC
CN: 78
TC: 11.6 MINS

P1-2A - TO FRENCH DRAIN
AREA: 1.33 AC
CN: 75
TC: 11.3 MINS

84B - PAXTON MONTAUK FINE SANDY LOAMS
HYDROLOGIC SOIL GROUP: C

86D - PAXTON AND MONTAUK FINE SANDY LOAM
HYDROLOGIC SOIL GROUP: C

85B - PAXTON MONTAUK FINE SANDY LOAMS
HYDROLOGIC SOIL GROUP: C

COLBY DRIVE

COLONEL LEDYARD HIGHWAY

SCALE: 1" = 50'

Prepared by:

benesch

Alfred Benesch & Company
120 Hebron Avenue, 2nd Floor
Glastonbury, Connecticut 06033
860-633-8341

Prepared for:

Habitat for Humanity®
of Eastern Connecticut

HABITAT FOR HUMANITY RESIDENTIAL DEVELOPMENT LOTS 8, 9 & 11

LEDYARD, CT

COLBY DRIVE

DATE:	REVISION:

KEY PLAN

PROJECT NO.: 0725 500010.00
SCALE: 1" = 50'
DATE: 12/20/2024

DRAWN BY: CLM
CHECKED BY: WGW

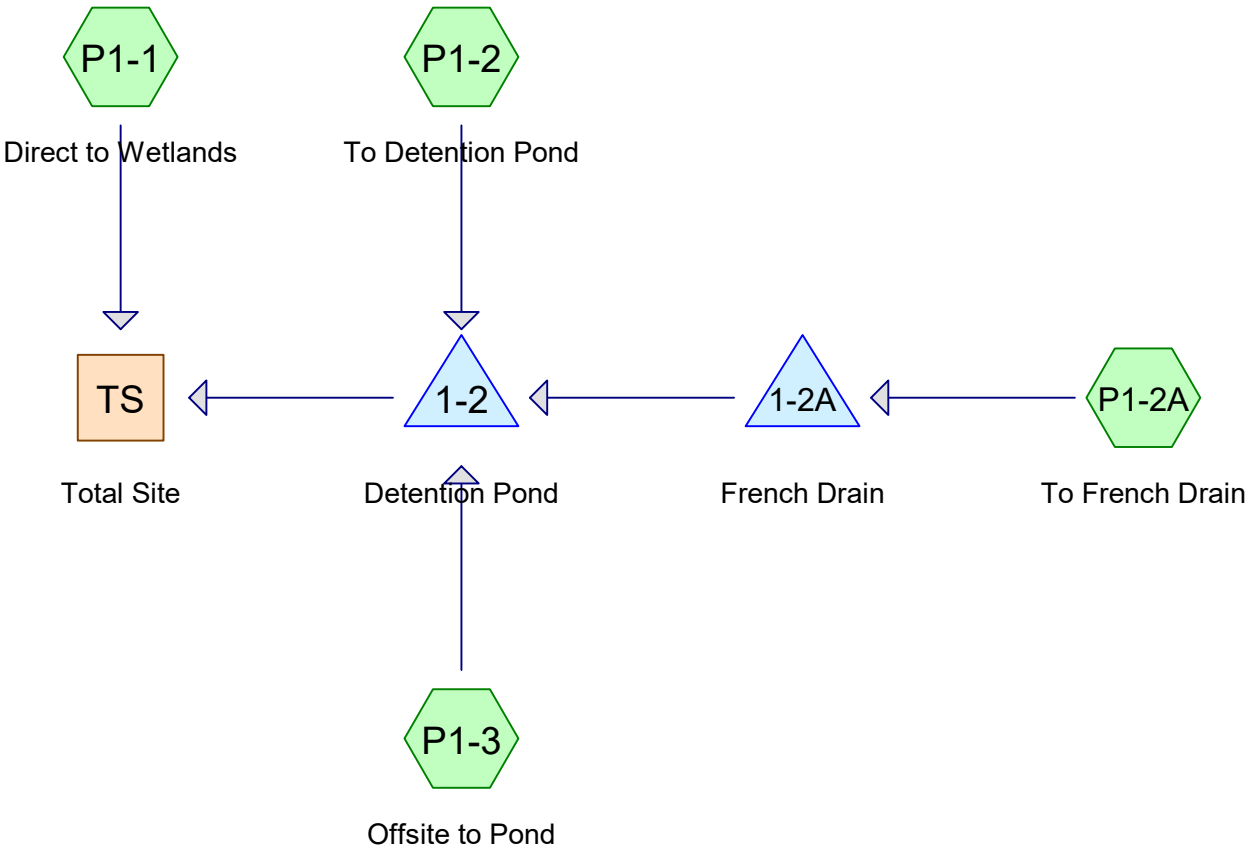
PROPOSED WATERSHED AREA MAP

DRAWING NO.:

PWAM

Proposed Watershed Cover Characteristics
Colby Drive Ledyard, CT
Project # 0725-500010.00

Watershed	Description	Total Area (AC)	Woods	Grass	Impervious	CN	Tc (min)
			C	C			
			Good	good			
			70	74	98		
P1-1	**Direct to Wetlands**	5.95	1.54	3.13	1.28	78	11.6
P1-2	**To Detention Pond**	5.57	1.46	2.05	2.07	82	12.5
P1-3	**Offsite to Pond**	0.61	0.26	0.10	0.25	82	5.0
P1-2A	**To French Drain**	1.33	1.04	0.10	0.25	75	11.3
TS	**Total Site**	13.46	4.30	5.38	3.84	80	



Subcat Reach Pond Link

Routing Diagram for 0725-500010.00 PWAM
Prepared by Alfred Benesch & Company, Printed 12/24/2024

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year	NOAA 24-hr	D	Default	24.00	1	3.46	2
2	10-year	NOAA 24-hr	D	Default	24.00	1	5.11	2
3	25-year	NOAA 24-hr	D	Default	24.00	1	6.15	2
4	50-year	NOAA 24-hr	D	Default	24.00	1	6.92	2
5	100-year	NOAA 24-hr	D	Default	24.00	1	7.74	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.380	74	>75% Grass cover, Good, HSG C (P1-1, P1-2, P1-2A, P1-3)
3.850	98	Paved parking, HSG C (P1-1, P1-2, P1-2A, P1-3)
4.300	70	Woods, Good, HSG C (P1-1, P1-2, P1-2A, P1-3)
13.530	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
13.530	HSG C	P1-1, P1-2, P1-2A, P1-3
0.000	HSG D	
0.000	Other	
13.530		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	5.380	0.000	0.000	5.380	>75% Grass cover, Good	P1-1, P1-2, P1-2A, P1-3
0.000	0.000	3.850	0.000	0.000	3.850	Paved parking	P1-1, P1-2, P1-2A, P1-3
0.000	0.000	4.300	0.000	0.000	4.300	Woods, Good	P1-1, P1-2, P1-2A, P1-3
0.000	**0.000**	**13.530**	**0.000**	**0.000**	**13.530**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	1-2	258.50	253.47	68.0	0.0740	0.011	0.0	24.0	0.0	

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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 P1-1: Direct to Wetlands Runoff Area=5.950 ac 21.51% Impervious Runoff Depth=1.47"
Flow Length=401' Tc=11.6 min CN=78 Runoff=8.17 cfs 0.727 af

Subcatchment P1-2: To Detention Pond Runoff Area=5.580 ac 37.10% Impervious Runoff Depth=1.75"
Flow Length=558' Tc=12.5 min CN=82 Runoff=8.99 cfs 0.814 af

Subcatchment P1-2A: To French Drain Runoff Area=1.390 ac 17.99% Impervious Runoff Depth=1.27"
Flow Length=275' Tc=11.3 min CN=75 Runoff=1.66 cfs 0.148 af

Subcatchment P1-3: Offsite to Pond Runoff Area=0.610 ac 40.98% Impervious Runoff Depth=1.75"
Tc=5.0 min CN=82 Runoff=1.25 cfs 0.089 af

Reach TS: Total Site Inflow=9.23 cfs 1.420 af
Outflow=9.23 cfs 1.420 af

Pond 1-2: Detention Pond Peak Elev=262.38' Storage=15,963 cf Inflow=11.29 cfs 1.016 af
Discarded=0.07 cfs 0.089 af Primary=5.00 cfs 0.692 af Outflow=5.07 cfs 0.782 af

Pond 1-2A: French Drain Peak Elev=308.40' Storage=537 cf Inflow=1.66 cfs 0.148 af
Discarded=0.02 cfs 0.034 af Primary=1.61 cfs 0.114 af Outflow=1.63 cfs 0.148 af

Total Runoff Area = 13.530 ac Runoff Volume = 1.777 af Average Runoff Depth = 1.58"
71.54% Pervious = 9.680 ac 28.46% Impervious = 3.850 ac

Summary for Subcatchment P1-1: Direct to Wetlands

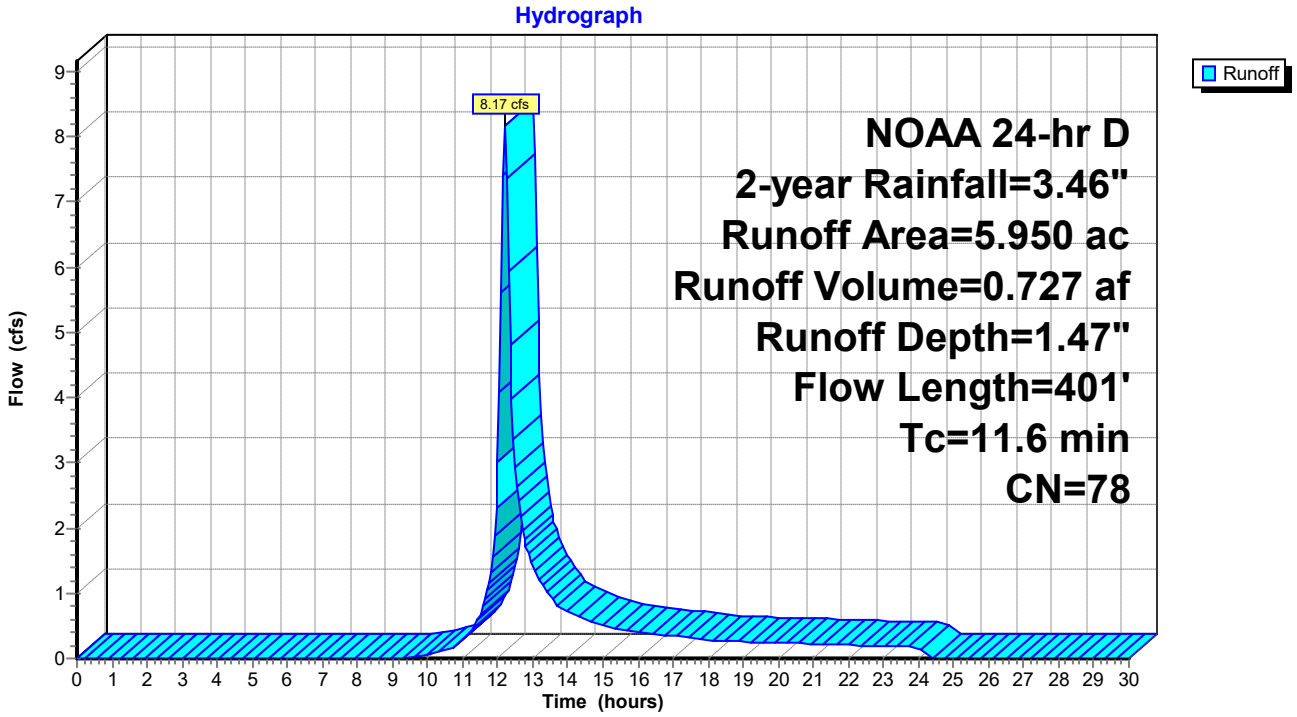
Runoff = 8.17 cfs @ 12.20 hrs, Volume= 0.727 af, Depth= 1.47"
Routed to Reach TS : Total Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-year Rainfall=3.46"

Area (ac)	CN	Description
1.540	70	Woods, Good, HSG C
3.130	74	>75% Grass cover, Good, HSG C
1.280	98	Paved parking, HSG C
5.950	78	Weighted Average
4.670		78.49% Pervious Area
1.280		21.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.1000	0.15		**Sheet Flow, Grass** Woods: Light underbrush n= 0.400 P2= 3.46"
0.1	46	0.1740	6.72		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.2	89	0.2030	7.25		**Shallow Concentrated Flow, Grass** Unpaved Kv= 16.1 fps
0.5	166	0.1330	5.87		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
11.6	401	Total			

Subcatchment P1-1: Direct to Wetlands



Summary for Subcatchment P1-2: To Detention Pond

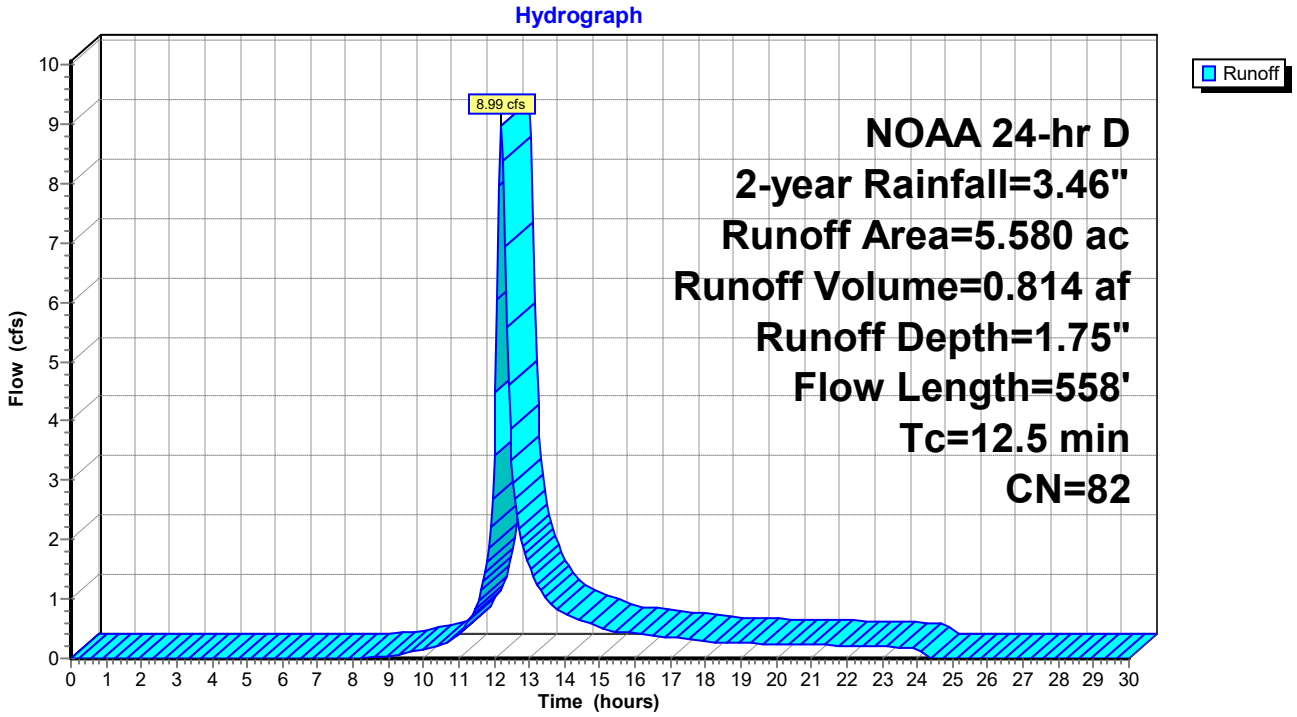
Runoff = 8.99 cfs @ 12.21 hrs, Volume= 0.814 af, Depth= 1.75"
Routed to Pond 1-2 : Detention Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-year Rainfall=3.46"

Area (ac)	CN	Description
1.460	70	Woods, Good, HSG C
2.050	74	>75% Grass cover, Good, HSG C
2.070	98	Paved parking, HSG C
5.580	82	Weighted Average
3.510		62.90% Pervious Area
2.070		37.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.1000	0.15		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.46"
0.7	216	0.0930	4.91		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.8	179	0.0310	3.57		**Shallow Concentrated Flow, Gravel** Paved Kv= 20.3 fps
0.1	20	0.1500	6.24		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.1	43	0.2300	7.72		**Shallow Concentrated Flow, Grass** Unpaved Kv= 16.1 fps
12.5	558	Total			

Subcatchment P1-2: To Detention Pond



Summary for Subcatchment P1-2A: To French Drain

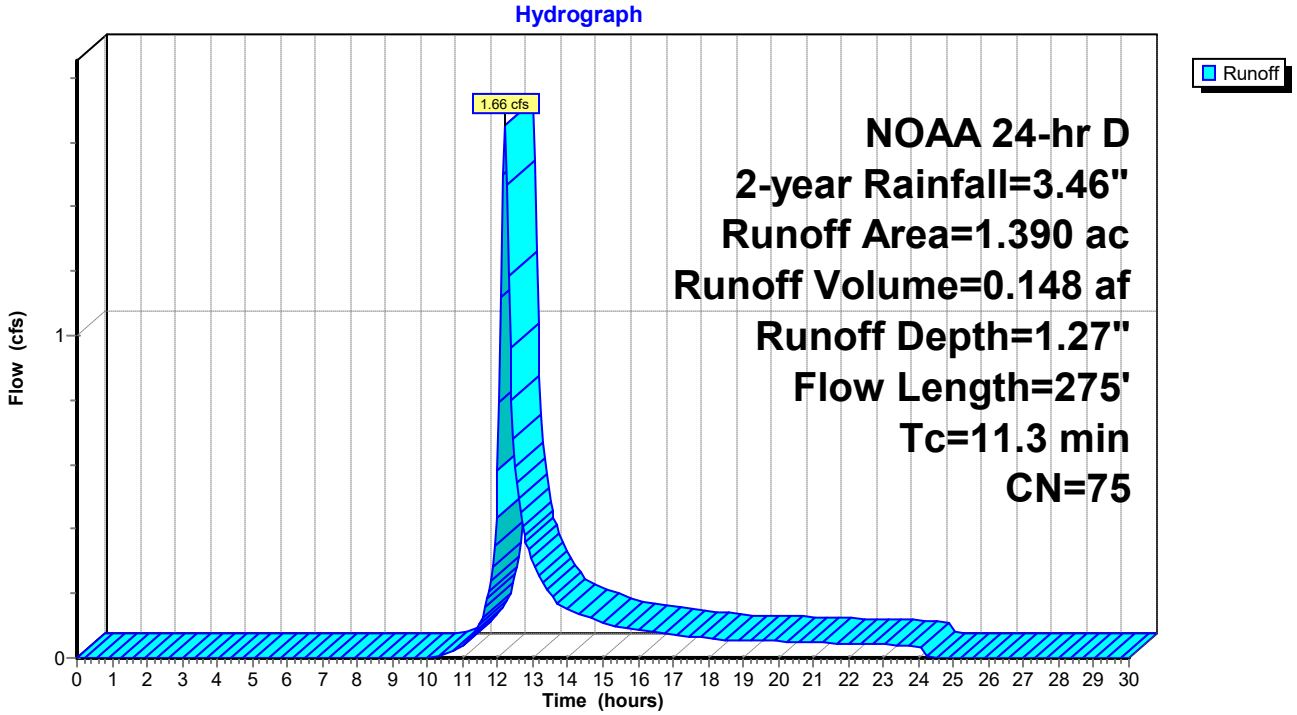
Runoff = 1.66 cfs @ 12.20 hrs, Volume= 0.148 af, Depth= 1.27"
Routed to Pond 1-2A : French Drain

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-year Rainfall=3.46"

Area (ac)	CN	Description
1.040	70	Woods, Good, HSG C
0.100	74	>75% Grass cover, Good, HSG C
0.250	98	Paved parking, HSG C
1.390	75	Weighted Average
1.140		82.01% Pervious Area
0.250		17.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.1000	0.15		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.46"
0.5	175	0.1430	6.09		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
11.3	275	Total			

Subcatchment P1-2A: To French Drain



Summary for Subcatchment P1-3: Offsite to Pond

[49] Hint: Tc<2dt may require smaller dt

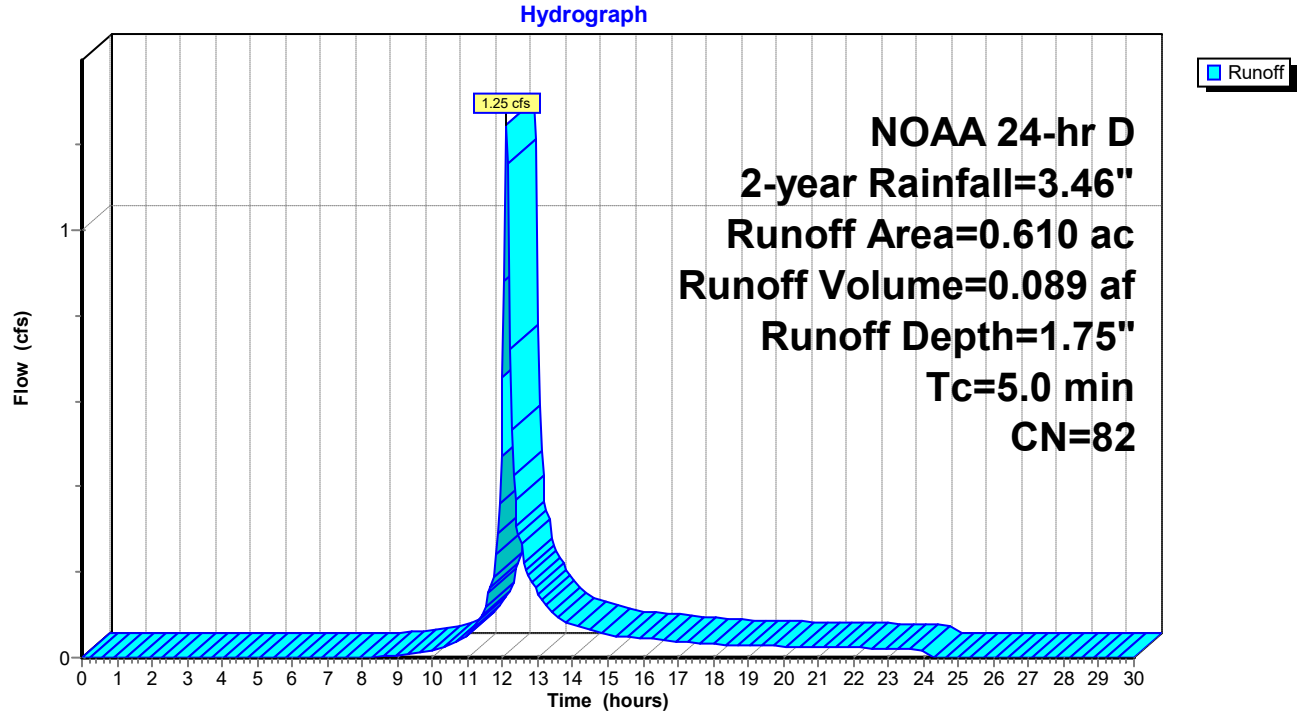
Runoff = 1.25 cfs @ 12.12 hrs, Volume= 0.089 af, Depth= 1.75"
Routed to Pond 1-2 : Detention Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-year Rainfall=3.46"

Area (ac)	CN	Description
0.260	70	Woods, Good, HSG C
0.100	74	>75% Grass cover, Good, HSG C
0.250	98	Paved parking, HSG C
0.610	82	Weighted Average
0.360		59.02% Pervious Area
0.250		40.98% Impervious Area

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

Subcatchment P1-3: Offsite to Pond



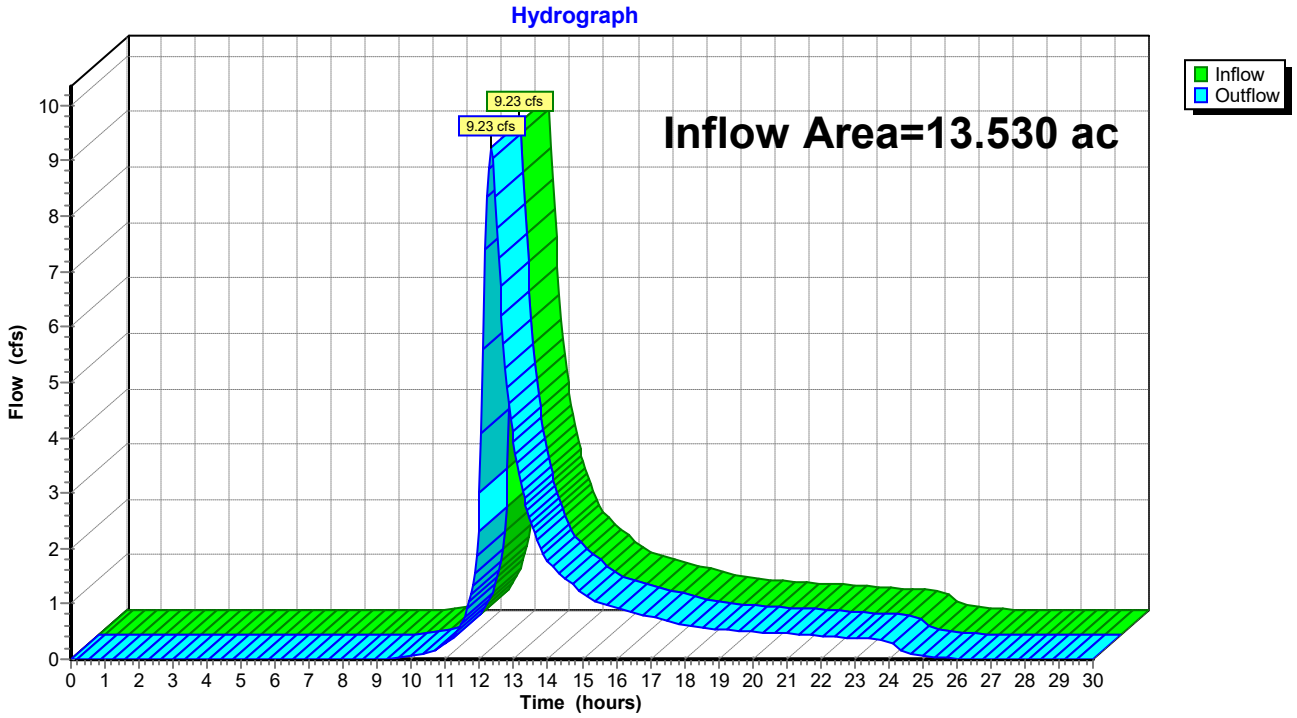
Summary for Reach TS: Total Site

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 13.530 ac, 28.46% Impervious, Inflow Depth = 1.26" for 2-year event
Inflow = 9.23 cfs @ 12.33 hrs, Volume= 1.420 af
Outflow = 9.23 cfs @ 12.33 hrs, Volume= 1.420 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach TS: Total Site



Summary for Pond 1-2: Detention Pond

Inflow Area = 7.580 ac, 33.91% Impervious, Inflow Depth = 1.61" for 2-year event
Inflow = 11.29 cfs @ 12.20 hrs, Volume= 1.016 af
Outflow = 5.07 cfs @ 12.44 hrs, Volume= 0.782 af, Atten= 55%, Lag= 14.6 min
Discarded = 0.07 cfs @ 12.44 hrs, Volume= 0.089 af
Primary = 5.00 cfs @ 12.44 hrs, Volume= 0.692 af
Routed to Reach TS : Total Site

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 262.38' @ 12.44 hrs Surf.Area= 6,437 sf Storage= 15,963 cf

Plug-Flow detention time= 189.9 min calculated for 0.780 af (77% of inflow)
Center-of-Mass det. time= 99.9 min (948.1 - 848.2)

Volume	Invert	Avail.Storage	Storage Description
#1	258.50'	37,234 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

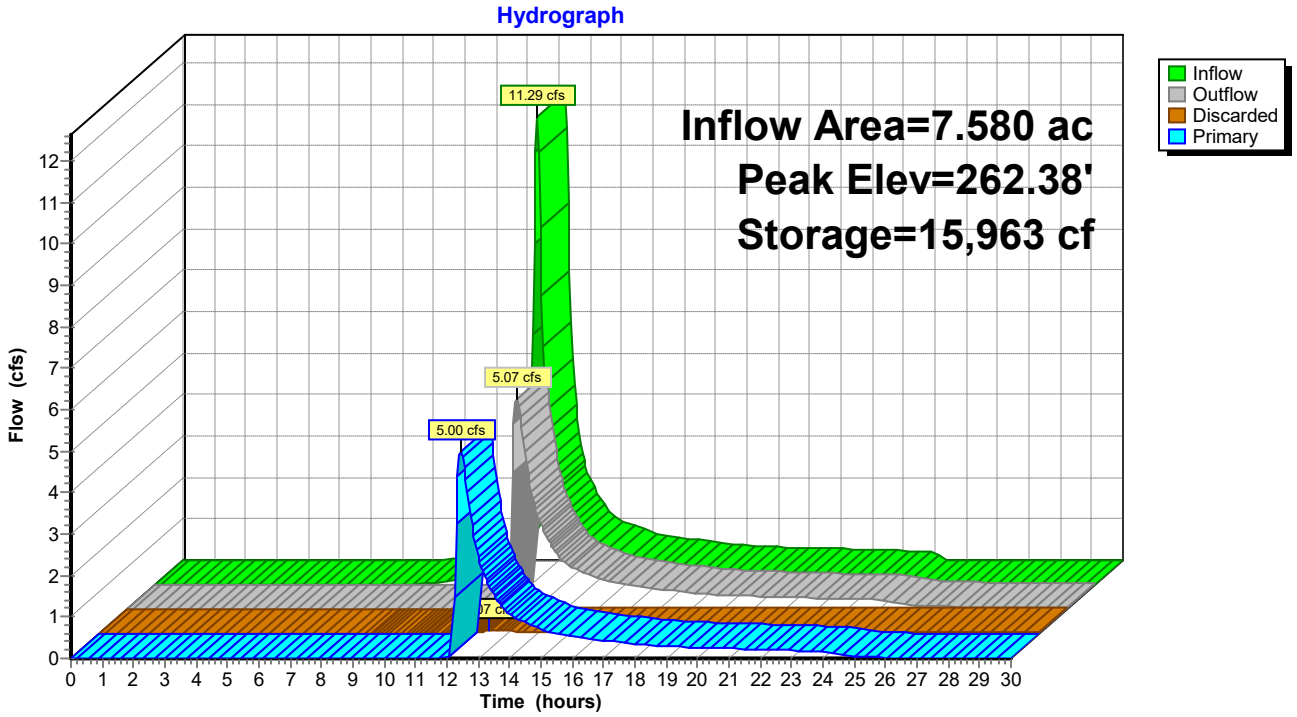
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
258.50	880	0	0
259.00	2,605	871	871
260.00	3,670	3,138	4,009
261.00	4,792	4,231	8,240
262.00	5,971	5,382	13,621
263.00	7,206	6,589	20,210
264.00	8,498	7,852	28,062
265.00	9,847	9,173	37,234

Device	Routing	Invert	Outlet Devices
#1	Primary	258.50'	**24.0" Round Culvert** L= 68.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 258.50' / 253.47' S= 0.0740 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Device 1	261.50'	**16.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	261.75'	**18.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	263.70'	**40.0" W x 33.0" H Vert. Grate** C= 0.600 Limited to weir flow at low heads
#5	Discarded	258.50'	**0.210 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 257.00'

Discarded OutFlow Max=0.07 cfs @ 12.44 hrs HW=262.38' (Free Discharge)
└─**5=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=4.98 cfs @ 12.44 hrs HW=262.38' (Free Discharge)
└─**1=Culvert** (Passes 4.98 cfs of 22.64 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 3.10 cfs @ 3.19 fps)
  ├─**3=Orifice** (Orifice Controls 1.88 cfs @ 2.69 fps)
  └─**4=Grate** (Controls 0.00 cfs)

Pond 1-2: Detention Pond



Summary for Pond 1-2A: French Drain

Inflow Area = 1.390 ac, 17.99% Impervious, Inflow Depth = 1.27" for 2-year event
Inflow = 1.66 cfs @ 12.20 hrs, Volume= 0.148 af
Outflow = 1.63 cfs @ 12.22 hrs, Volume= 0.148 af, Atten= 2%, Lag= 1.1 min
Discarded = 0.02 cfs @ 12.22 hrs, Volume= 0.034 af
Primary = 1.61 cfs @ 12.22 hrs, Volume= 0.114 af
Routed to Pond 1-2 : Detention Pond

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 308.40' @ 12.22 hrs Surf.Area= 960 sf Storage= 537 cf

Plug-Flow detention time= 56.5 min calculated for 0.148 af (100% of inflow)
Center-of-Mass det. time= 56.4 min (927.8 - 871.4)

Volume	Invert	Avail.Storage	Storage Description
#1	307.00'	768 cf	**French Drain Storage (Prismatic)** Listed below (Recalc) 1,920 cf Overall x 40.0% Voids

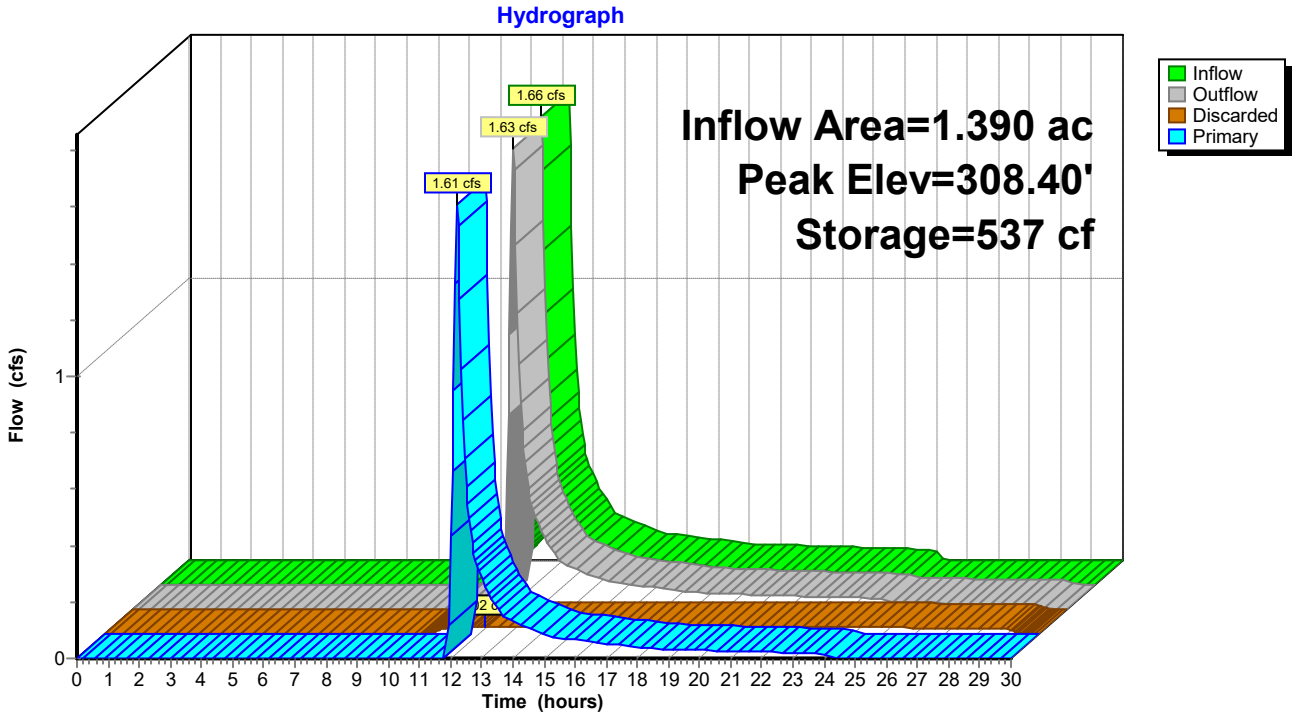
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
307.00	960	0	0
308.00	960	960	960
309.00	960	960	1,920

Device	Routing	Invert	Outlet Devices
#1	Discarded	307.00'	**0.940 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 290.00'
#2	Primary	308.00'	**24.0" W x 36.0" H Vert. Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.22 hrs HW=308.39' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=1.57 cfs @ 12.22 hrs HW=308.39' (Free Discharge)
↑—**2=Grate** (Orifice Controls 1.57 cfs @ 2.01 fps)

Pond 1-2A: French Drain



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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 P1-1: Direct to Wetlands Runoff Area=5.950 ac 21.51% Impervious Runoff Depth=2.81"
Flow Length=401' Tc=11.6 min CN=78 Runoff=15.74 cfs 1.391 af

Subcatchment P1-2: To Detention Pond Runoff Area=5.580 ac 37.10% Impervious Runoff Depth=3.18"
Flow Length=558' Tc=12.5 min CN=82 Runoff=16.22 cfs 1.478 af

Subcatchment P1-2A: To French Drain Runoff Area=1.390 ac 17.99% Impervious Runoff Depth=2.54"
Flow Length=275' Tc=11.3 min CN=75 Runoff=3.37 cfs 0.294 af

Subcatchment P1-3: Offsite to Pond Runoff Area=0.610 ac 40.98% Impervious Runoff Depth=3.18"
Tc=5.0 min CN=82 Runoff=2.24 cfs 0.162 af

Reach TS: Total Site Inflow=28.53 cfs 2.954 af
Outflow=28.53 cfs 2.954 af

Pond 1-2: Detention Pond Peak Elev=263.27' Storage=22,193 cf Inflow=20.80 cfs 1.896 af
Discarded=0.09 cfs 0.097 af Primary=14.52 cfs 1.563 af Outflow=14.61 cfs 1.660 af

Pond 1-2A: French Drain Peak Elev=308.64' Storage=632 cf Inflow=3.37 cfs 0.294 af
Discarded=0.02 cfs 0.037 af Primary=3.32 cfs 0.257 af Outflow=3.35 cfs 0.294 af

Total Runoff Area = 13.530 ac Runoff Volume = 3.324 af Average Runoff Depth = 2.95"
71.54% Pervious = 9.680 ac 28.46% Impervious = 3.850 ac

Summary for Subcatchment P1-1: Direct to Wetlands

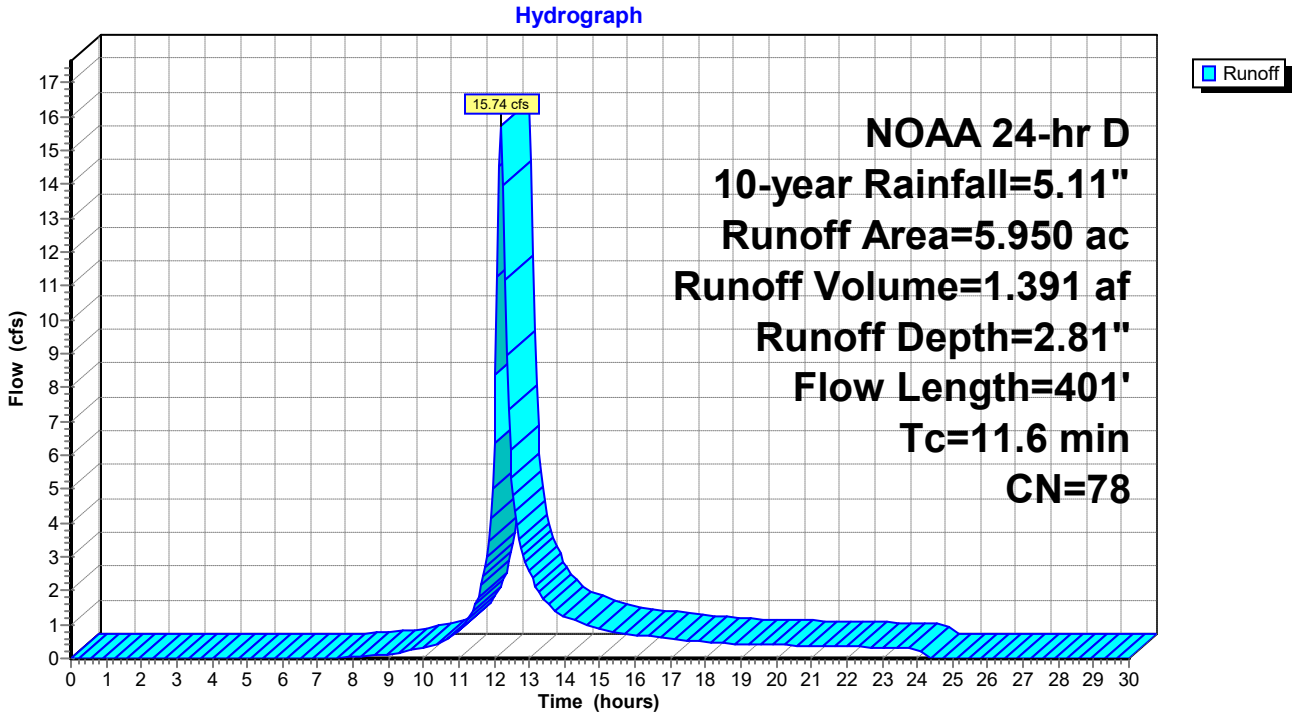
Runoff = 15.74 cfs @ 12.20 hrs, Volume= 1.391 af, Depth= 2.81"
Routed to Reach TS : Total Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-year Rainfall=5.11"

Area (ac)	CN	Description
1.540	70	Woods, Good, HSG C
3.130	74	>75% Grass cover, Good, HSG C
1.280	98	Paved parking, HSG C
5.950	78	Weighted Average
4.670		78.49% Pervious Area
1.280		21.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.1000	0.15		**Sheet Flow, Grass** Woods: Light underbrush n= 0.400 P2= 3.46"
0.1	46	0.1740	6.72		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.2	89	0.2030	7.25		**Shallow Concentrated Flow, Grass** Unpaved Kv= 16.1 fps
0.5	166	0.1330	5.87		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
11.6	401	Total			

Subcatchment P1-1: Direct to Wetlands



Summary for Subcatchment P1-2: To Detention Pond

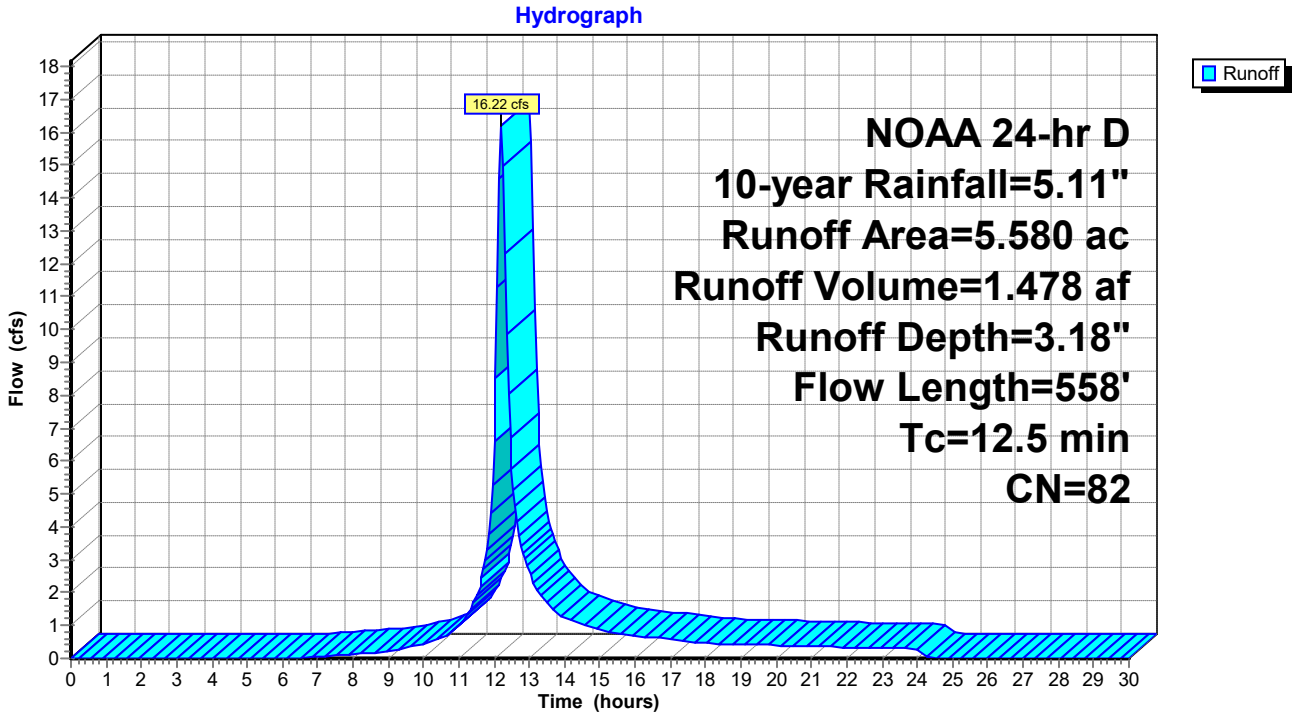
Runoff = 16.22 cfs @ 12.20 hrs, Volume= 1.478 af, Depth= 3.18"
Routed to Pond 1-2 : Detention Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-year Rainfall=5.11"

Area (ac)	CN	Description
1.460	70	Woods, Good, HSG C
2.050	74	>75% Grass cover, Good, HSG C
2.070	98	Paved parking, HSG C
5.580	82	Weighted Average
3.510		62.90% Pervious Area
2.070		37.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.1000	0.15		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.46"
0.7	216	0.0930	4.91		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.8	179	0.0310	3.57		**Shallow Concentrated Flow, Gravel** Paved Kv= 20.3 fps
0.1	20	0.1500	6.24		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.1	43	0.2300	7.72		**Shallow Concentrated Flow, Grass** Unpaved Kv= 16.1 fps
12.5	558	Total			

Subcatchment P1-2: To Detention Pond



Summary for Subcatchment P1-2A: To French Drain

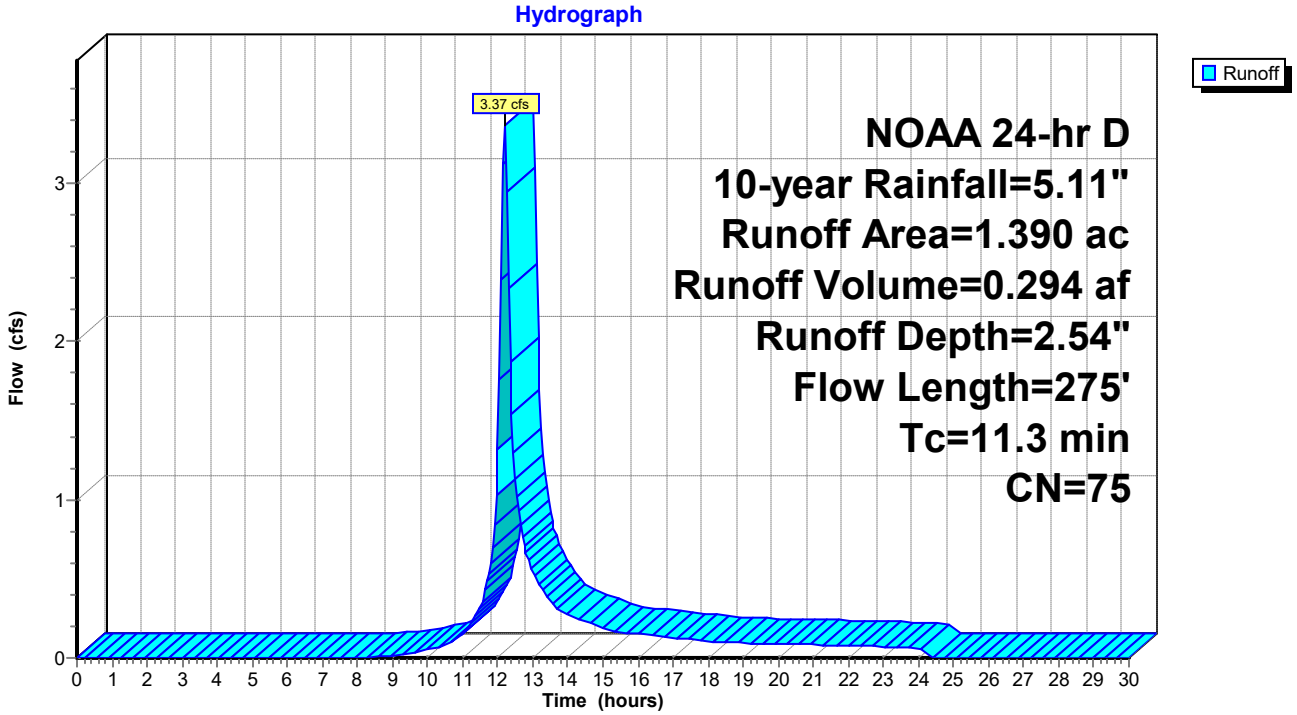
Runoff = 3.37 cfs @ 12.19 hrs, Volume= 0.294 af, Depth= 2.54"
Routed to Pond 1-2A : French Drain

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-year Rainfall=5.11"

Area (ac)	CN	Description
1.040	70	Woods, Good, HSG C
0.100	74	>75% Grass cover, Good, HSG C
0.250	98	Paved parking, HSG C
1.390	75	Weighted Average
1.140		82.01% Pervious Area
0.250		17.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.1000	0.15		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.46"
0.5	175	0.1430	6.09		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
11.3	275	Total			

Subcatchment P1-2A: To French Drain



Summary for Subcatchment P1-3: Offsite to Pond

[49] Hint: Tc<2dt may require smaller dt

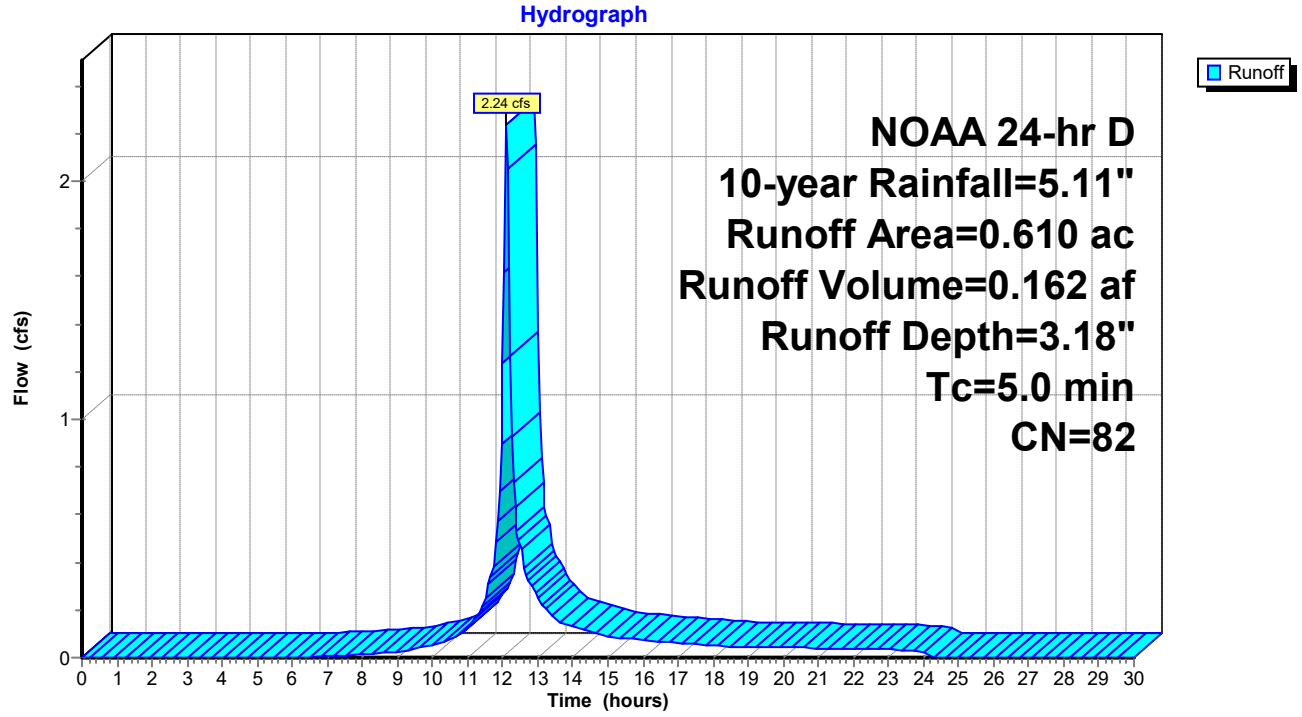
Runoff = 2.24 cfs @ 12.11 hrs, Volume= 0.162 af, Depth= 3.18"
Routed to Pond 1-2 : Detention Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-year Rainfall=5.11"

Area (ac)	CN	Description
0.260	70	Woods, Good, HSG C
0.100	74	>75% Grass cover, Good, HSG C
0.250	98	Paved parking, HSG C
0.610	82	Weighted Average
0.360		59.02% Pervious Area
0.250		40.98% Impervious Area

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

Subcatchment P1-3: Offsite to Pond



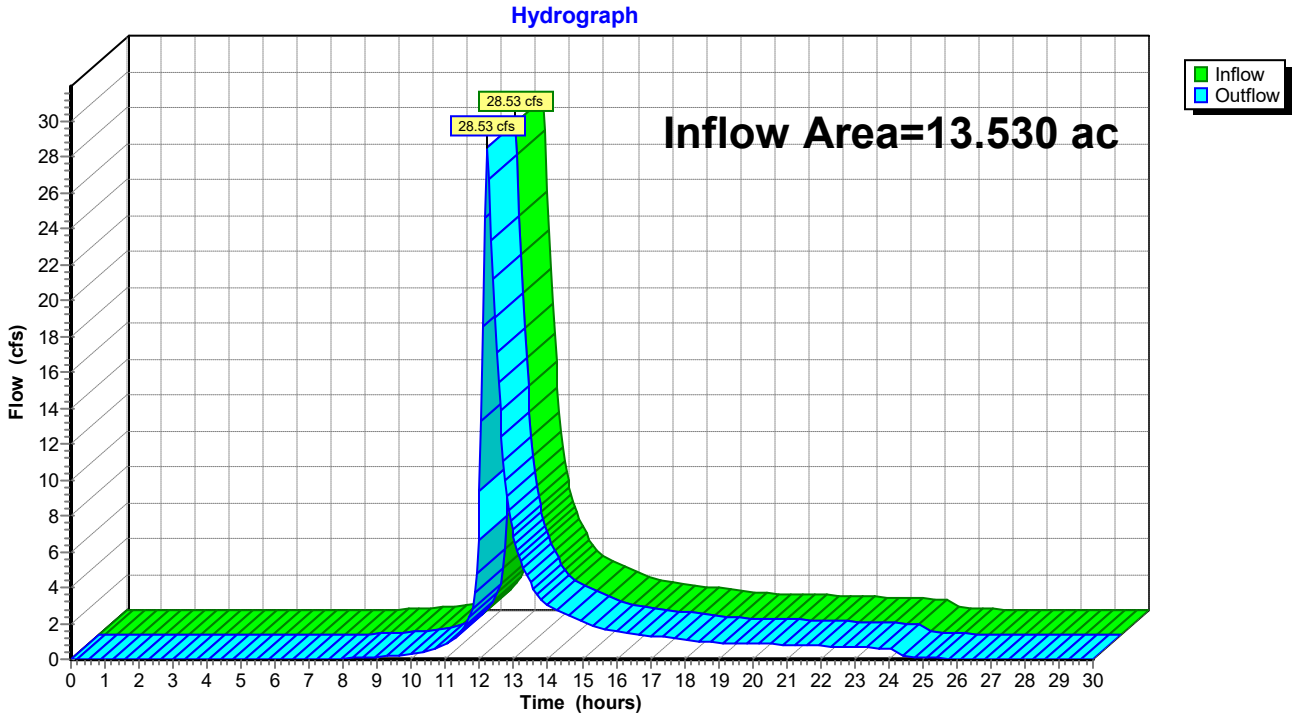
Summary for Reach TS: Total Site

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 13.530 ac, 28.46% Impervious, Inflow Depth = 2.62" for 10-year event
Inflow = 28.53 cfs @ 12.22 hrs, Volume= 2.954 af
Outflow = 28.53 cfs @ 12.22 hrs, Volume= 2.954 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach TS: Total Site



Summary for Pond 1-2: Detention Pond

Inflow Area = 7.580 ac, 33.91% Impervious, Inflow Depth = 3.00" for 10-year event
Inflow = 20.80 cfs @ 12.20 hrs, Volume= 1.896 af
Outflow = 14.61 cfs @ 12.32 hrs, Volume= 1.660 af, Atten= 30%, Lag= 7.3 min
Discarded = 0.09 cfs @ 12.32 hrs, Volume= 0.097 af
Primary = 14.52 cfs @ 12.32 hrs, Volume= 1.563 af
Routed to Reach TS : Total Site

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 263.27' @ 12.32 hrs Surf.Area= 7,553 sf Storage= 22,193 cf

Plug-Flow detention time= 120.9 min calculated for 1.660 af (88% of inflow)
Center-of-Mass det. time= 60.9 min (891.8 - 830.9)

Volume	Invert	Avail.Storage	Storage Description
#1	258.50'	37,234 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

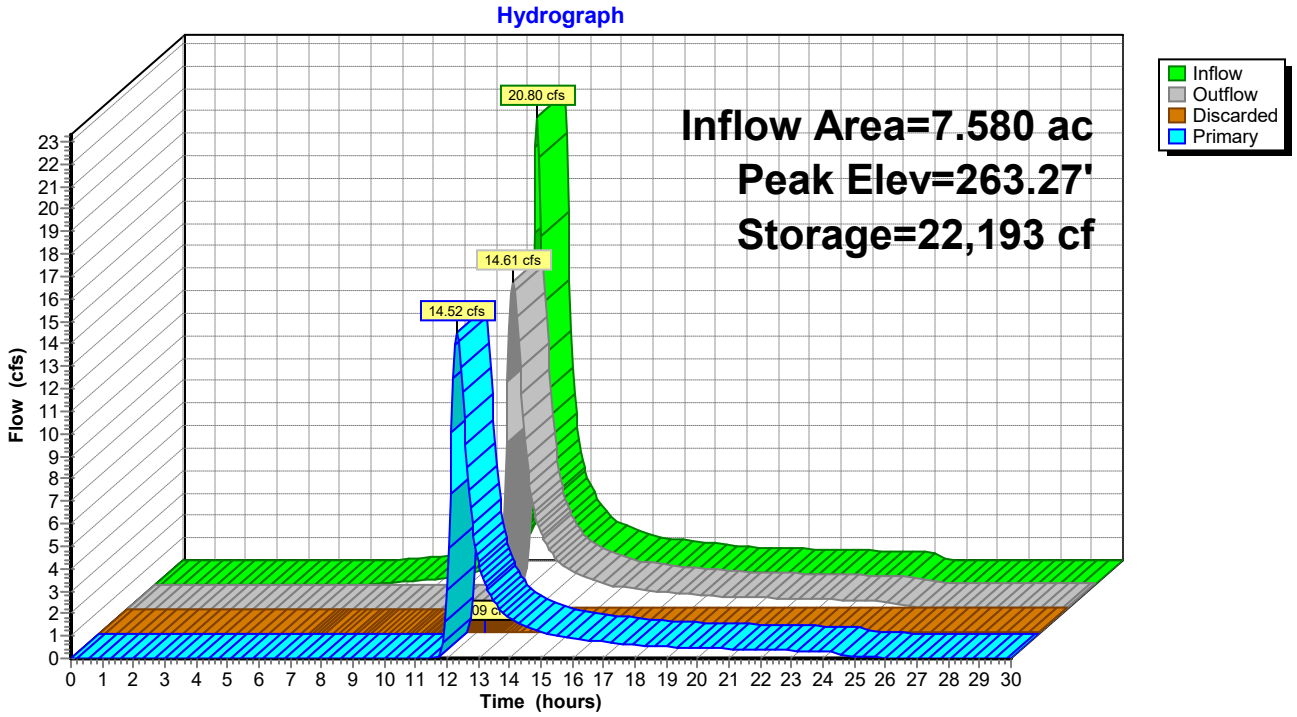
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
258.50	880	0	0
259.00	2,605	871	871
260.00	3,670	3,138	4,009
261.00	4,792	4,231	8,240
262.00	5,971	5,382	13,621
263.00	7,206	6,589	20,210
264.00	8,498	7,852	28,062
265.00	9,847	9,173	37,234

Device	Routing	Invert	Outlet Devices
#1	Primary	258.50'	**24.0" Round Culvert** L= 68.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 258.50' / 253.47' S= 0.0740 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Device 1	261.50'	**16.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	261.75'	**18.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	263.70'	**40.0" W x 33.0" H Vert. Grate** C= 0.600 Limited to weir flow at low heads
#5	Discarded	258.50'	**0.210 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 257.00'

Discarded OutFlow Max=0.09 cfs @ 12.32 hrs HW=263.26' (Free Discharge)
└**5=Exfiltration** (Controls 0.09 cfs)

Primary OutFlow Max=14.44 cfs @ 12.32 hrs HW=263.26' (Free Discharge)
└**1=Culvert** (Passes 14.44 cfs of 25.88 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 7.03 cfs @ 5.03 fps)
  ├**3=Orifice** (Orifice Controls 7.41 cfs @ 4.20 fps)
  └**4=Grate** (Controls 0.00 cfs)

Pond 1-2: Detention Pond



Summary for Pond 1-2A: French Drain

Inflow Area = 1.390 ac, 17.99% Impervious, Inflow Depth = 2.54" for 10-year event
Inflow = 3.37 cfs @ 12.19 hrs, Volume= 0.294 af
Outflow = 3.35 cfs @ 12.21 hrs, Volume= 0.294 af, Atten= 1%, Lag= 0.8 min
Discarded = 0.02 cfs @ 12.21 hrs, Volume= 0.037 af
Primary = 3.32 cfs @ 12.21 hrs, Volume= 0.257 af
Routed to Pond 1-2 : Detention Pond

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 308.64' @ 12.21 hrs Surf.Area= 960 sf Storage= 632 cf

Plug-Flow detention time= 30.8 min calculated for 0.294 af (100% of inflow)
Center-of-Mass det. time= 31.3 min (880.3 - 849.1)

Volume	Invert	Avail.Storage	Storage Description
#1	307.00'	768 cf	**French Drain Storage (Prismatic)** Listed below (Recalc) 1,920 cf Overall x 40.0% Voids

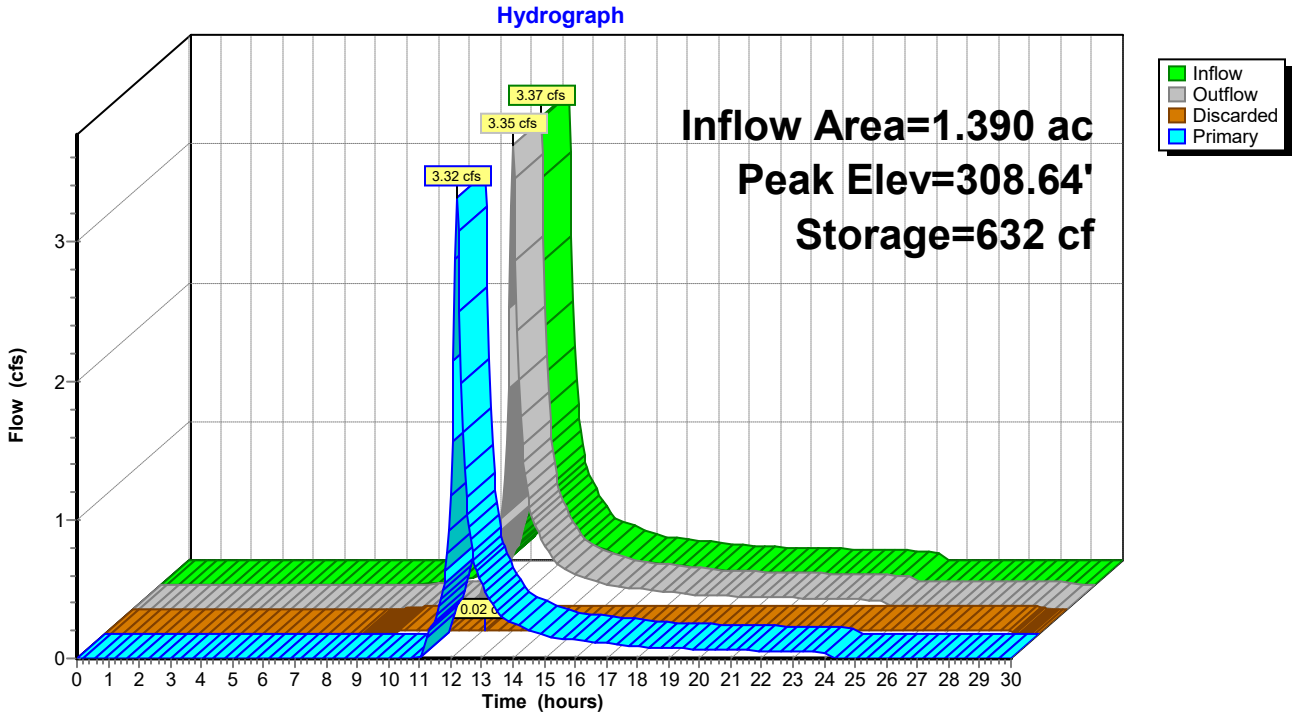
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
307.00	960	0	0
308.00	960	960	960
309.00	960	960	1,920

Device	Routing	Invert	Outlet Devices
#1	Discarded	307.00'	**0.940 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 290.00'
#2	Primary	308.00'	**24.0" W x 36.0" H Vert. Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.21 hrs HW=308.64' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=3.28 cfs @ 12.21 hrs HW=308.64' (Free Discharge)
↑—**2=Grate** (Orifice Controls 3.28 cfs @ 2.57 fps)

Pond 1-2A: French Drain



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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 P1-1: Direct to Wetlands Runoff Area=5.950 ac 21.51% Impervious Runoff Depth=3.71"
Flow Length=401' Tc=11.6 min CN=78 Runoff=20.74 cfs 1.840 af

Subcatchment P1-2: To Detention Pond Runoff Area=5.580 ac 37.10% Impervious Runoff Depth=4.13"
Flow Length=558' Tc=12.5 min CN=82 Runoff=20.88 cfs 1.918 af

Subcatchment P1-2A: To French Drain Runoff Area=1.390 ac 17.99% Impervious Runoff Depth=3.41"
Flow Length=275' Tc=11.3 min CN=75 Runoff=4.53 cfs 0.395 af

Subcatchment P1-3: Offsite to Pond Runoff Area=0.610 ac 40.98% Impervious Runoff Depth=4.13"
Tc=5.0 min CN=82 Runoff=2.88 cfs 0.210 af

Reach TS: Total Site Inflow=36.75 cfs 3.986 af
Outflow=36.75 cfs 3.986 af

Pond 1-2: Detention Pond Peak Elev=263.76' Storage=26,047 cf Inflow=26.99 cfs 2.484 af
Discarded=0.10 cfs 0.102 af Primary=18.15 cfs 2.146 af Outflow=18.25 cfs 2.248 af

Pond 1-2A: French Drain Peak Elev=308.79' Storage=686 cf Inflow=4.53 cfs 0.395 af
Discarded=0.02 cfs 0.039 af Primary=4.48 cfs 0.356 af Outflow=4.50 cfs 0.395 af

Total Runoff Area = 13.530 ac Runoff Volume = 4.363 af Average Runoff Depth = 3.87"
71.54% Pervious = 9.680 ac 28.46% Impervious = 3.850 ac

Summary for Subcatchment P1-1: Direct to Wetlands

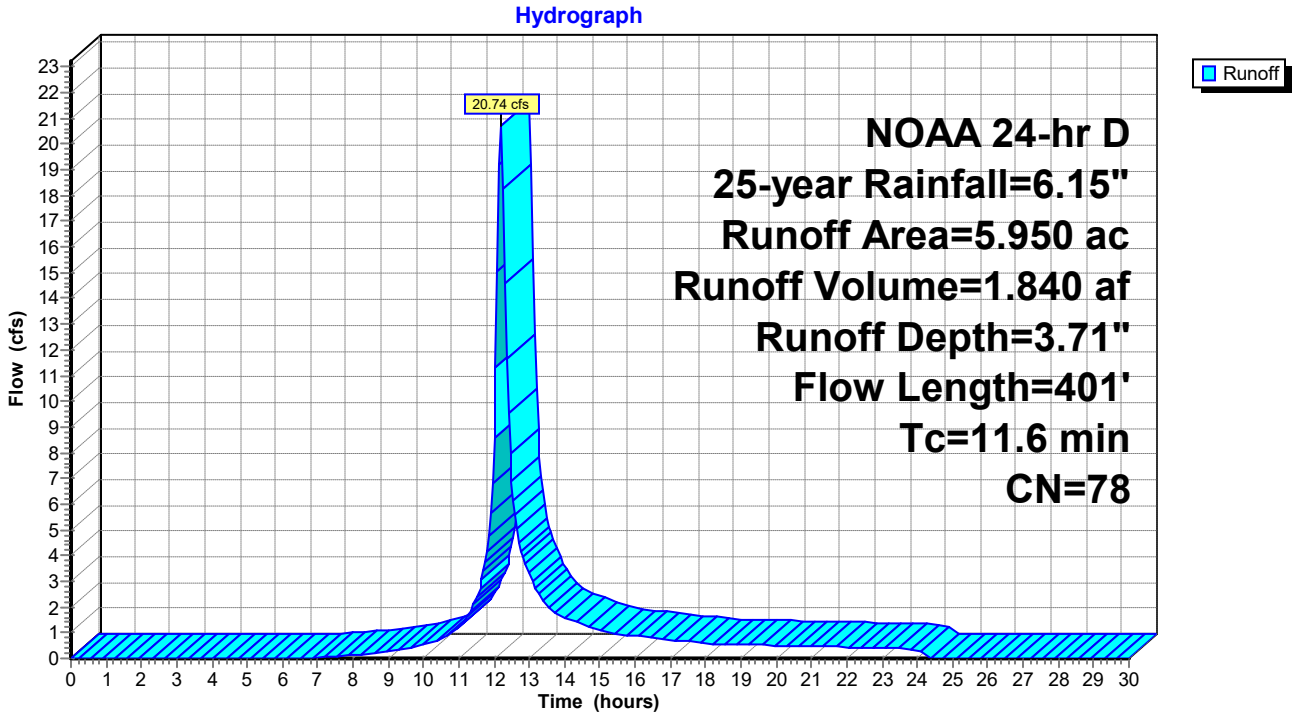
Runoff = 20.74 cfs @ 12.19 hrs, Volume= 1.840 af, Depth= 3.71"
Routed to Reach TS : Total Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 25-year Rainfall=6.15"

Area (ac)	CN	Description
1.540	70	Woods, Good, HSG C
3.130	74	>75% Grass cover, Good, HSG C
1.280	98	Paved parking, HSG C
5.950	78	Weighted Average
4.670		78.49% Pervious Area
1.280		21.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.1000	0.15		**Sheet Flow, Grass** Woods: Light underbrush n= 0.400 P2= 3.46"
0.1	46	0.1740	6.72		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.2	89	0.2030	7.25		**Shallow Concentrated Flow, Grass** Unpaved Kv= 16.1 fps
0.5	166	0.1330	5.87		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
11.6	401	Total			

Subcatchment P1-1: Direct to Wetlands



Summary for Subcatchment P1-2: To Detention Pond

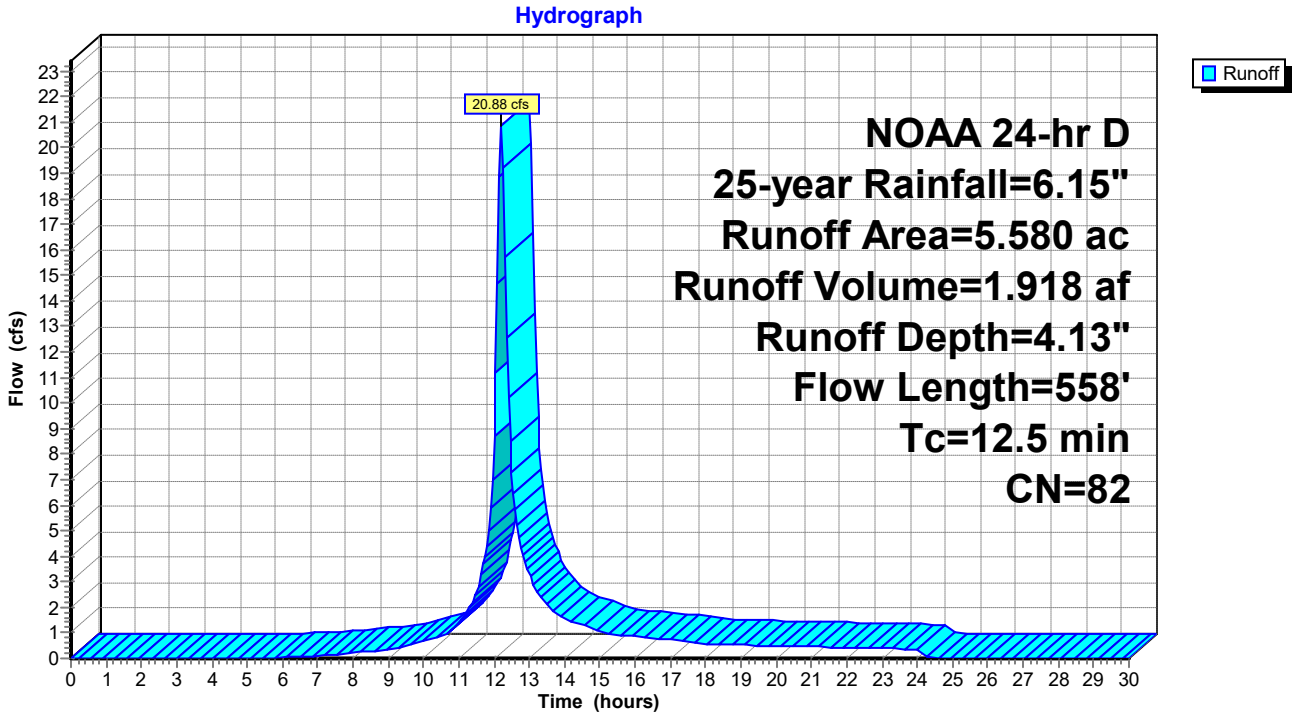
Runoff = 20.88 cfs @ 12.20 hrs, Volume= 1.918 af, Depth= 4.13"
Routed to Pond 1-2 : Detention Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 25-year Rainfall=6.15"

Area (ac)	CN	Description
1.460	70	Woods, Good, HSG C
2.050	74	>75% Grass cover, Good, HSG C
2.070	98	Paved parking, HSG C
5.580	82	Weighted Average
3.510		62.90% Pervious Area
2.070		37.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.1000	0.15		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.46"
0.7	216	0.0930	4.91		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.8	179	0.0310	3.57		**Shallow Concentrated Flow, Gravel** Paved Kv= 20.3 fps
0.1	20	0.1500	6.24		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.1	43	0.2300	7.72		**Shallow Concentrated Flow, Grass** Unpaved Kv= 16.1 fps
12.5	558	Total			

Subcatchment P1-2: To Detention Pond



Summary for Subcatchment P1-2A: To French Drain

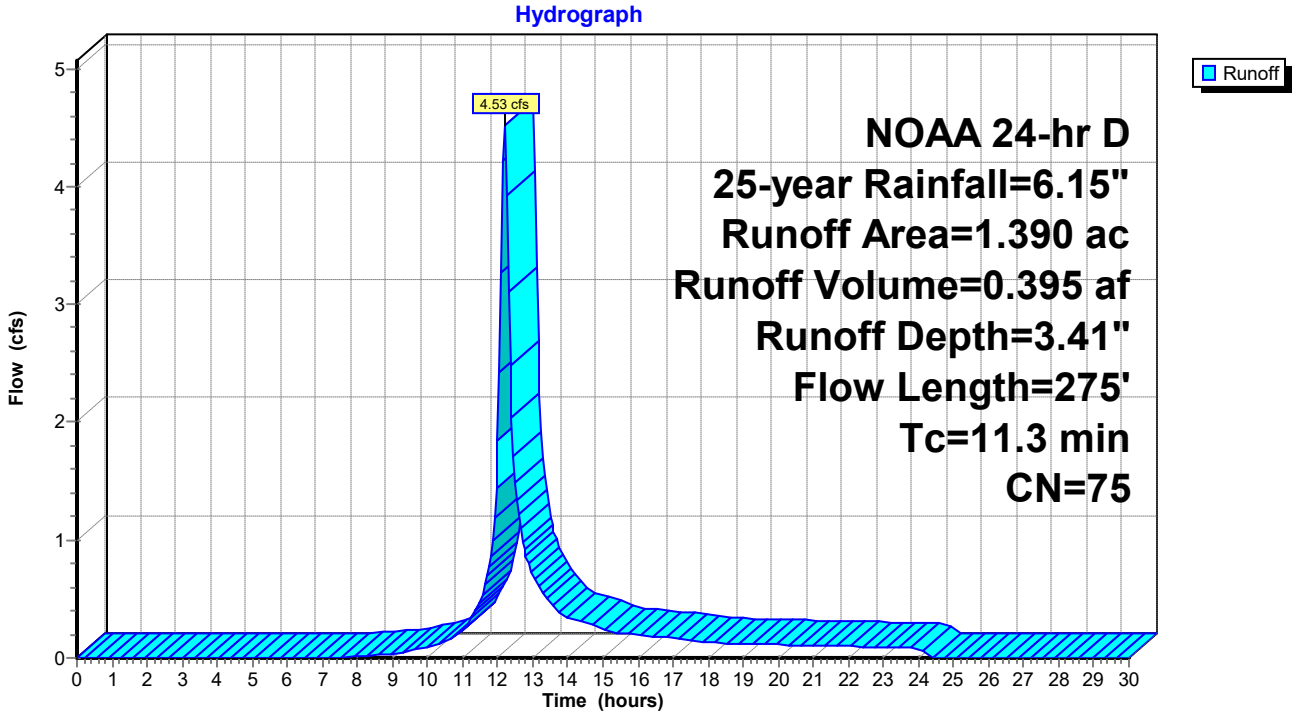
Runoff = 4.53 cfs @ 12.19 hrs, Volume= 0.395 af, Depth= 3.41"
Routed to Pond 1-2A : French Drain

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 25-year Rainfall=6.15"

Area (ac)	CN	Description
1.040	70	Woods, Good, HSG C
0.100	74	>75% Grass cover, Good, HSG C
0.250	98	Paved parking, HSG C
1.390	75	Weighted Average
1.140		82.01% Pervious Area
0.250		17.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.1000	0.15		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.46"
0.5	175	0.1430	6.09		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
11.3	275	Total			

Subcatchment P1-2A: To French Drain



Summary for Subcatchment P1-3: Offsite to Pond

[49] Hint: Tc<2dt may require smaller dt

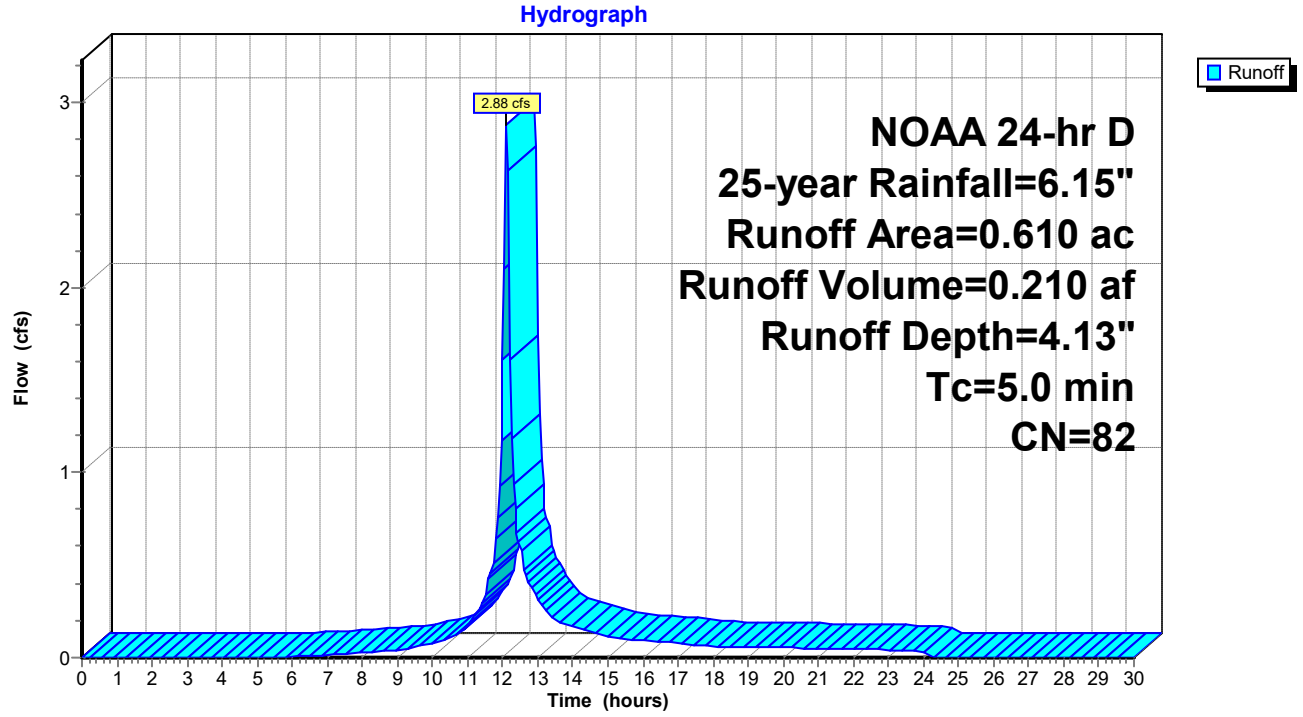
Runoff = 2.88 cfs @ 12.11 hrs, Volume= 0.210 af, Depth= 4.13"
Routed to Pond 1-2 : Detention Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 25-year Rainfall=6.15"

Area (ac)	CN	Description
0.260	70	Woods, Good, HSG C
0.100	74	>75% Grass cover, Good, HSG C
0.250	98	Paved parking, HSG C
0.610	82	Weighted Average
0.360		59.02% Pervious Area
0.250		40.98% Impervious Area

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

Subcatchment P1-3: Offsite to Pond



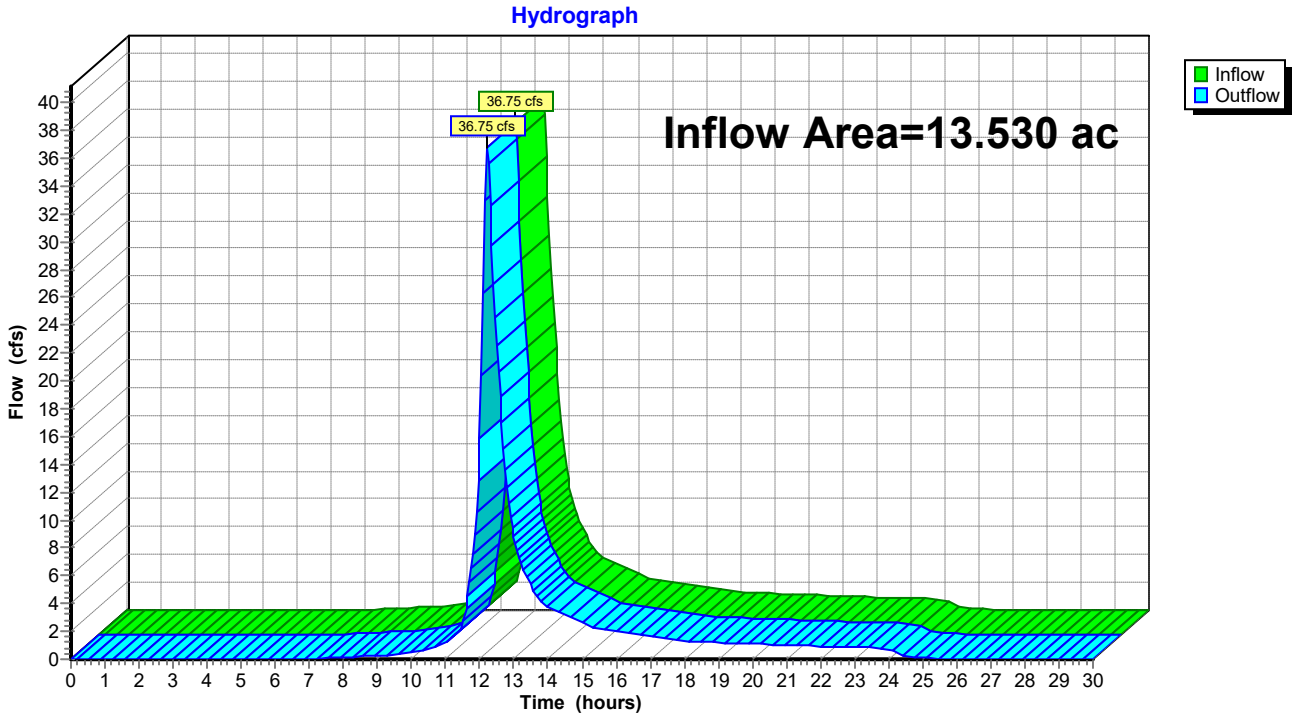
Summary for Reach TS: Total Site

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 13.530 ac, 28.46% Impervious, Inflow Depth = 3.54" for 25-year event
Inflow = 36.75 cfs @ 12.21 hrs, Volume= 3.986 af
Outflow = 36.75 cfs @ 12.21 hrs, Volume= 3.986 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach TS: Total Site



Summary for Pond 1-2: Detention Pond

Inflow Area = 7.580 ac, 33.91% Impervious, Inflow Depth = 3.93" for 25-year event
Inflow = 26.99 cfs @ 12.19 hrs, Volume= 2.484 af
Outflow = 18.25 cfs @ 12.32 hrs, Volume= 2.248 af, Atten= 32%, Lag= 7.7 min
Discarded = 0.10 cfs @ 12.32 hrs, Volume= 0.102 af
Primary = 18.15 cfs @ 12.32 hrs, Volume= 2.146 af
Routed to Reach TS : Total Site

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 263.76' @ 12.32 hrs Surf.Area= 8,186 sf Storage= 26,047 cf

Plug-Flow detention time= 100.6 min calculated for 2.244 af (90% of inflow)
Center-of-Mass det. time= 52.5 min (875.7 - 823.1)

Volume	Invert	Avail.Storage	Storage Description
#1	258.50'	37,234 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

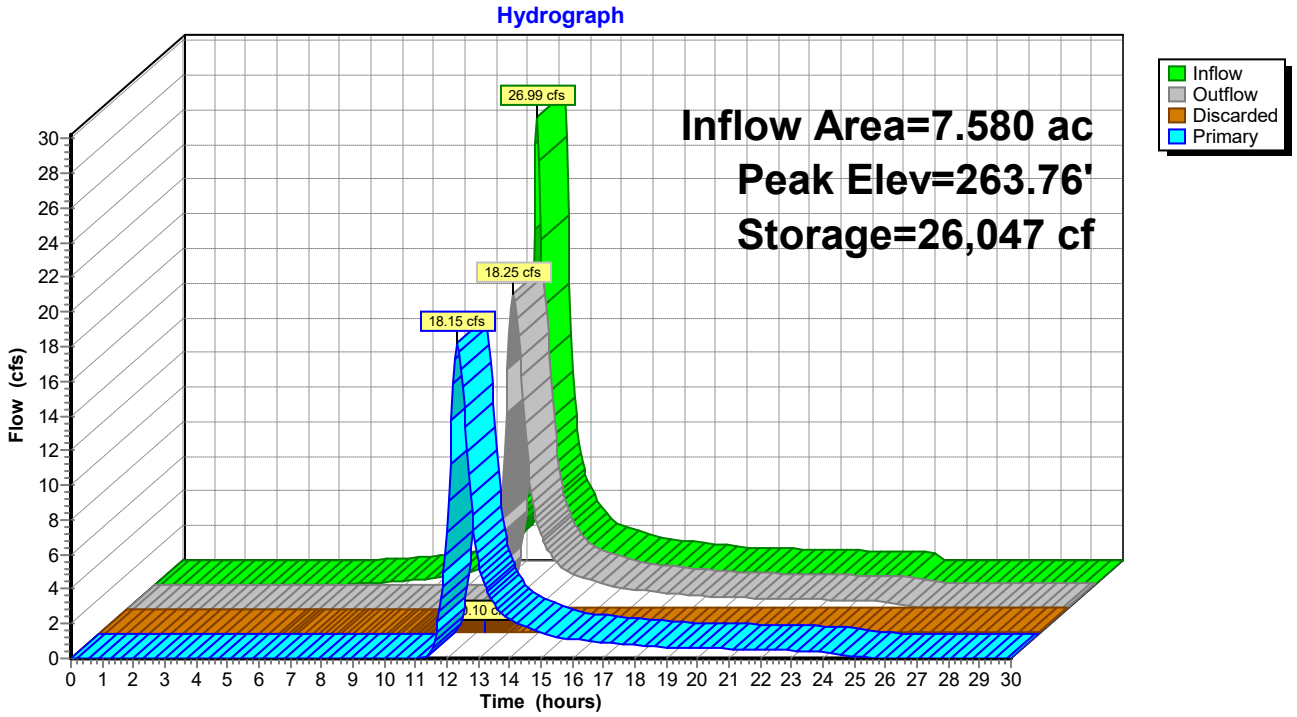
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
258.50	880	0	0
259.00	2,605	871	871
260.00	3,670	3,138	4,009
261.00	4,792	4,231	8,240
262.00	5,971	5,382	13,621
263.00	7,206	6,589	20,210
264.00	8,498	7,852	28,062
265.00	9,847	9,173	37,234

Device	Routing	Invert	Outlet Devices
#1	Primary	258.50'	**24.0" Round Culvert** L= 68.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 258.50' / 253.47' S= 0.0740 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Device 1	261.50'	**16.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	261.75'	**18.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	263.70'	**40.0" W x 33.0" H Vert. Grate** C= 0.600 Limited to weir flow at low heads
#5	Discarded	258.50'	**0.210 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 257.00'

Discarded OutFlow Max=0.10 cfs @ 12.32 hrs HW=263.75' (Free Discharge)
└**5=Exfiltration** (Controls 0.10 cfs)

Primary OutFlow Max=18.05 cfs @ 12.32 hrs HW=263.75' (Free Discharge)
└**1=Culvert** (Passes 18.05 cfs of 27.50 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 8.45 cfs @ 6.05 fps)
  ├**3=Orifice** (Orifice Controls 9.50 cfs @ 5.37 fps)
  └**4=Grate** (Orifice Controls 0.10 cfs @ 0.69 fps)

Pond 1-2: Detention Pond



Summary for Pond 1-2A: French Drain

Inflow Area = 1.390 ac, 17.99% Impervious, Inflow Depth = 3.41" for 25-year event
Inflow = 4.53 cfs @ 12.19 hrs, Volume= 0.395 af
Outflow = 4.50 cfs @ 12.20 hrs, Volume= 0.395 af, Atten= 1%, Lag= 0.8 min
Discarded = 0.02 cfs @ 12.20 hrs, Volume= 0.039 af
Primary = 4.48 cfs @ 12.20 hrs, Volume= 0.356 af
Routed to Pond 1-2 : Detention Pond

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 308.79' @ 12.20 hrs Surf.Area= 960 sf Storage= 686 cf

Plug-Flow detention time= 24.7 min calculated for 0.395 af (100% of inflow)
Center-of-Mass det. time= 24.7 min (864.4 - 839.7)

Volume	Invert	Avail.Storage	Storage Description
#1	307.00'	768 cf	**French Drain Storage (Prismatic)** Listed below (Recalc) 1,920 cf Overall x 40.0% Voids

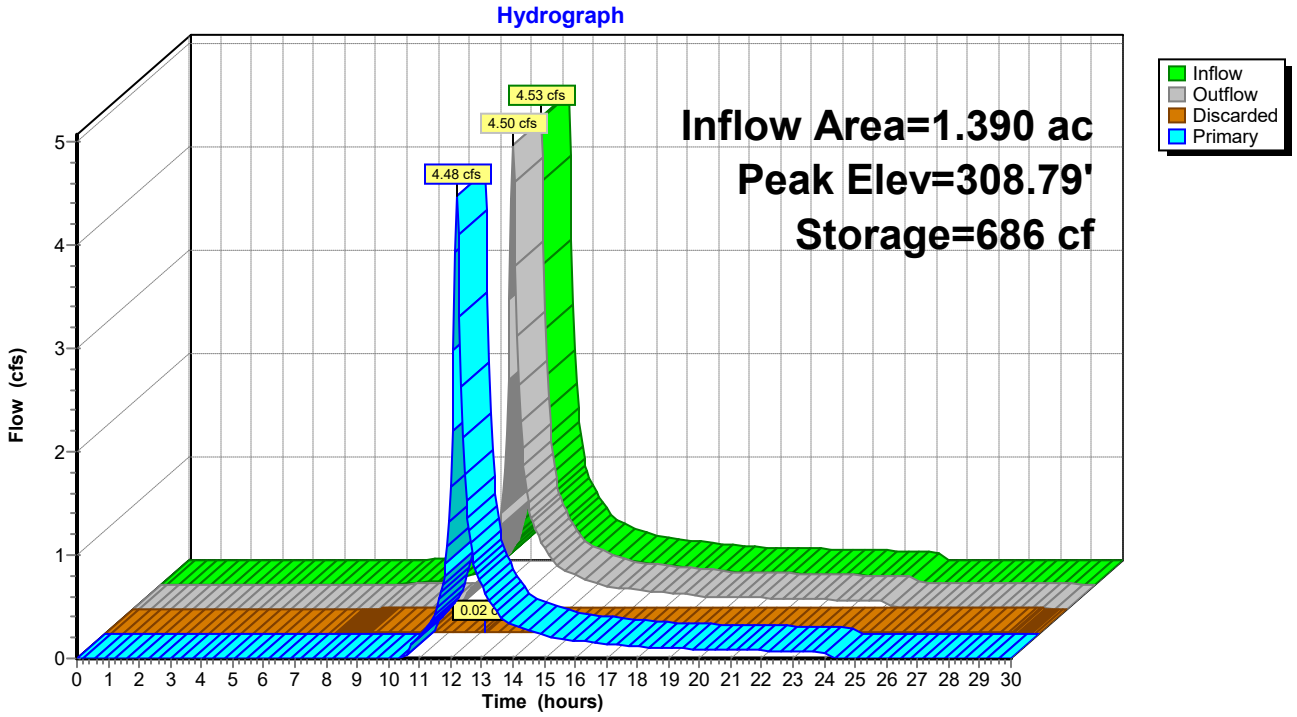
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
307.00	960	0	0
308.00	960	960	960
309.00	960	960	1,920

Device	Routing	Invert	Outlet Devices
#1	Discarded	307.00'	**0.940 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 290.00'
#2	Primary	308.00'	**24.0" W x 36.0" H Vert. Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.20 hrs HW=308.78' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=4.44 cfs @ 12.20 hrs HW=308.78' (Free Discharge)
↑—**2=Grate** (Orifice Controls 4.44 cfs @ 2.84 fps)

Pond 1-2A: French Drain



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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 P1-1: Direct to Wetlands Runoff Area=5.950 ac 21.51% Impervious Runoff Depth=4.40"
Flow Length=401' Tc=11.6 min CN=78 Runoff=24.49 cfs 2.183 af

Subcatchment P1-2: To Detention Pond Runoff Area=5.580 ac 37.10% Impervious Runoff Depth=4.84"
Flow Length=558' Tc=12.5 min CN=82 Runoff=24.35 cfs 2.251 af

Subcatchment P1-2A: To French Drain Runoff Area=1.390 ac 17.99% Impervious Runoff Depth=4.08"
Flow Length=275' Tc=11.3 min CN=75 Runoff=5.40 cfs 0.472 af

Subcatchment P1-3: Offsite to Pond Runoff Area=0.610 ac 40.98% Impervious Runoff Depth=4.84"
Tc=5.0 min CN=82 Runoff=3.36 cfs 0.246 af

Reach TS: Total Site Inflow=42.74 cfs 4.770 af
Outflow=42.74 cfs 4.770 af

Pond 1-2: Detention Pond Peak Elev=264.06' Storage=28,539 cf Inflow=31.61 cfs 2.930 af
Discarded=0.10 cfs 0.105 af Primary=22.13 cfs 2.588 af Outflow=22.23 cfs 2.693 af

Pond 1-2A: French Drain Peak Elev=308.89' Storage=724 cf Inflow=5.40 cfs 0.472 af
Discarded=0.02 cfs 0.040 af Primary=5.35 cfs 0.433 af Outflow=5.37 cfs 0.472 af

Total Runoff Area = 13.530 ac Runoff Volume = 5.153 af Average Runoff Depth = 4.57"
71.54% Pervious = 9.680 ac 28.46% Impervious = 3.850 ac

Summary for Subcatchment P1-1: Direct to Wetlands

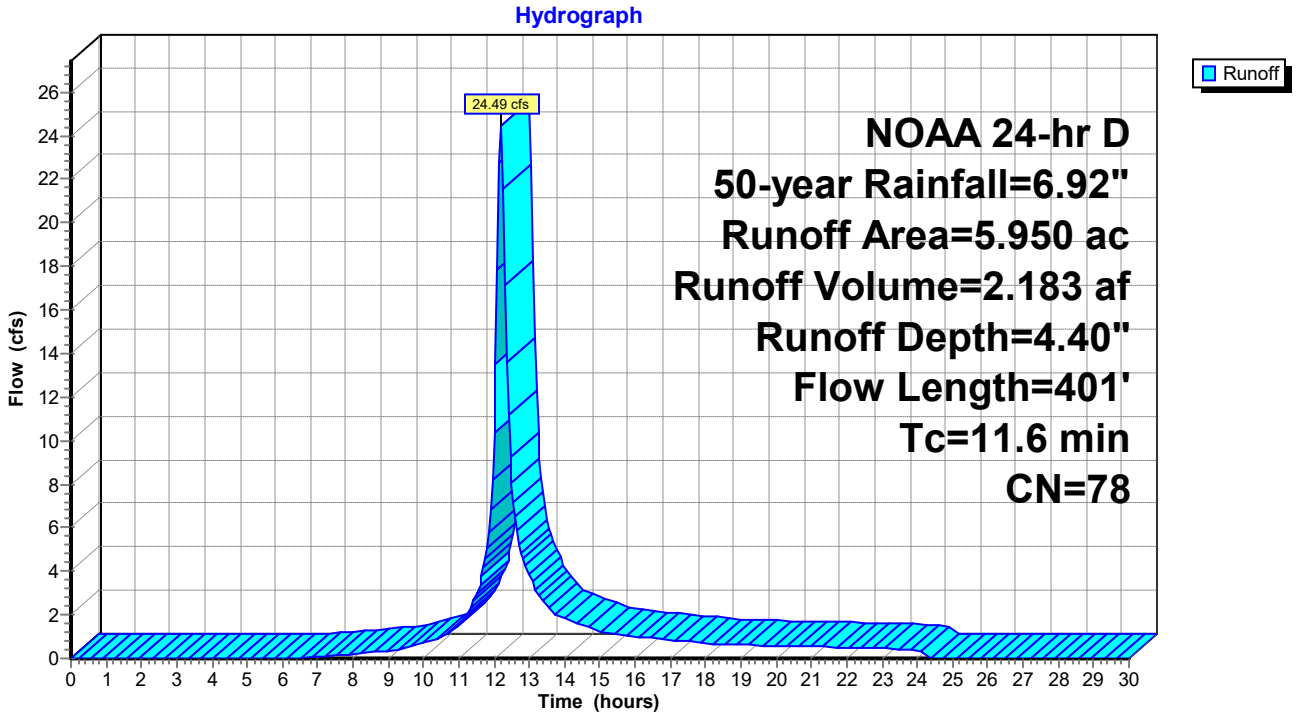
Runoff = 24.49 cfs @ 12.19 hrs, Volume= 2.183 af, Depth= 4.40"
Routed to Reach TS : Total Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 50-year Rainfall=6.92"

Area (ac)	CN	Description
1.540	70	Woods, Good, HSG C
3.130	74	>75% Grass cover, Good, HSG C
1.280	98	Paved parking, HSG C
5.950	78	Weighted Average
4.670		78.49% Pervious Area
1.280		21.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.1000	0.15		**Sheet Flow, Grass** Woods: Light underbrush n= 0.400 P2= 3.46"
0.1	46	0.1740	6.72		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.2	89	0.2030	7.25		**Shallow Concentrated Flow, Grass** Unpaved Kv= 16.1 fps
0.5	166	0.1330	5.87		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
11.6	401	Total			

Subcatchment P1-1: Direct to Wetlands



Summary for Subcatchment P1-2: To Detention Pond

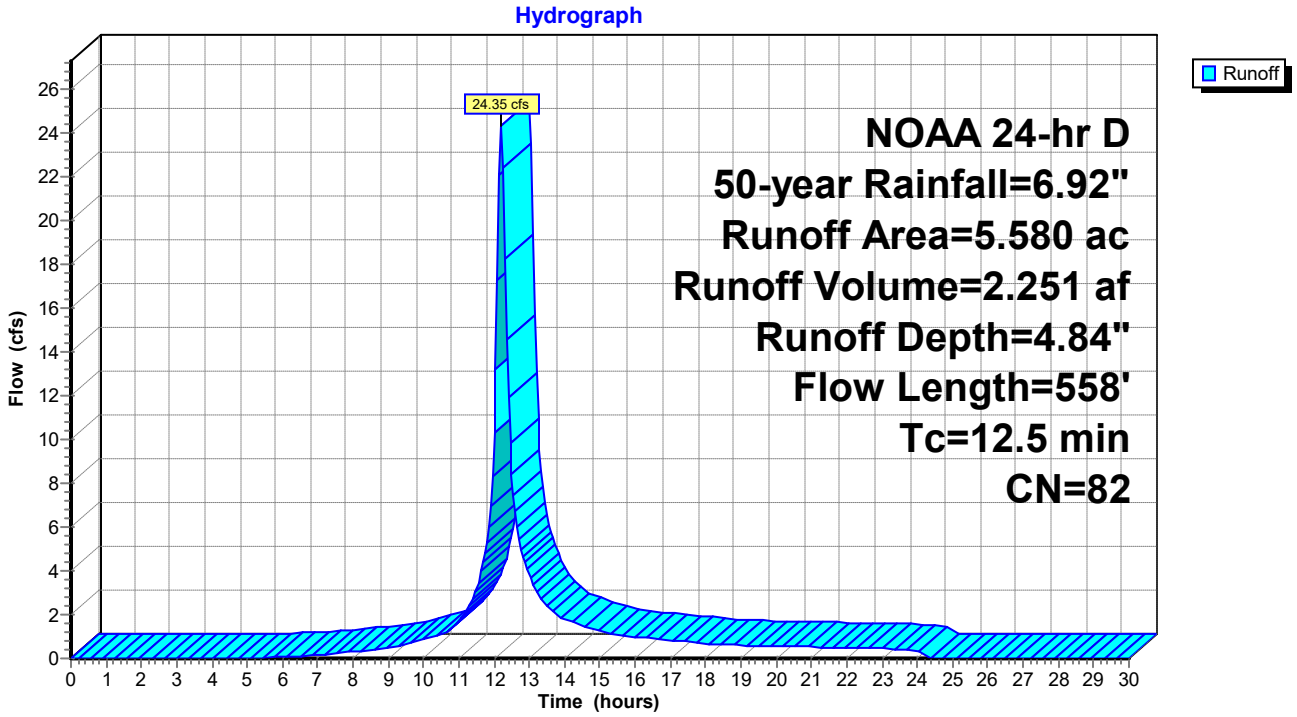
Runoff = 24.35 cfs @ 12.20 hrs, Volume= 2.251 af, Depth= 4.84"
Routed to Pond 1-2 : Detention Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 50-year Rainfall=6.92"

Area (ac)	CN	Description
1.460	70	Woods, Good, HSG C
2.050	74	>75% Grass cover, Good, HSG C
2.070	98	Paved parking, HSG C
5.580	82	Weighted Average
3.510		62.90% Pervious Area
2.070		37.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.1000	0.15		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.46"
0.7	216	0.0930	4.91		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.8	179	0.0310	3.57		**Shallow Concentrated Flow, Gravel** Paved Kv= 20.3 fps
0.1	20	0.1500	6.24		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.1	43	0.2300	7.72		**Shallow Concentrated Flow, Grass** Unpaved Kv= 16.1 fps
12.5	558	Total			

Subcatchment P1-2: To Detention Pond



Summary for Subcatchment P1-2A: To French Drain

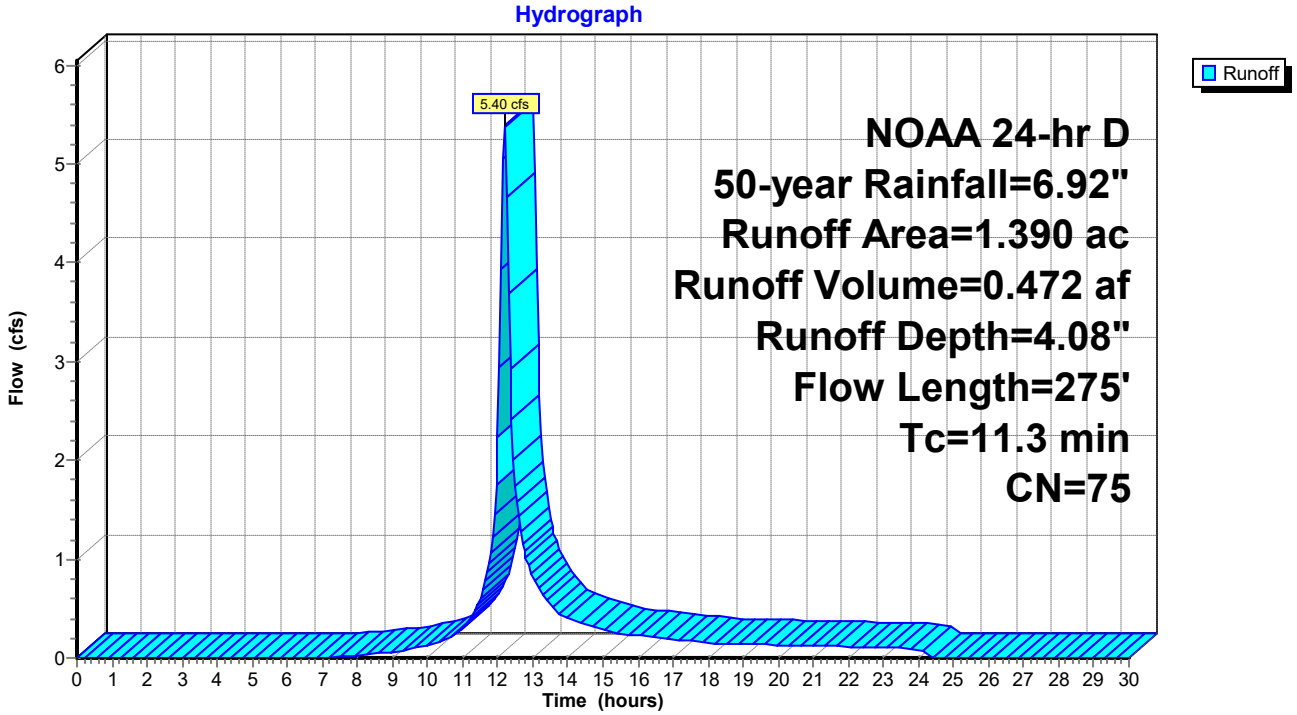
Runoff = 5.40 cfs @ 12.19 hrs, Volume= 0.472 af, Depth= 4.08"
Routed to Pond 1-2A : French Drain

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 50-year Rainfall=6.92"

Area (ac)	CN	Description
1.040	70	Woods, Good, HSG C
0.100	74	>75% Grass cover, Good, HSG C
0.250	98	Paved parking, HSG C
1.390	75	Weighted Average
1.140		82.01% Pervious Area
0.250		17.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.1000	0.15		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.46"
0.5	175	0.1430	6.09		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
11.3	275	Total			

Subcatchment P1-2A: To French Drain



Summary for Subcatchment P1-3: Offsite to Pond

[49] Hint: Tc<2dt may require smaller dt

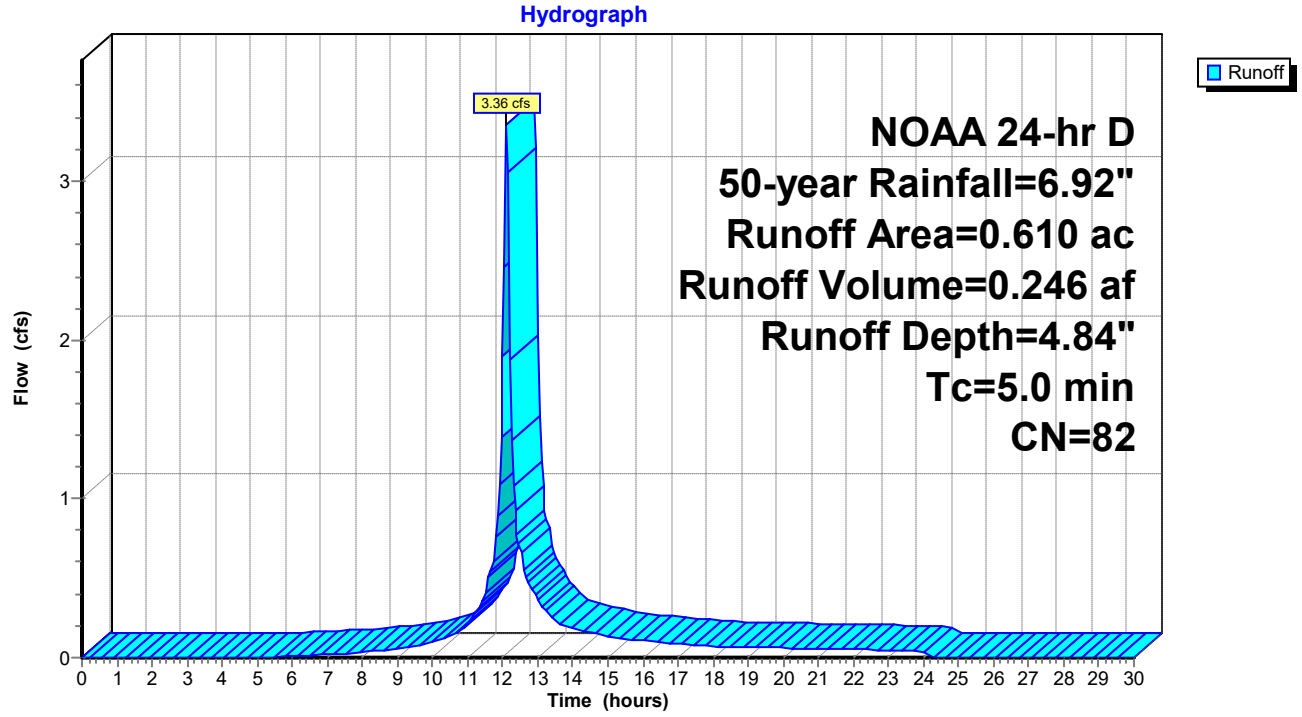
Runoff = 3.36 cfs @ 12.11 hrs, Volume= 0.246 af, Depth= 4.84"
Routed to Pond 1-2 : Detention Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 50-year Rainfall=6.92"

Area (ac)	CN	Description
0.260	70	Woods, Good, HSG C
0.100	74	>75% Grass cover, Good, HSG C
0.250	98	Paved parking, HSG C
0.610	82	Weighted Average
0.360		59.02% Pervious Area
0.250		40.98% Impervious Area

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

Subcatchment P1-3: Offsite to Pond



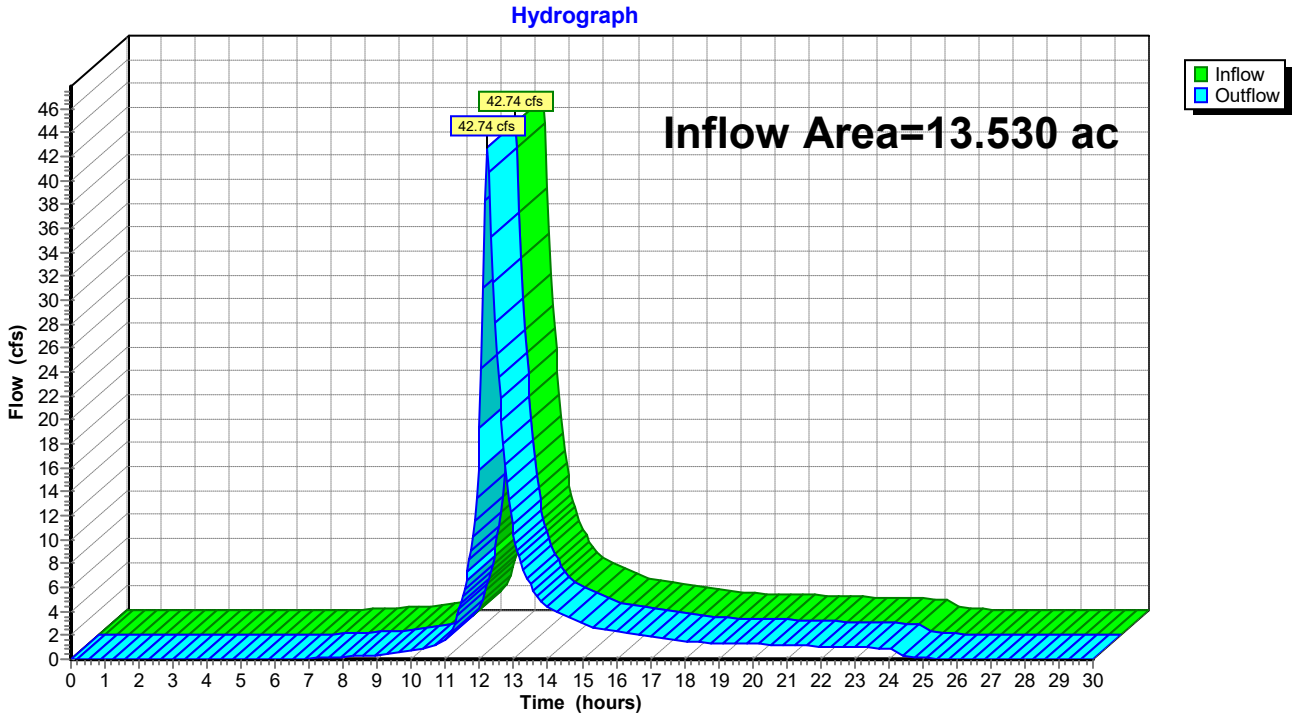
Summary for Reach TS: Total Site

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 13.530 ac, 28.46% Impervious, Inflow Depth = 4.23" for 50-year event
Inflow = 42.74 cfs @ 12.22 hrs, Volume= 4.770 af
Outflow = 42.74 cfs @ 12.22 hrs, Volume= 4.770 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach TS: Total Site



Summary for Pond 1-2: Detention Pond

Inflow Area = 7.580 ac, 33.91% Impervious, Inflow Depth = 4.64" for 50-year event
Inflow = 31.61 cfs @ 12.19 hrs, Volume= 2.930 af
Outflow = 22.23 cfs @ 12.32 hrs, Volume= 2.693 af, Atten= 30%, Lag= 7.3 min
Discarded = 0.10 cfs @ 12.32 hrs, Volume= 0.105 af
Primary = 22.13 cfs @ 12.32 hrs, Volume= 2.588 af
Routed to Reach TS : Total Site

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 264.06' @ 12.32 hrs Surf.Area= 8,573 sf Storage= 28,539 cf

Plug-Flow detention time= 91.5 min calculated for 2.693 af (92% of inflow)
Center-of-Mass det. time= 48.5 min (866.9 - 818.3)

Volume	Invert	Avail.Storage	Storage Description
#1	258.50'	37,234 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

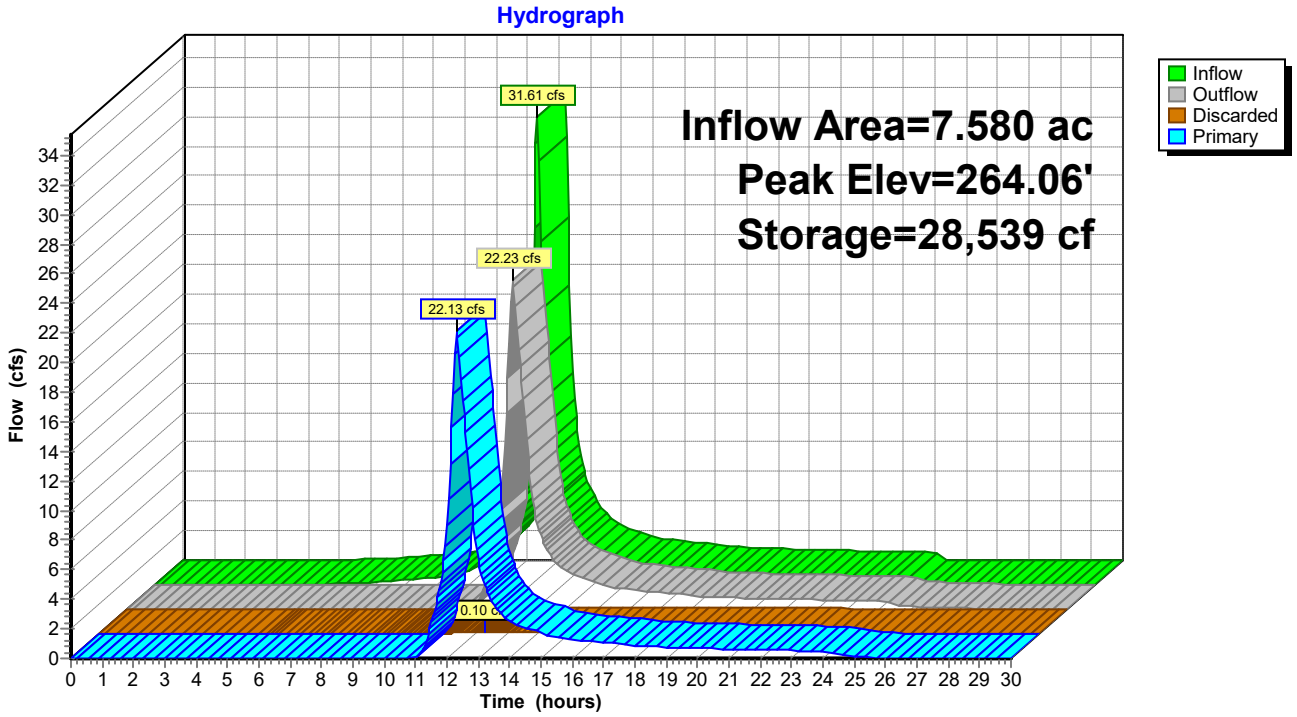
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
258.50	880	0	0
259.00	2,605	871	871
260.00	3,670	3,138	4,009
261.00	4,792	4,231	8,240
262.00	5,971	5,382	13,621
263.00	7,206	6,589	20,210
264.00	8,498	7,852	28,062
265.00	9,847	9,173	37,234

Device	Routing	Invert	Outlet Devices
#1	Primary	258.50'	**24.0" Round Culvert** L= 68.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 258.50' / 253.47' S= 0.0740 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Device 1	261.50'	**16.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	261.75'	**18.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	263.70'	**40.0" W x 33.0" H Vert. Grate** C= 0.600 Limited to weir flow at low heads
#5	Discarded	258.50'	**0.210 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 257.00'

Discarded OutFlow Max=0.10 cfs @ 12.32 hrs HW=264.04' (Free Discharge)
└**5=Exfiltration** (Controls 0.10 cfs)

Primary OutFlow Max=21.94 cfs @ 12.32 hrs HW=264.04' (Free Discharge)
└**1=Culvert** (Passes 21.94 cfs of 28.45 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 9.21 cfs @ 6.60 fps)
  ├**3=Orifice** (Orifice Controls 10.57 cfs @ 5.98 fps)
  └**4=Grate** (Orifice Controls 2.15 cfs @ 1.88 fps)

Pond 1-2: Detention Pond



Summary for Pond 1-2A: French Drain

Inflow Area = 1.390 ac, 17.99% Impervious, Inflow Depth = 4.08" for 50-year event
Inflow = 5.40 cfs @ 12.19 hrs, Volume= 0.472 af
Outflow = 5.37 cfs @ 12.20 hrs, Volume= 0.472 af, Atten= 0%, Lag= 0.7 min
Discarded = 0.02 cfs @ 12.20 hrs, Volume= 0.040 af
Primary = 5.35 cfs @ 12.20 hrs, Volume= 0.433 af
Routed to Pond 1-2 : Detention Pond

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 308.89' @ 12.20 hrs Surf.Area= 960 sf Storage= 724 cf

Plug-Flow detention time= 21.1 min calculated for 0.472 af (100% of inflow)
Center-of-Mass det. time= 21.5 min (855.5 - 834.0)

Volume	Invert	Avail.Storage	Storage Description
#1	307.00'	768 cf	**French Drain Storage (Prismatic)** Listed below (Recalc) 1,920 cf Overall x 40.0% Voids

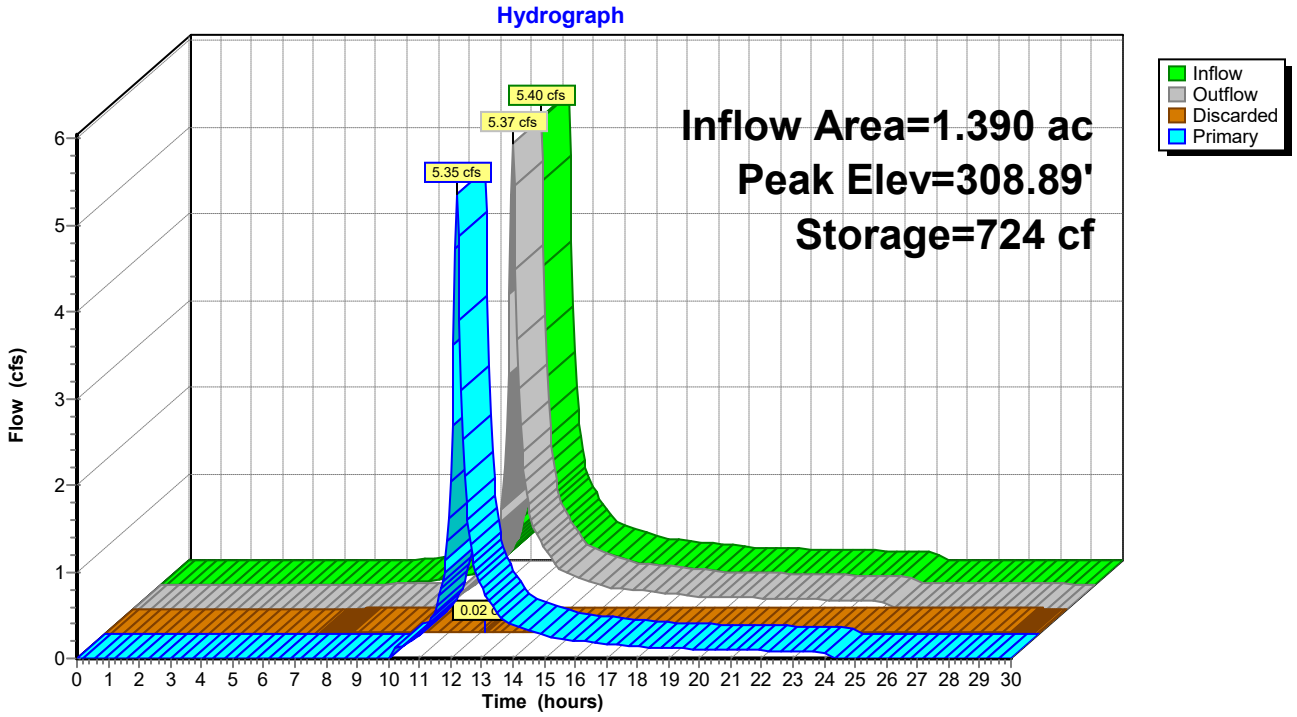
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
307.00	960	0	0
308.00	960	960	960
309.00	960	960	1,920

Device	Routing	Invert	Outlet Devices
#1	Discarded	307.00'	**0.940 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 290.00'
#2	Primary	308.00'	**24.0" W x 36.0" H Vert. Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.20 hrs HW=308.88' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=5.32 cfs @ 12.20 hrs HW=308.88' (Free Discharge)
↑—**2=Grate** (Orifice Controls 5.32 cfs @ 3.01 fps)

Pond 1-2A: French Drain



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 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 P1-1: Direct to Wetlands Runoff Area=5.950 ac 21.51% Impervious Runoff Depth=5.15"
Flow Length=401' Tc=11.6 min CN=78 Runoff=28.51 cfs 2.554 af

Subcatchment P1-2: To Detention Pond Runoff Area=5.580 ac 37.10% Impervious Runoff Depth=5.61"
Flow Length=558' Tc=12.5 min CN=82 Runoff=28.05 cfs 2.610 af

Subcatchment P1-2A: To French Drain Runoff Area=1.390 ac 17.99% Impervious Runoff Depth=4.81"
Flow Length=275' Tc=11.3 min CN=75 Runoff=6.34 cfs 0.557 af

Subcatchment P1-3: Offsite to Pond Runoff Area=0.610 ac 40.98% Impervious Runoff Depth=5.61"
Tc=5.0 min CN=82 Runoff=3.86 cfs 0.285 af

Reach TS: Total Site Inflow=50.49 cfs 5.620 af
Outflow=50.49 cfs 5.620 af

Pond 1-2: Detention Pond Peak Elev=264.32' Storage=30,853 cf Inflow=36.54 cfs 3.412 af
Discarded=0.11 cfs 0.109 af Primary=26.58 cfs 3.066 af Outflow=26.69 cfs 3.174 af

Pond 1-2A: French Drain Peak Elev=308.99' Storage=763 cf Inflow=6.34 cfs 0.557 af
Discarded=0.02 cfs 0.041 af Primary=6.29 cfs 0.516 af Outflow=6.31 cfs 0.557 af

Total Runoff Area = 13.530 ac Runoff Volume = 6.007 af Average Runoff Depth = 5.33"
71.54% Pervious = 9.680 ac 28.46% Impervious = 3.850 ac

Summary for Subcatchment P1-1: Direct to Wetlands

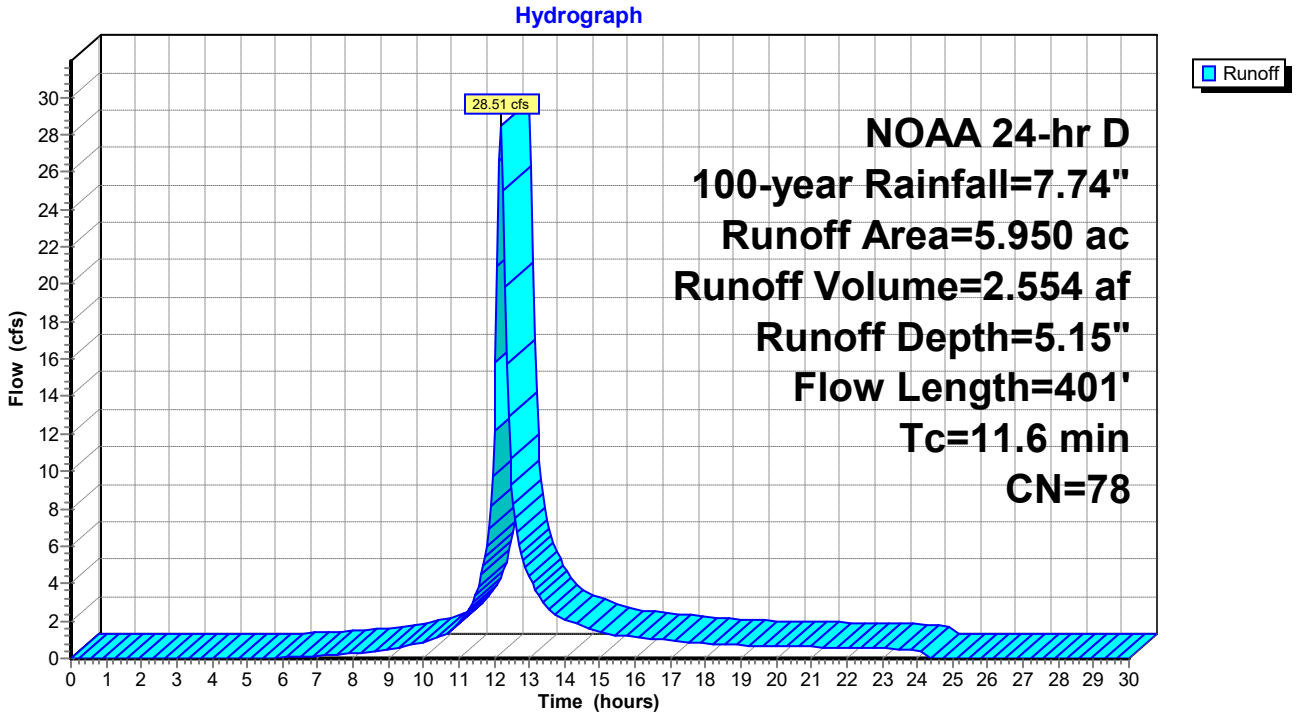
Runoff = 28.51 cfs @ 12.19 hrs, Volume= 2.554 af, Depth= 5.15"
Routed to Reach TS : Total Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-year Rainfall=7.74"

Area (ac)	CN	Description
1.540	70	Woods, Good, HSG C
3.130	74	>75% Grass cover, Good, HSG C
1.280	98	Paved parking, HSG C
5.950	78	Weighted Average
4.670		78.49% Pervious Area
1.280		21.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.1000	0.15		**Sheet Flow, Grass** Woods: Light underbrush n= 0.400 P2= 3.46"
0.1	46	0.1740	6.72		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.2	89	0.2030	7.25		**Shallow Concentrated Flow, Grass** Unpaved Kv= 16.1 fps
0.5	166	0.1330	5.87		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
11.6	401	Total			

Subcatchment P1-1: Direct to Wetlands



Summary for Subcatchment P1-2: To Detention Pond

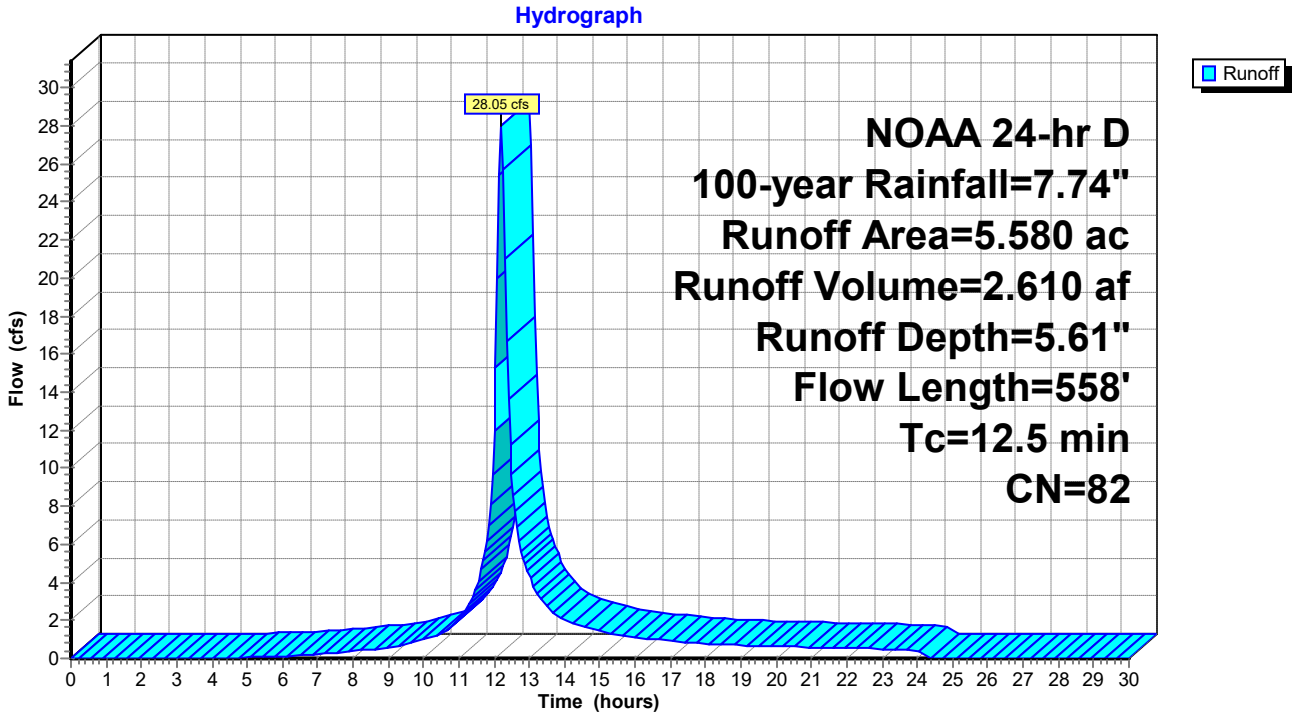
Runoff = 28.05 cfs @ 12.20 hrs, Volume= 2.610 af, Depth= 5.61"
Routed to Pond 1-2 : Detention Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-year Rainfall=7.74"

Area (ac)	CN	Description
1.460	70	Woods, Good, HSG C
2.050	74	>75% Grass cover, Good, HSG C
2.070	98	Paved parking, HSG C
5.580	82	Weighted Average
3.510		62.90% Pervious Area
2.070		37.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.1000	0.15		**Sheet Flow, Woods** Woods: Light underbrush n= 0.400 P2= 3.46"
0.7	216	0.0930	4.91		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.8	179	0.0310	3.57		**Shallow Concentrated Flow, Gravel** Paved Kv= 20.3 fps
0.1	20	0.1500	6.24		**Shallow Concentrated Flow, Woods** Unpaved Kv= 16.1 fps
0.1	43	0.2300	7.72		**Shallow Concentrated Flow, Grass** Unpaved Kv= 16.1 fps
12.5	558	Total			

Subcatchment P1-2: To Detention Pond



Summary for Subcatchment P1-2A: To French Drain

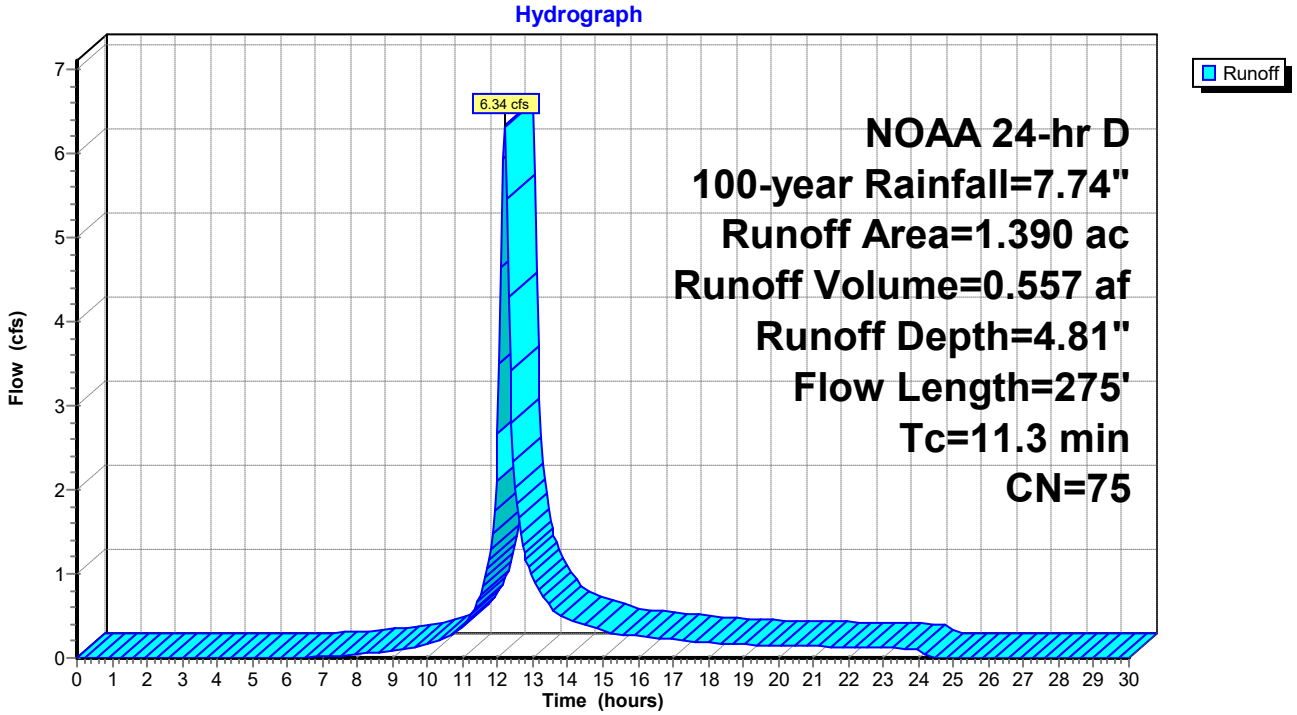
Runoff = 6.34 cfs @ 12.19 hrs, Volume= 0.557 af, Depth= 4.81"
Routed to Pond 1-2A : French Drain

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-year Rainfall=7.74"

Area (ac)	CN	Description
1.040	70	Woods, Good, HSG C
0.100	74	>75% Grass cover, Good, HSG C
0.250	98	Paved parking, HSG C
1.390	75	Weighted Average
1.140		82.01% Pervious Area
0.250		17.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	100	0.1000	0.15		**Sheet Flow, AB** Woods: Light underbrush n= 0.400 P2= 3.46"
0.5	175	0.1430	6.09		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
11.3	275	Total			

Subcatchment P1-2A: To French Drain



Summary for Subcatchment P1-3: Offsite to Pond

[49] Hint: Tc<2dt may require smaller dt

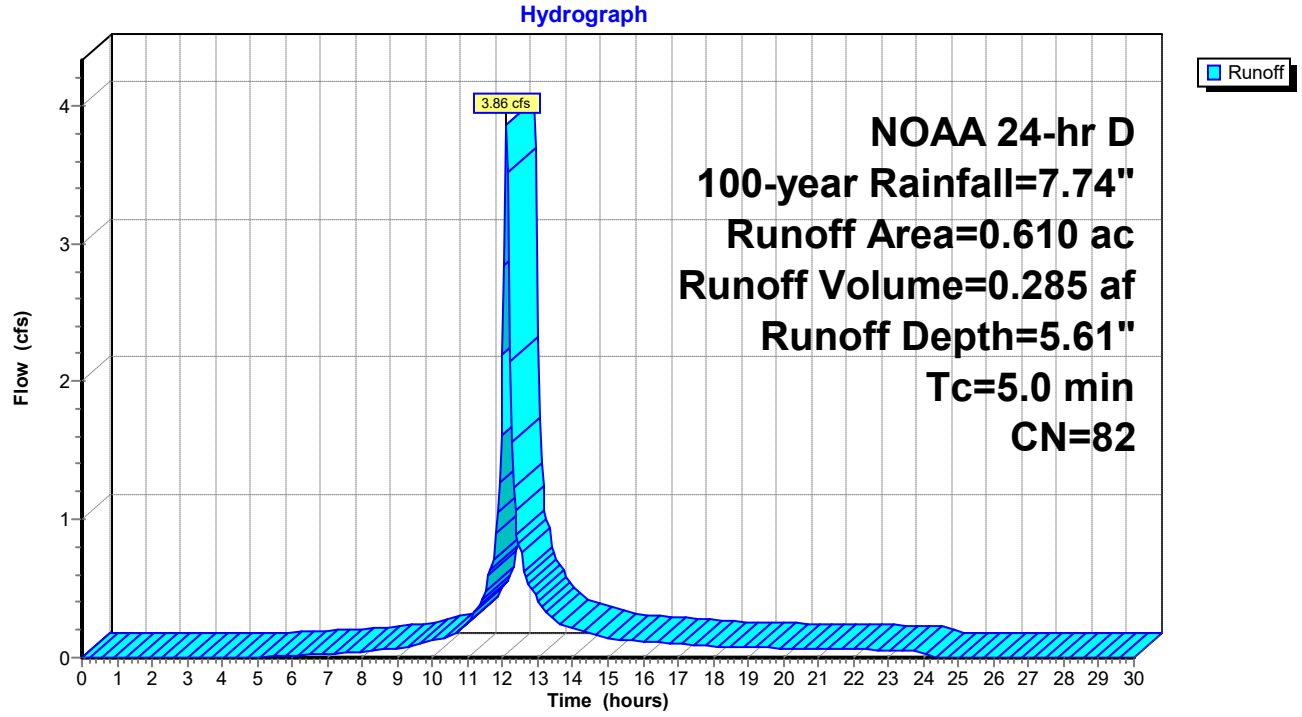
Runoff = 3.86 cfs @ 12.11 hrs, Volume= 0.285 af, Depth= 5.61"
Routed to Pond 1-2 : Detention Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-year Rainfall=7.74"

Area (ac)	CN	Description
0.260	70	Woods, Good, HSG C
0.100	74	>75% Grass cover, Good, HSG C
0.250	98	Paved parking, HSG C
0.610	82	Weighted Average
0.360		59.02% Pervious Area
0.250		40.98% Impervious Area

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

Subcatchment P1-3: Offsite to Pond



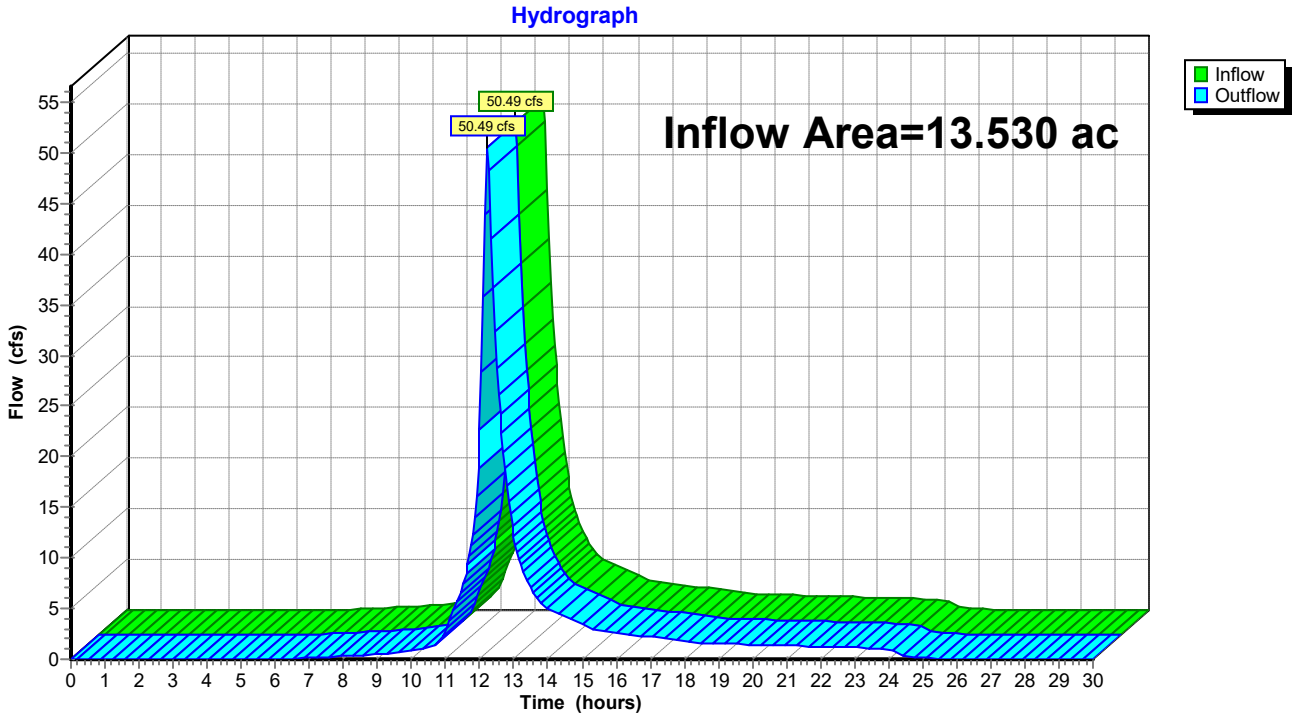
Summary for Reach TS: Total Site

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 13.530 ac, 28.46% Impervious, Inflow Depth = 4.98" for 100-year event
Inflow = 50.49 cfs @ 12.23 hrs, Volume= 5.620 af
Outflow = 50.49 cfs @ 12.23 hrs, Volume= 5.620 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Reach TS: Total Site



Summary for Pond 1-2: Detention Pond

Inflow Area = 7.580 ac, 33.91% Impervious, Inflow Depth = 5.40" for 100-year event
Inflow = 36.54 cfs @ 12.19 hrs, Volume= 3.412 af
Outflow = 26.69 cfs @ 12.31 hrs, Volume= 3.174 af, Atten= 27%, Lag= 6.9 min
Discarded = 0.11 cfs @ 12.31 hrs, Volume= 0.109 af
Primary = 26.58 cfs @ 12.31 hrs, Volume= 3.066 af
Routed to Reach TS : Total Site

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 264.32' @ 12.31 hrs Surf.Area= 8,930 sf Storage= 30,853 cf

Plug-Flow detention time= 82.5 min calculated for 3.169 af (93% of inflow)
Center-of-Mass det. time= 45.3 min (859.2 - 813.9)

Volume	Invert	Avail.Storage	Storage Description
#1	258.50'	37,234 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

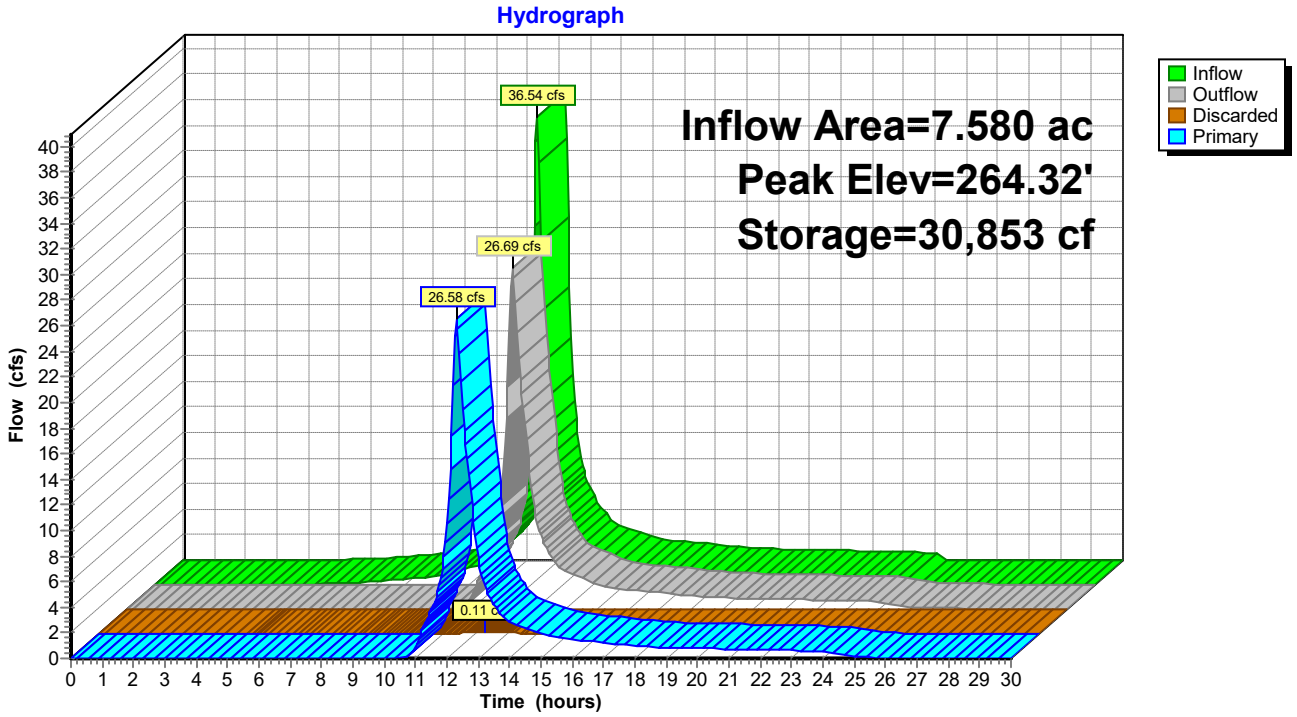
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
258.50	880	0	0
259.00	2,605	871	871
260.00	3,670	3,138	4,009
261.00	4,792	4,231	8,240
262.00	5,971	5,382	13,621
263.00	7,206	6,589	20,210
264.00	8,498	7,852	28,062
265.00	9,847	9,173	37,234

Device	Routing	Invert	Outlet Devices
#1	Primary	258.50'	**24.0" Round Culvert** L= 68.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 258.50' / 253.47' S= 0.0740 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf
#2	Device 1	261.50'	**16.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	261.75'	**18.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	263.70'	**40.0" W x 33.0" H Vert. Grate** C= 0.600 Limited to weir flow at low heads
#5	Discarded	258.50'	**0.210 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 257.00'

Discarded OutFlow Max=0.11 cfs @ 12.31 hrs HW=264.31' (Free Discharge)
└**5=Exfiltration** (Controls 0.11 cfs)

Primary OutFlow Max=26.44 cfs @ 12.31 hrs HW=264.31' (Free Discharge)
└**1=Culvert** (Passes 26.44 cfs of 29.28 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 9.85 cfs @ 7.05 fps)
  ├**3=Orifice** (Orifice Controls 11.46 cfs @ 6.48 fps)
  └**4=Grate** (Orifice Controls 5.13 cfs @ 2.51 fps)

Pond 1-2: Detention Pond



Summary for Pond 1-2A: French Drain

Inflow Area = 1.390 ac, 17.99% Impervious, Inflow Depth = 4.81" for 100-year event
Inflow = 6.34 cfs @ 12.19 hrs, Volume= 0.557 af
Outflow = 6.31 cfs @ 12.20 hrs, Volume= 0.557 af, Atten= 0%, Lag= 0.7 min
Discarded = 0.02 cfs @ 12.20 hrs, Volume= 0.041 af
Primary = 6.29 cfs @ 12.20 hrs, Volume= 0.516 af
Routed to Pond 1-2 : Detention Pond

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 308.99' @ 12.20 hrs Surf.Area= 960 sf Storage= 763 cf

Plug-Flow detention time= 18.5 min calculated for 0.556 af (100% of inflow)
Center-of-Mass det. time= 19.0 min (847.8 - 828.8)

Volume	Invert	Avail.Storage	Storage Description
#1	307.00'	768 cf	**French Drain Storage (Prismatic)** Listed below (Recalc) 1,920 cf Overall x 40.0% Voids

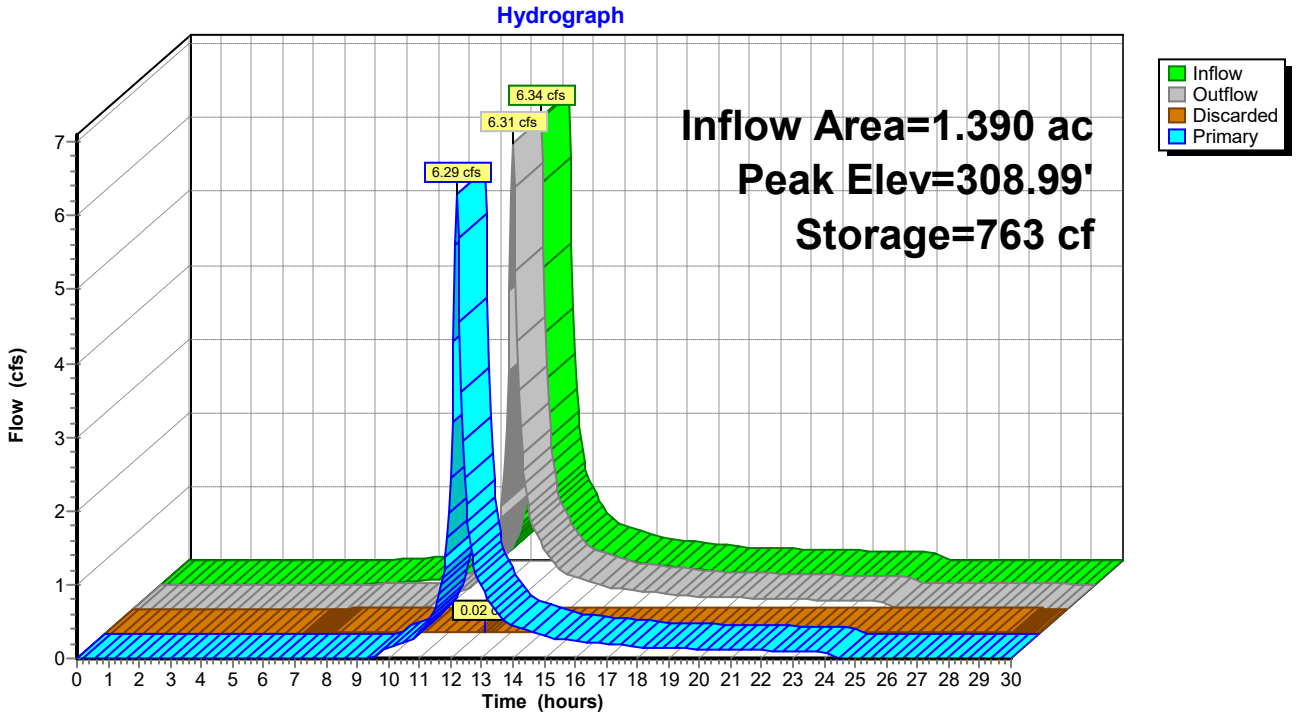
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
307.00	960	0	0
308.00	960	960	960
309.00	960	960	1,920

Device	Routing	Invert	Outlet Devices
#1	Discarded	307.00'	**0.940 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 290.00'
#2	Primary	308.00'	**24.0" W x 36.0" H Vert. Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.20 hrs HW=308.98' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=6.27 cfs @ 12.20 hrs HW=308.98' (Free Discharge)
↑—**2=Grate** (Orifice Controls 6.27 cfs @ 3.18 fps)

Pond 1-2A: French Drain



APPENDIX C

Hydraulic Analysis

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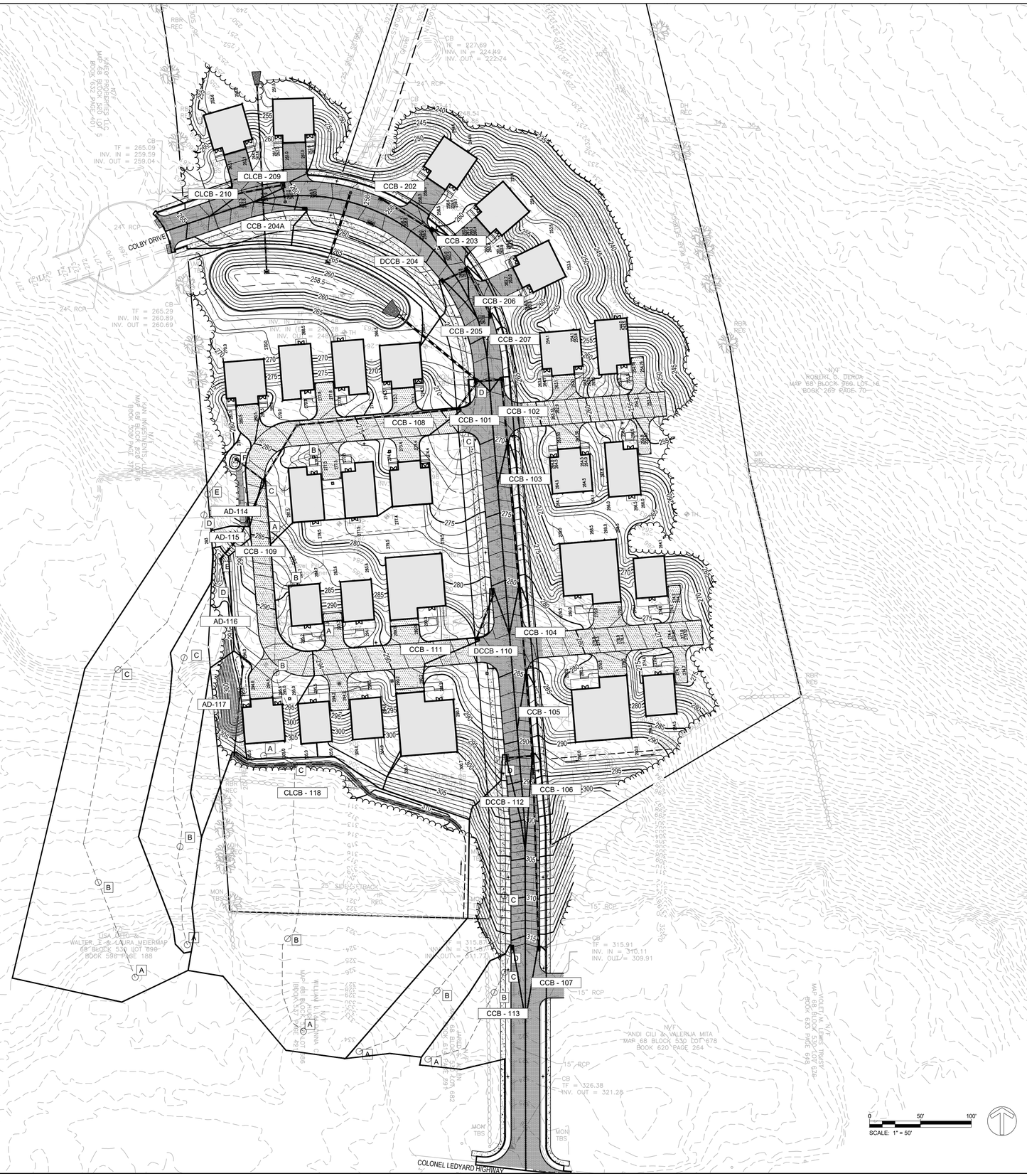


Prepared by:

benesch

Alfred Benesch & Company
120 Hebron Avenue, 2nd Floor
Glastonbury, Connecticut 06033
860-633-8341

Prepared for:

Habitat for Humanity®
of Eastern Connecticut

HABITAT FOR HUMANITY RESIDENTIAL DEVELOPMENT LOTS 8, 9 & 11

LEDYARD, CT

COLBY DRIVE

DATE:	REVISION:

KEY PLAN

PROJECT NO.: 0725 500010.00
SCALE: 1" = 50'
DATE: 12/20/2024

DRAWN BY: CLM
CHECKED BY: WGW

CATCHMENT AREA MAP

DRAWING NO.:

CAM

Drainage Analysis for Proposed Conditions
Ledyard Housing Development
Ledyard, CT

Job Number: 0725-500010.00

Drainage Areas

BASIN	TOTAL (SF)	TOTAL (AC)	IMPERV. (SF)	IMPERV. (AC)	PERVIOUS (SF)	PERVIOUS (AC)	C-Value	Tc (Min.)
CCB - 101	34,001	**0.78**	10851	0.25	23,150	0.53	**0.49**	6.70
CCB - 102	1,589	**0.04**	1589	0.04	0	0.00	**0.90**	5.00
CCB - 103	2,914	**0.07**	2,914	0.07	0	0.00	**0.90**	5.00
CCB - 104	1,798	**0.04**	1,798	0.04	0	0.00	**0.90**	5.00
CCB - 105	1,820	**0.04**	1,820	0.04	0	0.00	**0.90**	5.00
CCB - 106	3,727	**0.09**	3,727	0.09	0	0.00	**0.90**	5.00
CCB - 107	4,320	**0.10**	4,320	0.10	0	0.00	**0.90**	5.00
CCB - 108	18,980	**0.44**	13,614	0.31	5,365	0.12	**0.73**	5.80
CCB - 109	12,714	**0.29**	6,369	0.15	6,345	0.15	**0.60**	5.50
DCCB - 110	17,607	**0.40**	7,807	0.18	9,801	0.22	**0.57**	5.00
CCB - 111	13,444	**0.31**	8,135	0.19	5,309	0.12	**0.66**	5.00
DCCB - 112	16,320	**0.37**	3,659	0.08	12,661	0.29	**0.43**	12.00
CCB - 113	9,566	**0.22**	4379.73	0.10	5,187	0.12	**0.57**	11.40
AD-114	47,830	**1.10**	10736.6	0.25	37,094	0.85	**0.43**	12.50
AD-115	785	**0.02**	0	0.00	785	0.02	**0.30**	5.00
AD-116	14,833	**0.34**	1841.63	0.04	12,991	0.30	**0.37**	10.80
AD-117	5,697	**0.13**	0	0.00	5,697	0.13	**0.30**	5.00
CLCB-118	59,686	**1.37**	0	0.00	59,686	1.37	**0.30**	11.30

CCB - 202	4,326	**0.10**	4,326	0.10	0	0.00	**0.90**	5.00
CCB - 203	1,059	**0.02**	1,059	0.02	0	0.00	**0.90**	5.00
DCCB - 204	9,480	**0.22**	3,981	0.09	5,499	0.13	**0.55**	5.00
CCB - 205	5,730	**0.13**	1,897	0.04	3,833	0.09	**0.50**	5.00
CCB - 206	1,427	**0.03**	1,427	0.03	0	0.00	**0.90**	5.00
CCB - 207	1,106	**0.03**	1,106	0.03	0	0.00	**0.90**	5.00

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	94.000	0.78	6.15	0.49	0.38	3.00	6.7	14.9	5.2	15.52	36.80	5.10	24	2.26	261.00	263.12	264.59	264.90	263.00	266.94	CCB - 101
2	1	25.000	0.04	1.68	0.90	0.04	1.07	5.0	14.8	5.2	5.54	10.91	3.14	18	0.92	263.17	263.40	265.54	265.60	266.94	266.95	CCB - 102
3	2	62.000	0.07	1.64	0.90	0.06	1.03	5.0	14.4	5.3	5.42	26.29	3.99	18	5.34	263.45	266.76	265.83	267.66	266.95	270.31	CCB - 103
4	3	137.000	0.04	1.57	0.90	0.04	0.97	5.0	13.7	5.4	5.24	0.00	4.98	18	5.74	266.81	274.68	267.66	275.56	270.31	280.41	CCB - 104
5	4	81.000	0.04	0.82	0.90	0.04	0.50	5.0	13.1	5.5	2.76	0.00	7.11	15	5.72	277.16	281.79	277.50	282.46	280.41	285.09	CCB - 105
6	5	73.000	0.09	0.78	0.90	0.08	0.46	5.0	12.6	5.7	2.63	0.00	4.22	15	8.60	281.84	288.12	282.46	288.77	285.09	291.62	CCB - 106
7	6	185.000	0.10	0.32	0.90	0.09	0.22	5.0	6.0	8.2	1.81	0.00	4.49	15	11.64	288.37	309.91	288.77	310.44	291.62	316.00	CCB - 107
8	7	25.000	0.22	0.22	0.60	0.13	0.13	5.5	5.5	8.4	1.11	0.00	3.65	15	1.00	310.11	310.36	310.45	310.78	316.00	316.00	CCB - 113
9	6	25.000	0.37	0.37	0.43	0.16	0.16	12.0	12.0	5.8	0.93	0.00	2.28	15	0.92	288.17	288.40	288.77	288.78	291.62	291.65	DCCB - 112
10	4	25.000	0.40	0.71	0.57	0.23	0.43	5.0	5.5	8.4	3.65	0.00	5.18	15	1.00	274.93	275.18	275.57	275.95	280.41	280.40	DCCB - 110
11	10	43.000	0.31	0.31	0.66	0.20	0.20	5.0	5.0	8.8	1.79	0.00	7.08	15	9.30	277.15	281.15	277.40	281.68	280.40	284.41	CCB - 111
12	1	29.000	0.44	3.69	0.73	0.32	1.55	5.8	13.8	5.4	8.38	0.00	7.00	15	6.86	263.69	265.68	265.54	266.81	266.94	268.98	CCB - 108
13	12	155.000	0.00	3.25	0.00	0.00	1.23	0.0	13.3	5.5	6.77	0.00	6.09	15	5.88	265.73	274.85	266.81	275.89	268.98	278.18	DMH - 114
14	13	60.000	0.29	3.25	0.60	0.17	1.23	5.5	13.1	5.5	6.82	0.00	6.22	15	1.00	274.85	275.45	275.89	276.50	278.18	281.56	CCB - 109
15	14	30.000	1.10	1.10	0.43	0.47	0.47	12.5	12.5	5.7	2.69	0.00	4.29	12	1.00	275.70	276.00	276.50	276.70	281.56	279.00	AD-114
16	14	53.000	0.02	1.86	0.37	0.01	0.58	5.0	12.9	5.6	3.26	0.00	4.93	12	8.11	275.70	280.00	276.50	280.77	281.56	286.00	AD - 115
17	16	31.000	0.34	1.84	0.37	0.13	0.58	10.8	12.8	5.6	3.24	0.00	9.56	12	12.26	283.00	286.80	283.33	287.57	286.00	293.00	AD - 116
18	17	105.000	0.13	1.50	0.30	0.04	0.45	5.0	12.3	5.8	2.59	0.00	4.24	12	4.00	286.80	291.00	287.57	291.69	293.00	294.00	AD - 117
19	18	83.000	1.37	1.37	0.30	0.41	0.41	11.8	11.8	5.9	2.41	0.00	4.27	12	10.84	291.00	300.00	291.69	300.66	294.00	308.00	CLCB - 118

CAM - 100

Number of lines: 19

Run Date: 12/10/2024

NOTES:Intensity = 38.62 / (Inlet time + 3.60) ^ 0.69; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	215.000	0.00	0.70	0.00	0.00	0.48	0.0	15.1	5.1	14.19	77.88	6.25	24	10.10	224.49	246.21	225.85	247.57	227.69	258.47	DMH - 201
2	1	26.000	0.10	0.63	0.90	0.09	0.41	5.0	13.9	5.4	2.22	52.20	2.84	24	4.54	246.86	248.04	247.57	248.56	258.47	257.60	CCB - 202
3	2	55.000	0.02	0.02	0.90	0.02	0.02	5.0	5.0	8.8	0.16	12.55	2.67	15	3.22	254.35	256.12	254.45	256.27	257.60	259.37	CCB - 203
4	2	26.000	0.22	0.51	0.55	0.12	0.31	5.0	13.5	5.5	1.66	22.32	4.35	21	1.69	248.24	248.68	248.56	249.14	257.60	257.60	DCCB - 204
5	4	85.000	0.13	0.19	0.50	0.07	0.12	5.0	10.2	6.3	0.75	23.62	3.55	21	1.89	249.28	250.89	249.49	251.20	257.60	261.33	CCB - 205
6	5	25.000	0.03	0.06	0.90	0.03	0.05	5.0	9.1	6.7	0.36	6.71	2.60	15	0.92	257.95	258.18	258.15	258.41	261.33	261.48	CCB - 206
7	6	47.000	0.03	0.03	0.90	0.03	0.03	5.0	5.0	8.8	0.24	16.07	2.08	15	5.28	258.23	260.71	258.41	260.90	261.48	263.96	CCB - 207
8	1	68.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	11.74	30.63	11.69	18	7.25	254.57	259.50	255.21	260.80	258.47	0.00	OCS - 1
9	1	60.000	0.00	0.07	0.00	0.00	0.06	0.0	9.3	6.6	0.42	83.33	4.55	24	11.57	248.51	255.45	248.61	255.67	258.47	260.52	DMH - 211
10	9	12.000	0.04	0.07	0.90	0.04	0.06	5.0	8.8	6.8	0.43	7.00	2.78	15	1.00	256.95	257.07	257.16	257.32	260.52	260.37	CLCB - 209
11	10	44.000	0.03	0.03	0.90	0.03	0.03	5.0	5.0	8.8	0.24	14.80	1.93	15	4.48	257.12	259.09	257.32	259.28	260.37	262.34	CLCB - 210
12	4	60.000	0.10	0.10	0.65	0.07	0.07	5.0	5.0	8.8	0.57	18.57	1.98	15	7.05	248.68	252.91	249.14	253.20	257.60	259.70	CCB - 208

Project File: storm - 200.stm | Number of lines: 12 | Run Date: 12/23/2024

NOTES:Intensity = 38.62 / (Inlet time + 3.60) ^ 0.69; Return period =Yrs. 25 ; c = cir e = ellip b = box

APPENDIX D

Water Quality Volume

benesch

Water Quality Volume Computations
8, 9, 11 Colby Drive, Ledyard, CT
Project # 0725-500010.00

Designation	Description	Total Area (ac)	Total Impervious Area (ac)	Impervious Coverage, I (%)	Volumetric Runoff Coefficient (R)	WQV (ac-ft, apply 1.3")	Required WQV (cf)	Provided WQV (cf)
					R = 0.05 + 0.009*(I)	WQV = (1.3")*(R)*(A)/12		
1	Total Site	9.95	1.84	18.49	0.22	0.233	10,162	10,783
2	Flow to Pond	5.57	1.34	24.06	0.27	0.161	7,005	10,783

APPENDIX E

NOAA Rainfall Data

NOAA Atlas 14, Volume 10, Version 3
Location name: Ledyard, Connecticut, USA*
Latitude: 41.4421°, Longitude: -72.0096°
Elevation: 269 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.341 (0.264-0.437)	0.408 (0.315-0.523)	0.517 (0.399-0.665)	0.607 (0.466-0.783)	0.732 (0.545-0.975)	0.826 (0.602-1.12)	0.925 (0.656-1.28)	1.04 (0.697-1.45)	1.20 (0.776-1.72)	1.33 (0.842-1.94)
10-min	0.483 (0.374-0.619)	0.577 (0.447-0.741)	0.732 (0.565-0.942)	0.861 (0.660-1.11)	1.04 (0.772-1.38)	1.17 (0.854-1.58)	1.31 (0.930-1.82)	1.47 (0.987-2.06)	1.70 (1.10-2.43)	1.88 (1.19-2.74)
15-min	0.568 (0.440-0.728)	0.679 (0.526-0.872)	0.861 (0.664-1.11)	1.01 (0.777-1.31)	1.22 (0.908-1.62)	1.38 (1.00-1.86)	1.54 (1.09-2.14)	1.73 (1.16-2.42)	2.00 (1.29-2.86)	2.22 (1.40-3.23)
30-min	0.801 (0.621-1.03)	0.957 (0.741-1.23)	1.21 (0.936-1.56)	1.42 (1.09-1.84)	1.72 (1.28-2.28)	1.94 (1.41-2.62)	2.17 (1.54-3.01)	2.43 (1.63-3.40)	2.81 (1.82-4.03)	3.12 (1.97-4.54)
60-min	1.03 (0.801-1.33)	1.24 (0.956-1.58)	1.56 (1.21-2.01)	1.84 (1.41-2.37)	2.21 (1.65-2.95)	2.50 (1.82-3.37)	2.79 (1.98-3.88)	3.13 (2.10-4.39)	3.62 (2.34-5.19)	4.02 (2.54-5.85)
2-hr	1.36 (1.06-1.73)	1.62 (1.27-2.06)	2.05 (1.60-2.62)	2.41 (1.86-3.08)	2.90 (2.18-3.83)	3.27 (2.40-4.39)	3.66 (2.62-5.04)	4.10 (2.78-5.71)	4.75 (3.09-6.76)	5.28 (3.35-7.62)
3-hr	1.58 (1.24-1.99)	1.88 (1.48-2.38)	2.38 (1.86-3.02)	2.79 (2.17-3.56)	3.36 (2.53-4.42)	3.79 (2.80-5.05)	4.24 (3.04-5.81)	4.75 (3.22-6.57)	5.49 (3.58-7.78)	6.10 (3.89-8.78)
6-hr	2.00 (1.59-2.51)	2.38 (1.89-2.99)	3.00 (2.37-3.77)	3.52 (2.76-4.44)	4.23 (3.21-5.50)	4.76 (3.54-6.29)	5.32 (3.84-7.23)	5.96 (4.07-8.18)	6.89 (4.52-9.69)	7.65 (4.90-10.9)
12-hr	2.48 (1.98-3.08)	2.94 (2.34-3.65)	3.69 (2.94-4.60)	4.32 (3.41-5.40)	5.18 (3.96-6.69)	5.82 (4.36-7.64)	6.51 (4.73-8.78)	7.29 (5.00-9.93)	8.42 (5.56-11.8)	9.37 (6.03-13.3)
24-hr	2.90 (2.34-3.57)	3.46 (2.78-4.26)	4.36 (3.50-5.38)	5.11 (4.08-6.34)	6.15 (4.74-7.88)	6.92 (5.23-9.02)	7.74 (5.68-10.4)	8.70 (6.01-11.8)	10.1 (6.70-14.0)	11.3 (7.30-15.9)
2-day	3.24 (2.64-3.96)	3.90 (3.17-4.76)	4.97 (4.03-6.08)	5.86 (4.72-7.20)	7.09 (5.52-9.02)	8.00 (6.10-10.4)	8.98 (6.65-12.0)	10.1 (7.04-13.6)	11.9 (7.91-16.3)	13.3 (8.67-18.6)
3-day	3.52 (2.88-4.26)	4.22 (3.45-5.12)	5.38 (4.38-6.54)	6.34 (5.13-7.74)	7.66 (5.99-9.70)	8.64 (6.62-11.1)	9.70 (7.21-12.9)	10.9 (7.63-14.6)	12.8 (8.57-17.6)	14.4 (9.39-20.0)
4-day	3.77 (3.10-4.56)	4.51 (3.70-5.46)	5.72 (4.68-6.94)	6.73 (5.46-8.19)	8.11 (6.37-10.2)	9.14 (7.02-11.7)	10.2 (7.64-13.6)	11.6 (8.07-15.4)	13.5 (9.05-18.4)	15.2 (9.90-21.0)
7-day	4.49 (3.71-5.38)	5.30 (4.38-6.36)	6.62 (5.45-7.96)	7.72 (6.31-9.32)	9.22 (7.28-11.5)	10.4 (7.99-13.2)	11.6 (8.64-15.1)	12.9 (9.09-17.1)	15.0 (10.1-20.4)	16.7 (11.0-23.0)
10-day	5.20 (4.32-6.21)	6.05 (5.02-7.22)	7.43 (6.14-8.90)	8.58 (7.05-10.3)	10.2 (8.05-12.6)	11.3 (8.78-14.3)	12.6 (9.43-16.4)	14.0 (9.88-18.4)	16.1 (10.8-21.7)	17.8 (11.7-24.3)
20-day	7.39 (6.20-8.73)	8.29 (6.95-9.81)	9.78 (8.16-11.6)	11.0 (9.12-13.1)	12.7 (10.1-15.5)	14.0 (10.9-17.4)	15.3 (11.4-19.5)	16.7 (11.8-21.7)	18.5 (12.6-24.7)	19.9 (13.1-27.0)
30-day	9.20 (7.76-10.8)	10.2 (8.55-11.9)	11.7 (9.82-13.8)	13.0 (10.8-15.4)	14.8 (11.8-17.9)	16.1 (12.6-19.9)	17.5 (13.1-22.0)	18.8 (13.4-24.3)	20.4 (13.9-27.2)	21.6 (14.3-29.2)
45-day	11.4 (9.71-13.4)	12.5 (10.6-14.6)	14.1 (11.9-16.5)	15.5 (13.0-18.2)	17.4 (14.0-20.9)	18.9 (14.7-23.0)	20.3 (15.1-25.2)	21.5 (15.4-27.7)	23.0 (15.7-30.4)	23.9 (15.9-32.2)
60-day	13.3 (11.3-15.5)	14.4 (12.2-16.8)	16.1 (13.7-18.8)	17.6 (14.8-20.6)	19.6 (15.8-23.4)	21.2 (16.6-25.7)	22.6 (16.9-28.0)	23.9 (17.2-30.6)	25.3 (17.4-33.3)	26.1 (17.4-35.0)

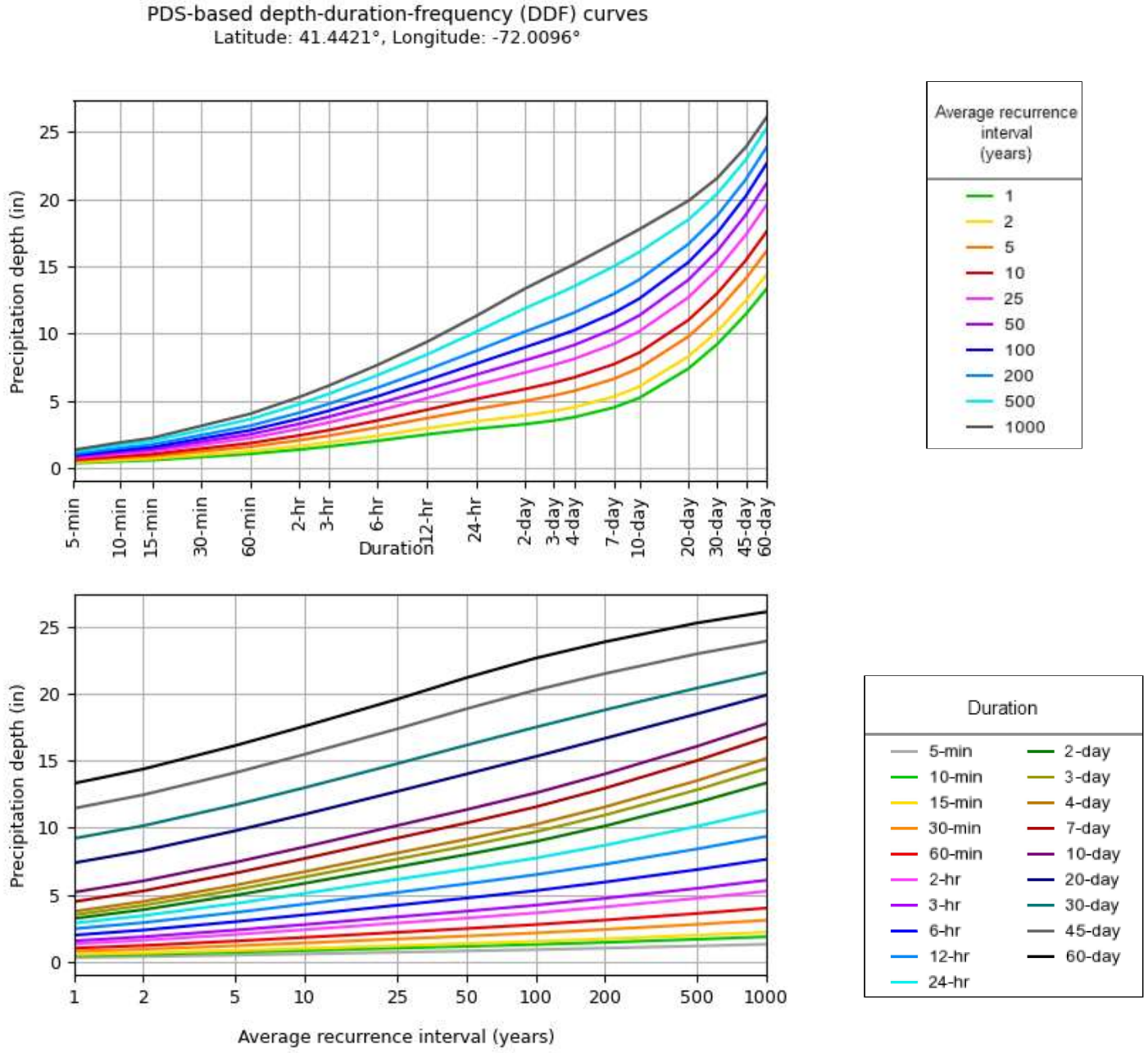
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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.

Back to Top

PF graphical



NOAA Atlas 14, Volume 10, Version 3

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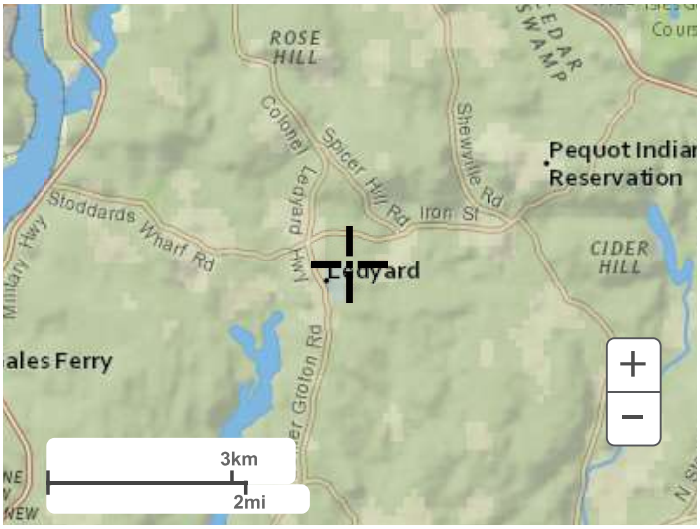
Back to Top

Maps & aerials

Small scale terrain



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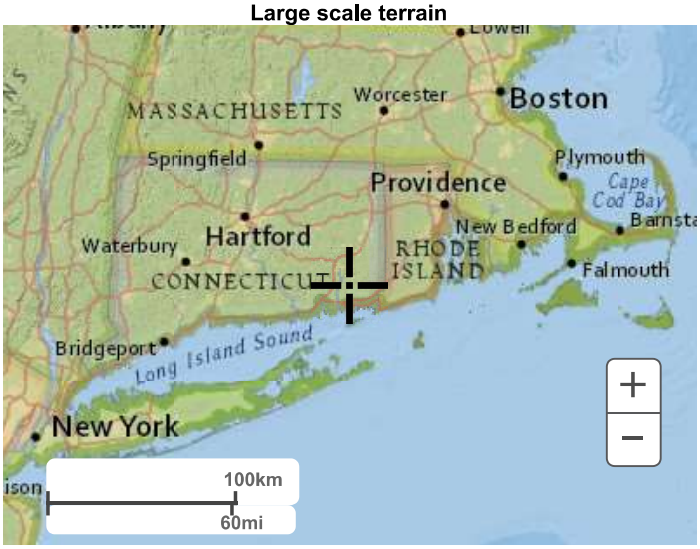

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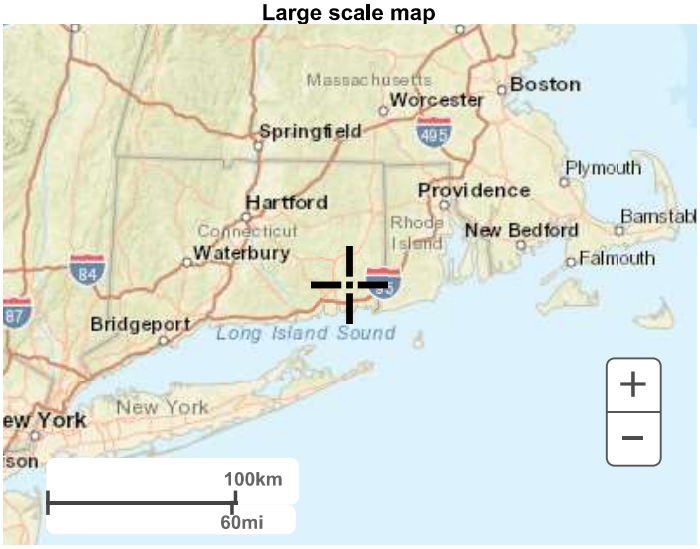
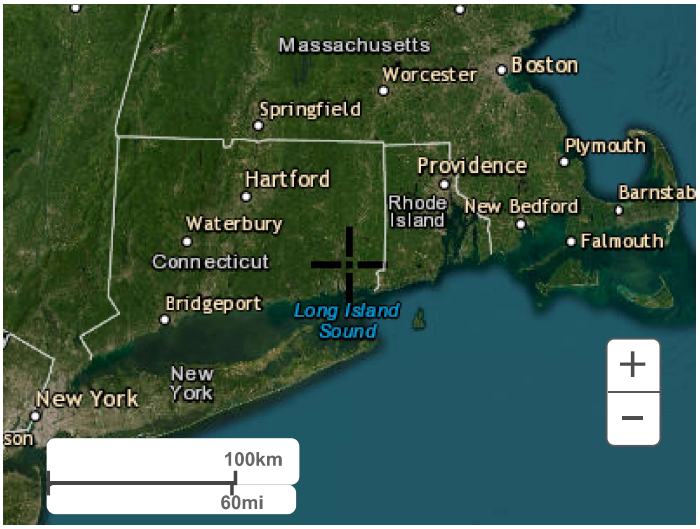


Large scale aerial



Back to Top

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National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

NOAA Atlas 14, Volume 10, Version 3
Location name: Ledyard, Connecticut, USA*
Latitude: 41.4421°, Longitude: -72.0096°
Elevation: 269 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	4.09 (3.17-5.24)	4.90 (3.78-6.28)	6.20 (4.79-7.98)	7.28 (5.59-9.40)	8.78 (6.54-11.7)	9.91 (7.22-13.4)	11.1 (7.87-15.4)	12.4 (8.36-17.4)	14.4 (9.31-20.6)	16.0 (10.1-23.2)
10-min	2.90 (2.24-3.71)	3.46 (2.68-4.45)	4.39 (3.39-5.65)	5.17 (3.96-6.67)	6.23 (4.63-8.29)	7.03 (5.12-9.49)	7.86 (5.58-10.9)	8.81 (5.92-12.3)	10.2 (6.59-14.6)	11.3 (7.16-16.5)
15-min	2.27 (1.76-2.91)	2.72 (2.10-3.49)	3.44 (2.66-4.43)	4.05 (3.11-5.22)	4.88 (3.63-6.50)	5.51 (4.02-7.44)	6.17 (4.38-8.56)	6.91 (4.65-9.68)	7.98 (5.17-11.5)	8.87 (5.61-12.9)
30-min	1.60 (1.24-2.05)	1.91 (1.48-2.46)	2.43 (1.87-3.12)	2.85 (2.19-3.68)	3.43 (2.55-4.57)	3.87 (2.82-5.23)	4.33 (3.08-6.01)	4.86 (3.27-6.81)	5.61 (3.64-8.06)	6.24 (3.95-9.07)
60-min	1.03 (0.801-1.33)	1.24 (0.956-1.58)	1.56 (1.21-2.01)	1.84 (1.41-2.37)	2.21 (1.65-2.95)	2.50 (1.82-3.37)	2.79 (1.98-3.88)	3.13 (2.10-4.39)	3.62 (2.34-5.19)	4.02 (2.54-5.85)
2-hr	0.679 (0.531-0.863)	0.811 (0.633-1.03)	1.03 (0.798-1.31)	1.20 (0.932-1.54)	1.45 (1.09-1.92)	1.64 (1.20-2.19)	1.83 (1.31-2.52)	2.05 (1.39-2.85)	2.37 (1.54-3.38)	2.64 (1.68-3.81)
3-hr	0.525 (0.412-0.664)	0.626 (0.491-0.792)	0.792 (0.619-1.00)	0.930 (0.722-1.18)	1.12 (0.842-1.47)	1.26 (0.931-1.68)	1.41 (1.01-1.93)	1.58 (1.07-2.19)	1.83 (1.19-2.59)	2.03 (1.30-2.92)
6-hr	0.334 (0.265-0.419)	0.397 (0.314-0.498)	0.501 (0.395-0.630)	0.587 (0.460-0.741)	0.705 (0.535-0.919)	0.794 (0.590-1.05)	0.888 (0.641-1.21)	0.994 (0.679-1.37)	1.15 (0.754-1.62)	1.28 (0.818-1.82)
12-hr	0.205 (0.164-0.255)	0.243 (0.194-0.303)	0.306 (0.243-0.381)	0.358 (0.283-0.448)	0.429 (0.328-0.555)	0.483 (0.362-0.634)	0.539 (0.392-0.728)	0.604 (0.415-0.824)	0.699 (0.461-0.976)	0.777 (0.500-1.10)
24-hr	0.120 (0.097-0.148)	0.143 (0.115-0.177)	0.181 (0.145-0.224)	0.213 (0.169-0.264)	0.256 (0.197-0.328)	0.288 (0.217-0.375)	0.322 (0.236-0.432)	0.362 (0.250-0.490)	0.421 (0.279-0.584)	0.470 (0.304-0.661)
2-day	0.067 (0.054-0.082)	0.081 (0.066-0.099)	0.103 (0.083-0.126)	0.122 (0.098-0.149)	0.147 (0.114-0.187)	0.166 (0.127-0.215)	0.187 (0.138-0.249)	0.211 (0.146-0.283)	0.247 (0.164-0.340)	0.278 (0.180-0.388)
3-day	0.048 (0.039-0.059)	0.058 (0.047-0.071)	0.074 (0.060-0.090)	0.088 (0.071-0.107)	0.106 (0.083-0.134)	0.120 (0.091-0.154)	0.134 (0.100-0.178)	0.152 (0.105-0.203)	0.178 (0.119-0.243)	0.200 (0.130-0.278)
4-day	0.039 (0.032-0.047)	0.047 (0.038-0.056)	0.059 (0.048-0.072)	0.070 (0.056-0.085)	0.084 (0.066-0.106)	0.095 (0.073-0.122)	0.106 (0.079-0.141)	0.120 (0.084-0.160)	0.140 (0.094-0.192)	0.157 (0.103-0.218)
7-day	0.026 (0.022-0.032)	0.031 (0.026-0.037)	0.039 (0.032-0.047)	0.045 (0.037-0.055)	0.054 (0.043-0.068)	0.061 (0.047-0.078)	0.068 (0.051-0.090)	0.077 (0.054-0.101)	0.089 (0.060-0.121)	0.099 (0.065-0.137)
10-day	0.021 (0.018-0.025)	0.025 (0.020-0.030)	0.030 (0.025-0.037)	0.035 (0.029-0.042)	0.042 (0.033-0.052)	0.047 (0.036-0.059)	0.052 (0.039-0.068)	0.058 (0.041-0.076)	0.066 (0.045-0.090)	0.074 (0.048-0.101)
20-day	0.015 (0.012-0.018)	0.017 (0.014-0.020)	0.020 (0.016-0.024)	0.022 (0.019-0.027)	0.026 (0.021-0.032)	0.029 (0.022-0.036)	0.031 (0.023-0.040)	0.034 (0.024-0.045)	0.038 (0.026-0.051)	0.041 (0.027-0.056)
30-day	0.012 (0.010-0.015)	0.014 (0.011-0.016)	0.016 (0.013-0.019)	0.018 (0.015-0.021)	0.020 (0.016-0.024)	0.022 (0.017-0.027)	0.024 (0.018-0.030)	0.026 (0.018-0.033)	0.028 (0.019-0.037)	0.029 (0.019-0.040)
45-day	0.010 (0.008-0.012)	0.011 (0.009-0.013)	0.013 (0.011-0.015)	0.014 (0.012-0.016)	0.016 (0.012-0.019)	0.017 (0.013-0.021)	0.018 (0.014-0.023)	0.019 (0.014-0.025)	0.021 (0.014-0.028)	0.022 (0.014-0.029)
60-day	0.009 (0.007-0.010)	0.009 (0.008-0.011)	0.011 (0.009-0.013)	0.012 (0.010-0.014)	0.013 (0.010-0.016)	0.014 (0.011-0.017)	0.015 (0.011-0.019)	0.016 (0.011-0.021)	0.017 (0.012-0.023)	0.018 (0.012-0.024)

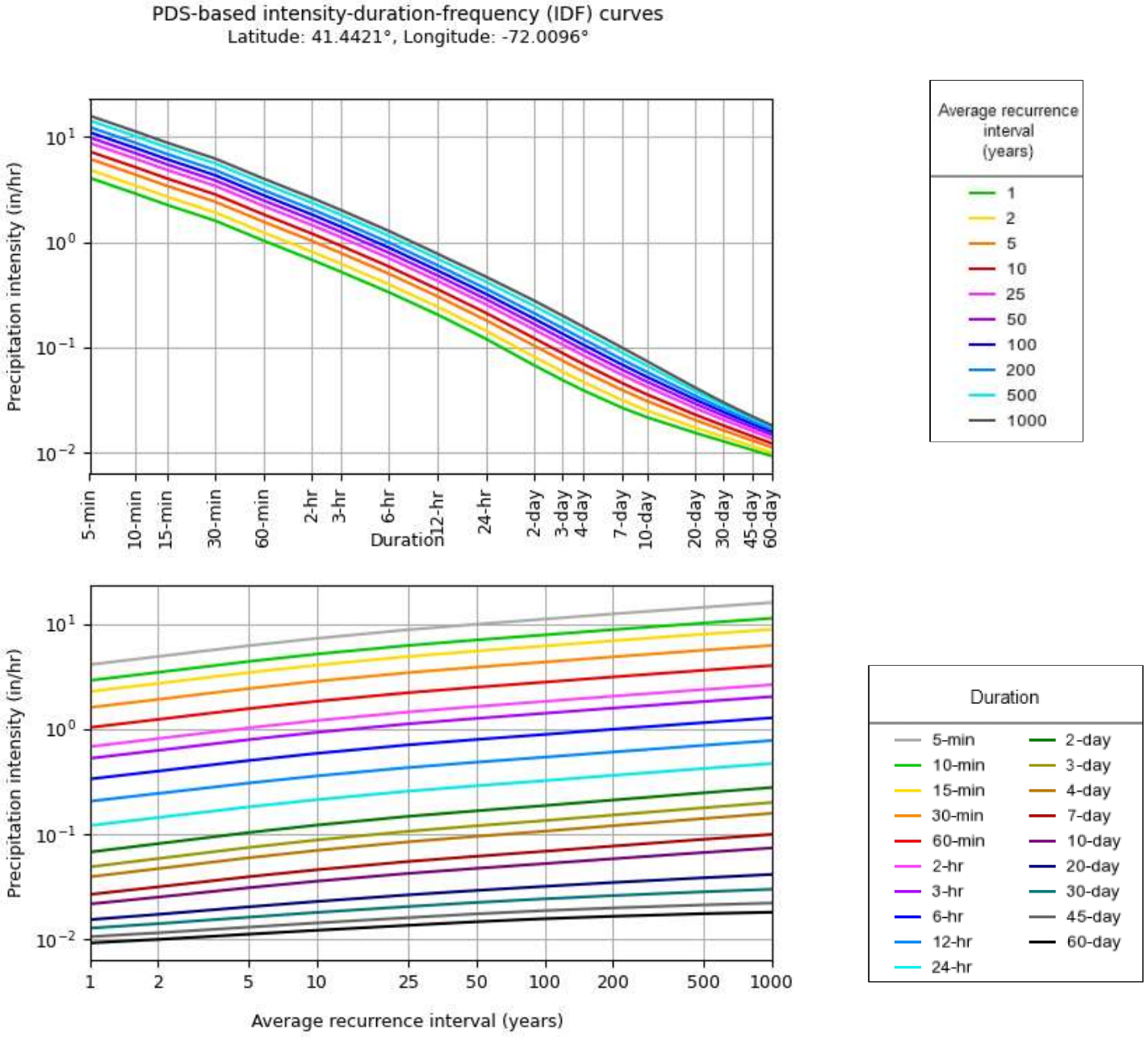
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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.

Back to Top

PF graphical



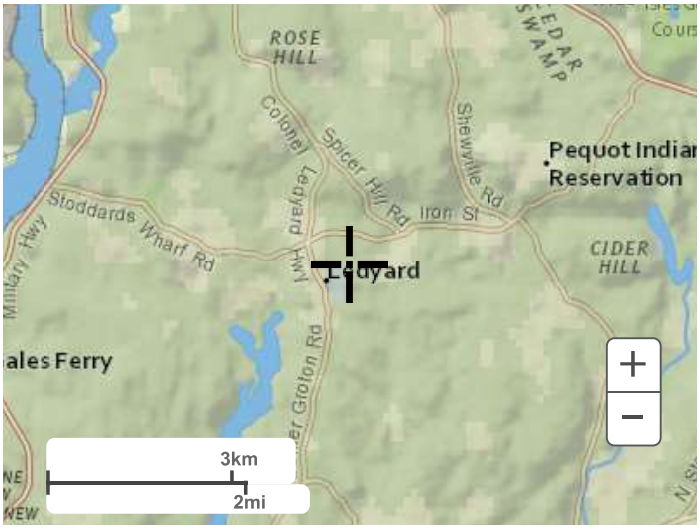
NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Tue Aug 6 12:47:28 2024

Back to Top

Maps & aerials

Small scale terrain



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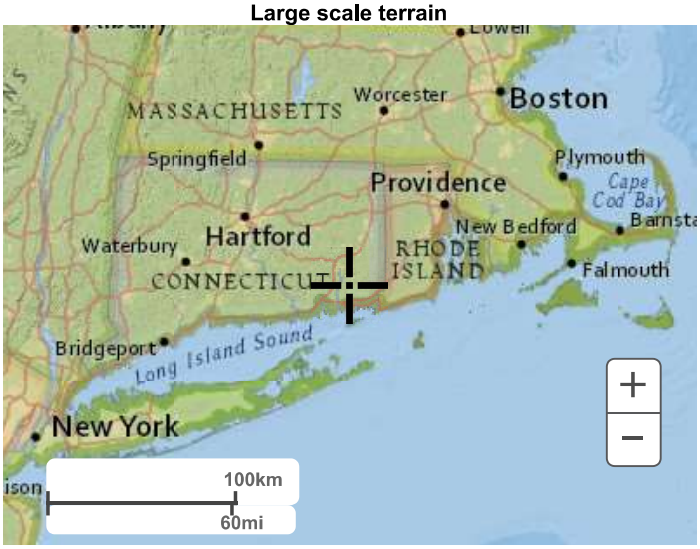
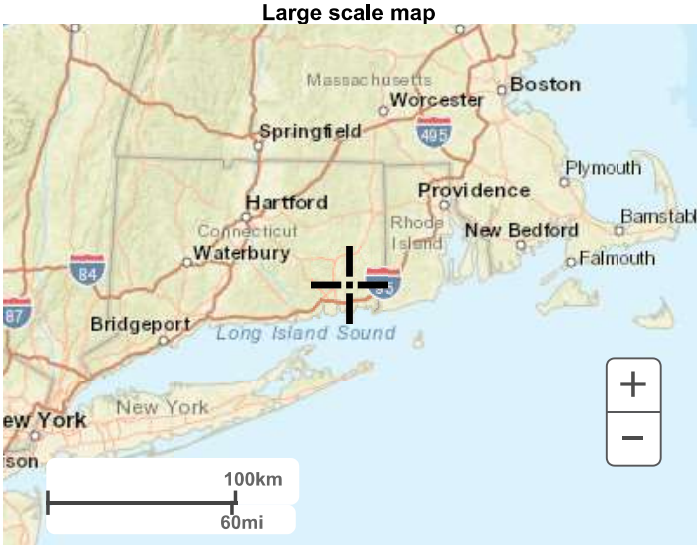
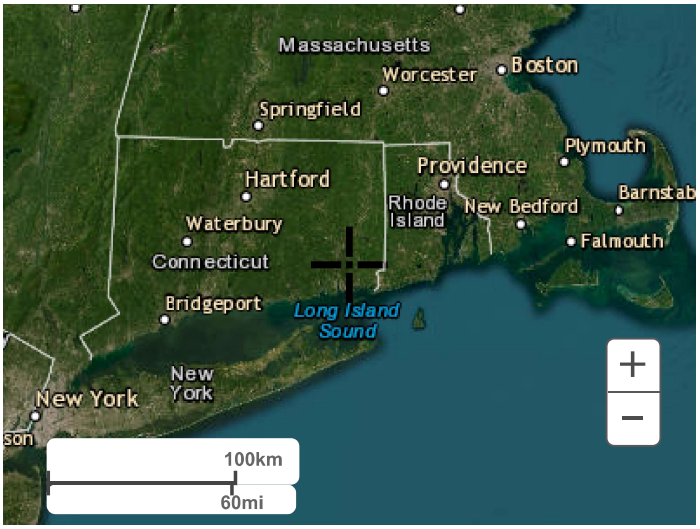


Large scale map



Large scale aerial



Back to Top

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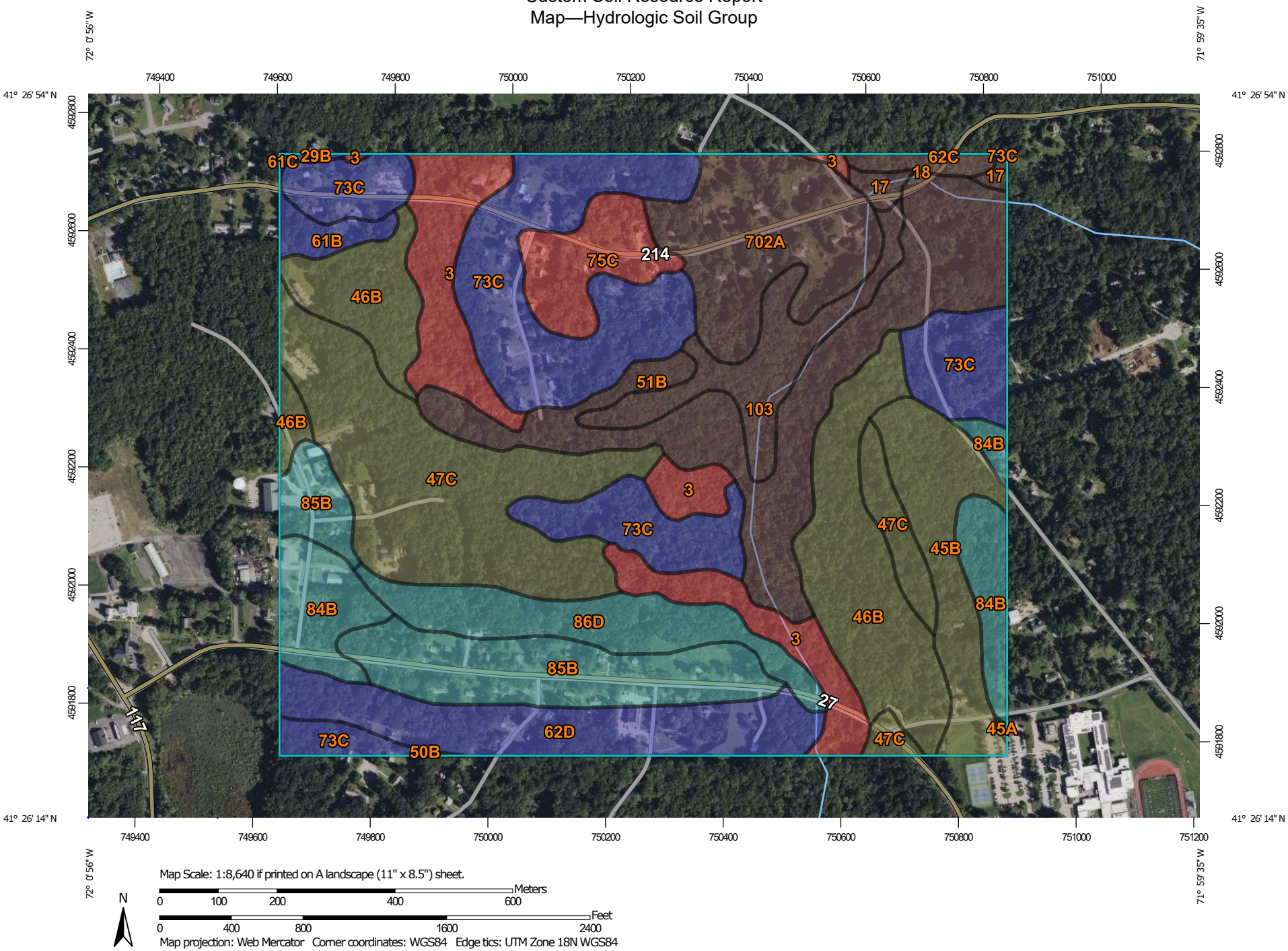
Questions?: HDSC.Questions@noaa.gov

APPENDIX F

NRCS Soil Survey

Custom Soil Resource Report
Map—Hydrologic Soil Group



APPENDIX G

Test Pits & Infiltration Results

benesch

GRADING LEGEND

- DIRECTION OF SURFACE DRAINAGE FLOW
- PROPOSED INTERMEDIATE CONTOUR
- PROPOSED INDEX CONTOUR
- PROPOSED SPOT ELEVATION (TW 123.45, BW 122.45)
- MATCH EXISTING SPOT ELEVATION (123.45 (ME))
- FLUSH CONDITION
- ACCESSIBLE ROUTE
- SOIL BORING LOCATION (B-#)

DRAINAGE AND UTILITIES LEGEND

- STORM DRAINAGE PIPE
- CATCH BASIN
- DRAINAGE MANHOLE
- AREA/YARD DRAIN
- TREATMENT UNIT
- ROOF LEADER
- SANITARY MANHOLE
- SAN — SANITARY SEWER
- VENT — VENT LINE
- CLEANOUT
- W — WATER LINE / FIRE LINE
- W — WATER LINE DOMESTIC
- WATER GATE VALVE
- WATER TAPPING SLEEVE
- WATER METER
- ELECTRIC / COMM. DUCT BANK
- E — ELECTRIC / COMM. DUCT BANK
- GAS LINE
- GAS METER
- CO_2 SUPPLY
- COMMUNICATION CONDUITS
- EXISTING DRINKING WATER WELL
- EXISTING LEACHING FIELD
- EXISTING SEPTIC TANK

Legend

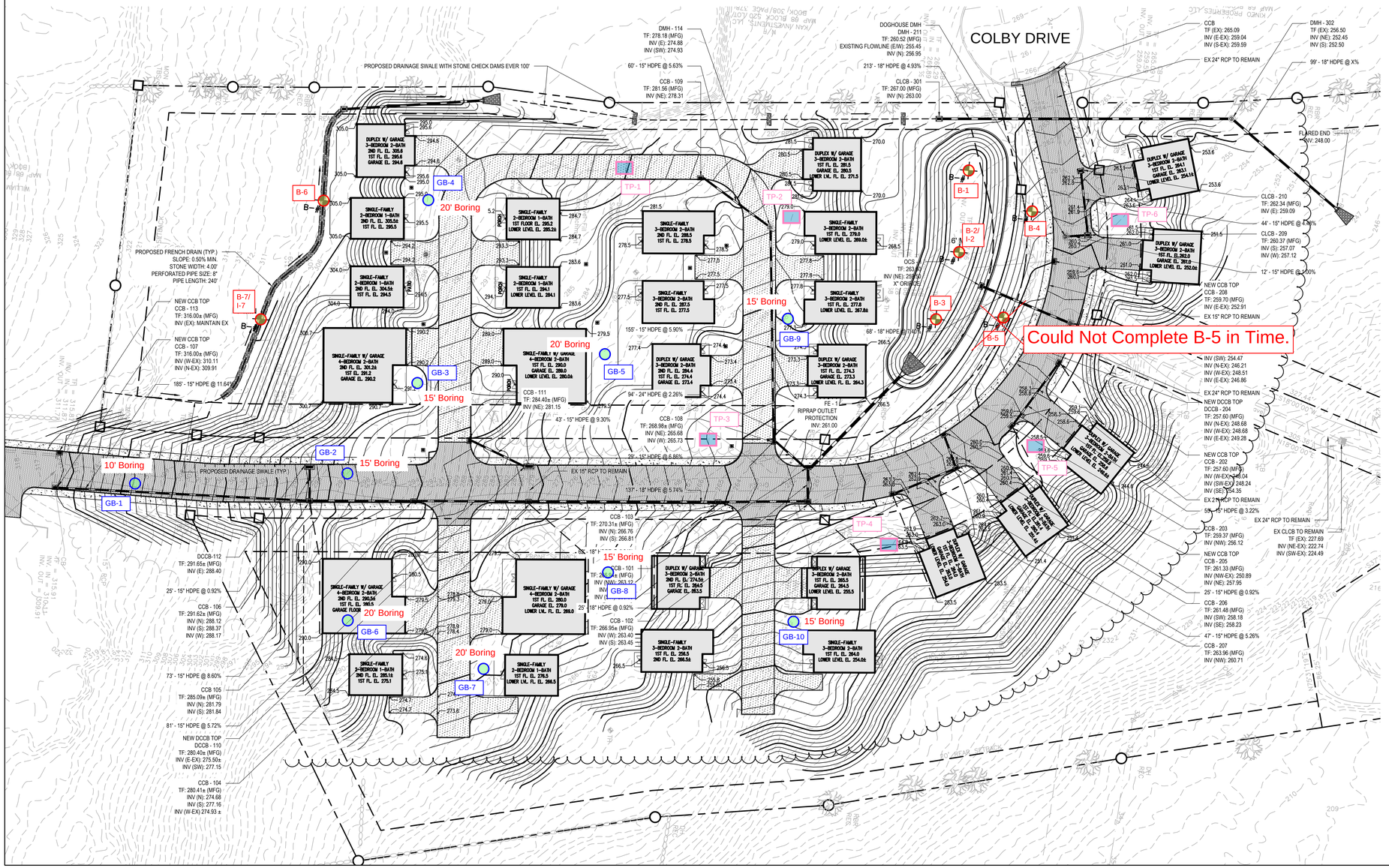
- Stormwater Boring
- Geotech Boring
- Geotech Test Pit

ACCESSIBILITY NOTES

1. SLOPES ALONG THE ACCESSIBLE ROUTE SHALL BE LESS THAN 1:20 (5%) AND THE CROSS SLOPES SHALL NOT EXCEED 1:50 (2%). CHANGES IN LEVELS SHALL NOT BE GREATER THAN ¼ INCH.
2. LANDINGS SHALL NOT HAVE A SLOPE GREATER THAN 1:50 (2%) IN ANY DIRECTION.
3. SLOPES WITHIN THE ACCESSIBLE PARKING SPACE SHALL NOT EXCEED 1:50 (2%) IN ANY DIRECTION.

DRAINAGE NOTES

1. CONTRACTOR SHALL NOTIFY "CALL BEFORE YOU DIG" (1-800-922-4455) AND VERIFY UTILITY MARK-OUT WITH THE OWNER PRIOR TO THE INITIATION OF ANY SITE DISTURBANCE.
2. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR VERIFICATION OF THE LOCATION AND NATURE OF ALL SUBSURFACE UTILITIES AT THE PROJECT WHICH MAY BE AFFECTED BY THE WORK. COORDINATE WITH RESPECTIVE UTILITY OWNERS AND PERFORM VERIFICATION OF TYPE, LOCATION, AND INVERTS AS REQUIRED.
3. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY AND ALL DISCREPANCIES BETWEEN EXISTING CONDITIONS AND THE CONTRACT DOCUMENTS BEFORE PROCEEDING WITH THAT PORTION OF THE WORK.
4. THE LOCATIONS OF EXISTING SITE FEATURES AS SHOWN HAVE BEEN OBTAINED FROM MAPS, SURVEYS, FIELD INSPECTIONS, AND OTHER AVAILABLE INFORMATION. THEY MUST BE CONSIDERED APPROXIMATE BOTH TO LOCATION, SIZE, AND AS-BUILT CONDITION AND ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ACTUAL FIELD CONDITIONS.
5. THE DIMENSIONS SHOWN ON THE PLANS, INCLUDING THE INTENDED DIMENSIONS OF THE WORK, MAY VARY FROM ACTUAL EXISTING CONDITIONS IN THE FIELD. THE CONTRACTOR SHALL TAKE APPROPRIATE MEASUREMENTS TO VERIFY ALL DIMENSIONS SHOWN ON THE DRAWINGS AS WELL AS OTHER DIMENSIONS HE MAY DEEM APPROPRIATE TO FACILITATE THE COMPLETION OF THE WORK. NOTIFY THE ENGINEER OF ANY DISCREPANCIES BETWEEN EXISTING CONDITIONS AND THE CONTRACT DOCUMENTS BEFORE PROCEEDING WITH THAT PORTION OF THE WORK.
6. UNLESS OTHERWISE INDICATED, ALL DISTURBED AREAS SHALL BE RESTORED WITH SIX (6) INCHES OF LOAM, SEEDED, FERTILIZED, AND MULCHED. PROVIDE ADDITIONAL EROSION CONTROLS AS REQUIRED.
7. COMPLY WITH CONNECTICUT BUILDING CODE FOR ALL SITE CONSTRUCTION, INCLUDING HANDICAPPED ACCESSIBILITY.
8. THE CROSS-SLOPE OF ALL SIDEWALKS AND WALKWAYS SHALL BE LESS THAN 1V:50H (2.00%). UNLESS OTHERWISE INDICATED, THE MAXIMUM RUNNING SLOPE OF ALL SIDEWALKS AND WALKWAYS SHALL BE LESS THAN 1V:20H (5%). VERIFY GRADES AND SLOPES PRIOR TO CONCRETE PLACEMENT. REPORT DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
10. ENGAGE A CONNECTICUT-LICENSED LAND SURVEYOR TO PERFORM LAND-SURVEYING SERVICES REQUIRED, INCLUDING, BUT NOT LIMITED TO VERIFICATION AND LAYOUT OF BASELINES, PROPOSED IMPROVEMENTS, DIMENSIONS AND ELEVATIONS. REPORT DISCREPANCIES TO THE ENGINEER.
11. PROPOSED GRADES INDICATE DESIGN INTENT. VERIFY ELEVATIONS AND MAKE ADJUSTMENTS TO MEET FIELD CONDITIONS. DO NOT PROCEED WITH ANY ADJUSTMENT OR FIELD MODIFICATION UNTIL APPROVED BY THE ENGINEER.
12. GRADE TRANSITION BETWEEN TOPOGRAPHIC LINES AND SPOT GRADES SHALL BE UNIFORM UNLESS OTHERWISE INDICATED.
13. MAXIMUM LANDSCAPE SLOPES SHALL BE 3(H):1(V) UNLESS OTHERWISE INDICATED.
14. ALL DRAINAGE PIPE SHALL BE HIGH DENSITY POLYETHYLENE PIPE (HDPE), UNLESS OTHERWISE INDICATED. SEE SPECIFICATIONS. ALL PROPOSED DRAINAGE PIPE UNDER ROADWAY WITH LESS THAN TWO (2) FEET OF COVER SHALL BE CLASS V RCP.
15. ALL CATCH BASINS SET AGAINST CURBS SHALL BE CONNDOT TYPE "C" AND THOSE NOT AGAINST CURBING SHALL BE CONNDOT TYPE "C-L".
16. GRADE ELEVATIONS ADJACENT BUILDINGS SHALL BE NO HIGHER THAN 8" BELOW FINISH FLOOR EXCEPT AT BUILDING ENTRANCES.
17. AT THE CONCLUSION OF THE WORK, CONTRACTOR SHALL REMOVE ALL ACCUMULATED SEDIMENT MATERIAL FROM ALL PORTIONS OF THE STORM DRAINAGE SYSTEM



Prepared by:

benesch

Alfred Benesch & Company
120 Hebron Avenue, 2nd Floor
Glastonbury, Connecticut 06033
860-633-8341

Prepared for:

Habitat for Humanity® of Eastern Connecticut

HABITAT FOR HUMANITY RESIDENTIAL DEVELOPMENT LOTS 8, 9 & 11

COLBY DRIVE LEDYARD, CT

DATE:	REVISION:

KEY PLAN

0 40' 80'
SCALE: 1" = 40'

PROJECT NO.: 0725 500010.00
SCALE: AS SHOWN
DATE: 08/XX/2024
DRAWN BY: GSL, NL
CHECKED BY: WGW

BORING LOCATION PLAN

DRAWING NO.:
G1.0

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

Test Boring Falling Head Test
Proposed Habitat for Humanity Development
Colby Drive
Ledyard, CT
File No. 0015-046.00

Test Location: I-2
Test Type: Falling Head
Date: 11/5/2024

Driller: J. Casson
Engineer: M. Fekieta
Weather: Sunny, 60s

Ground surface El.: 262.0 (ft.)
Top of Casing El.: 264.5 (ft.)
Bottom of Casing El.: 259.0 (ft.)

Total Casing Length: 5.5 (ft.)

Inside Casing Diameter: 4 (in.)

Hydraulic Conductivity (Kv) = π [D {Ln (h1/h2) }] / 11 (t2-t1)

Elapsed Time (min.)	t2 - t1 (min.)	DTW (in.)	h1 (in.)	h2 (in.)	ln(h1/h2)	Kv (in/min)	Kv (cm/sec)	Kv (in/hr)
4.0	4.0	0.5	66.5	66.0	0.0075	2.2E-03	9.1E-05	1.3E-01
8	4.0	1.3	66.0	65.3	0.0114	3.3E-03	1.4E-04	2.0E-01
12	4.0	2.0	65.3	64.5	0.0116	3.3E-03	1.4E-04	2.0E-01
24	12.0	4.0	64.5	62.5	0.0315	3.0E-03	1.3E-04	1.8E-01
36	12.0	6.0	62.5	60.5	0.0325	3.1E-03	1.3E-04	1.9E-01
58	22.0	10.0	60.5	56.5	0.0684	3.6E-03	1.5E-04	2.1E-01
100	42.0	17.0	56.5	49.5	0.1323	3.6E-03	1.5E-04	2.2E-01
144	44.0	23.0	49.5	43.5	0.1292	3.4E-03	1.4E-04	2.0E-01
171	27.0	27.3	43.5	39.3	0.1028	4.3E-03	1.8E-04	2.6E-01
214	43.0	33.0	39.3	33.5	0.1584	4.2E-03	1.8E-04	2.5E-01
245	31.0	36.5	33.5	30.0	0.1103	4.1E-03	1.7E-04	2.4E-01

Average	3.4E-03	1.5E-04	2.1E-01

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

Test Boring Falling Head Test
Proposed Habitat for Humanity Development
Colby Drive
Ledyard, CT
File No. 0015-046.00

Test Location: I-7
Test Type: Falling Head
Date: 11/5/2024

Driller: Jim Casson
Engineer: M. Fekieta
Weather: Sunny 60s

Ground surface El.: 311.0 (ft.)
Top of Casing El.: 313.4 (ft.)
Bottom of Casing El.: 307.9 (ft.)

Total Casing Length: 5.5 (ft.)

Inside Casing Diameter: 4 (in.)

Hydraulic Conductivity (Kv) = π [D {Ln (h1/h2) }] / 11 (t2-t1)

Elapsed Time (min.)	t2 - t1 (min.)	DTW (in.)	h1 (in.)	h2 (in.)	ln(h1/h2)	Kv (in/min)	Kv (cm/sec)	Kv (in/hr)
1.0	1.0	0.5	66.0	65.5	0.0076	8.7E-03	3.7E-04	5.2E-01
2	1.0	1.3	65.5	64.8	0.0115	1.3E-02	5.6E-04	7.9E-01
4	2.0	3.0	64.8	63.0	0.0274	1.6E-02	6.6E-04	9.4E-01
6	2.0	4.5	63.0	61.5	0.0241	1.4E-02	5.8E-04	8.3E-01
10	4.0	7.5	61.5	58.5	0.0500	1.4E-02	6.0E-04	8.6E-01
16	6.0	11.8	58.5	54.3	0.0754	1.4E-02	6.1E-04	8.6E-01
32	16.0	21.8	54.3	44.3	0.2037	1.5E-02	6.2E-04	8.7E-01
45	13.0	29.5	44.3	36.5	0.1925	1.7E-02	7.2E-04	1.0E+00
70	25.0	40.8	36.5	25.3	0.3685	1.7E-02	7.1E-04	1.0E+00
89	19.0	48.0	25.3	18.0	0.3385	2.0E-02	8.6E-04	1.2E+00
105	16.0	53.0	18.0	13.0	0.3254	2.3E-02	9.8E-04	1.4E+00

Average	1.6E-02	6.6E-04	9.4E-01

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
PROPOSED HABITAT FOR HUMANITY DEVELOPMENT
COLBY DRIVE
LEDYARD, CONNECTICUT

BORING NO. B-1
SHEET 1 of 1
FILE NO. 0015-046.00
CHKD. BY TJO

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan		
Driller	Jim Casson	Ground Surface El.	264.5'+/-	Datum	Not Available
Logged By	Mateusz Fekieta	Date Start	10/24/2024	Date End	11/5/2024

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Truck Mounted Diedrich D-50
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
11/5/24	-	7	-	Moist Sample
11/5/24	-	10.5	254'+/-	End of Boring

DEPTH	Casing Blows (ft)	Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	15/24	0 to 2	1-2-4-4		Loose, gray-brown, fine to coarse SAND, some Silt, little fine to coarse Gravel, trace (-) Roots	6"+/- Topsoil
2								SUBSOIL
3		S-2	18/24	2 to 4	7-17-28-38		Dense, brown, fine to coarse SAND, some Silt, little fine to coarse Gravel	
4								
5								
6		S-3	20/24	5 to 7	14-32-17-20		Dense, brown, fine to coarse SAND, some Silt, little fine to coarse Gravel	TILL
7								
8		S-4	20/24	7 to 9	29-14-19-25		Dense, brown, fine to coarse SAND, little Silt, little fine to coarse Gravel, moist	
9								
10		S-5	18/18	9 to 10.5	17-29-50/6"		Very dense, gray, fine to coarse SAND, some Silt, little fine to coarse Gravel	
11								
12							END OF EXPLORATION AT 10.5 FEET BELOW GROUND SURFACE	
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SPT N-Values	SPT N-Values	Proportions
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%
Over 50 - Very Dense	16 to 30 - Very Stiff	
	Over 30 - Hard	

SYMBOL KEY

1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.
3) Cobbles and/or boulders were inferred based on observed auger chatter from about 4.5 to 5.5 and 8.5 to 9.5 feet below grade.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
PROPOSED HABITAT FOR HUMANITY DEVELOPMENT
COLBY DRIVE
LEDYARD, CONNECTICUT

BORING NO. B-2
SHEET 1 of 1
FILE NO. 0015-046.00
CHKD. BY TJO

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan		
Driller	Jim Casson	Ground Surface El.	262'+/-	Datum	Not Available
Logged By	Mateusz Fekieta	Date Start	10/24/2024	Date End	10/24/2024

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Truck Mounted Diedrich D-50
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
10/24/24	-	5	257'+/-	Perched Water

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1								8"+/- Topsoil
2		S-1	0/12	1 to 2	7-10-50/0"		Very dense, No Recovery	SUBSOIL
3		S-2	24/24	2 to 4	4-14-20-18		Dense, brown to gray-brown, fine to coarse SAND, some Silt, little fine to coarse Gravel	
4								
5		S-3	16/24	4 to 6	8-30-46-50		Very dense, Top 6": orange-brown, fine SAND, some Silt, wet;	
6							Bottom 10": gray-brown, fine to coarse SAND, some Silt, little fine to coarse Gravel, dry	TILL
7		S-4	18/24	6 to 8	20-15-22-29		Dense, gray, fine to coarse SAND, some Silt, little fine to coarse Gravel, moist	
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9							END OF EXPLORATION AT 8 FEET BELOW GROUND SURFACE	
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SPT N-Values	SPT N-Values	Proportions
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%
Over 50 - Very Dense	16 to 30 - Very Stiff	
	Over 30 - Hard	

SYMBOL KEY

1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.
3) Cobbles and/or boulders were inferred based on observed auger chatter from about 0 to 4 feet below grade.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
PROPOSED HABITAT FOR HUMANITY DEVELOPMENT
COLBY DRIVE
LEDYARD, CONNECTICUT

BORING NO. B-3
SHEET 1 of 1
FILE NO. 0015-046.00
CHKD. BY TJO

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan		
Driller	Jim Casson	Ground Surface El.	261'+/-	Datum	Not Available
Logged By	Mateusz Fekieta	Date Start	11/5/2024	Date End	11/5/2024

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Truck Mounted Diedrich D-50
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
11/5/24	-	-	-	Not Encountered

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1								9"+/- Topsoil
2		S-1	10/24	1 to 3	2-6-13-21		Medium dense, orange-brown, fine SAND, some Silt	SUBSOIL
3								
4		S-2	2/19	3 to 4.7	22-20-33-50/1"		Very dense, gray, fractured COBBLE fragments	
5								TILL
6		S-3	19/24	5 to 7	19-21-18-16		Dense, gray, fine to coarse SAND, some Silt, little fine to coarse Gravel	
7								
8							END OF EXPLORATION AT 7 FEET BELOW GROUND SURFACE	
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SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.
3) Cobbles and/or boulders were inferred based on observed auger chatter from about 3 to 5 feet below grade.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
PROPOSED HABITAT FOR HUMANITY DEVELOPMENT
COLBY DRIVE
LEDYARD, CONNECTICUT

BORING NO. B-4
SHEET 1 of 1
FILE NO. 0015-046.00
CHKD. BY TJO

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan		
Driller	Jim Casson	Ground Surface El.	261'+/-	Datum	Not Available
Logged By	Mateusz Fekieta	Date Start	11/5/2024	Date End	11/5/2024

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Truck Mounted Diedrich D-50
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
11/5/24	-	-	-	Not Encountered

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	20/24	0 to 2	2-6-5-5		Medium dense, orange-brown, fine SAND, some Silt	9"+/- Topsoil
2								SUBSOIL
3		S-2	20/24	2 to 4	7-13-19-43		Dense, brown to gray, fine to coarse SAND, little fine to coarse Gravel, little Silt	TILL
4								
5		S-3	10/15	4 to 5.3	43-39-50/3"		Very dense, gray, fine to coarse SAND, some Silt, little fine to coarse Gravel	
6							END OF EXPLORATION AT 5.3 FEET BELOW GROUND SURFACE	
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SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
PROPOSED HABITAT FOR HUMANITY DEVELOPMENT
COLBY DRIVE
LEDYARD, CONNECTICUT

BORING NO. B-6
SHEET 1 of 1
FILE NO. 0015-046.00
CHKD. BY TJO

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan		
Driller	Jim Casson	Ground Surface El.	308'+/-	Datum	Not Available
Logged By	Mateusz Fekieta	Date Start	11/5/2024	Date End	11/5/2024

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Truck Mounted Diedrich D-50
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
11/5/24	-	-	-	Not Encountered

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	10/24	0 to 2	2-4-13-26		Medium dense, dark brown, fine SAND, some Silt	8"+/- Topsoil
2								SUBSOIL
3		S-2	18/24	2 to 4	6-11-16-18		Medium dense, gray, fine to coarse SAND, little fine to coarse Gravel, little Silt	TILL
4								
5		S-3	18/24	4 to 6	17-20-34-50		Very dense, light gray, fine to coarse SAND, little fine to coarse Gravel, little Silt	
6								
7							END OF EXPLORATION AT 6 FEET BELOW GROUND SURFACE	
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SPT N-Values	SPT N-Values	Proportions
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%
Over 50 - Very Dense	16 to 30 - Very Stiff	
	Over 30 - Hard	

SYMBOL KEY

1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.
3) Cobbles and/or boulders were inferred based on observed auger chatter from about 0 to 5 feet below grade.
4) Multiple auger refusals between 2 to 5 feet below grade on inferred boulders.

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

PROJECT
PROPOSED HABITAT FOR HUMANITY DEVELOPMENT
COLBY DRIVE
LEDYARD, CONNECTICUT

BORING NO. B-7
SHEET 1 of 1
FILE NO. 0015-046.00
CHKD. BY TJO

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan		
Driller	Jim Casson	Ground Surface El.	310.5'+/-	Datum	Not Available
Logged By	Mateusz Fekieta	Date Start	11/5/2024	Date End	11/5/2024

Hammer Type:	Automatic Hammer
Sampler Size:	1-3/8" I.D. Split Spoon
Type Drill Rig:	Truck Mounted Diedrich D-50
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers

Groundwater Readings (from ground surface)

Date	Time	Depth (ft)	Elev.	Stabilization Time
11/5/24	-	-	-	Not Encountered

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	14/24	0 to 2	2-4-3-4		Loose, brown, fine SAND, some Silt, trace (-) Roots	9"+/- Topsoil
2								SUBSOIL
3		S-2	16/24	2 to 4	8-12-16-23		Medium dense, gray, fine to coarse SAND, little fine to coarse Gravel, little Silt	
4								TILL
5		S-3	16/24	4 to 6	20-22-40-56		Very dense, light gray, fine to coarse SAND, little fine to coarse Gravel, little Silt	
6								
7							END OF EXPLORATION AT 6 FEET BELOW GROUND SURFACE	
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SPT N-Values	SPT N-Values	Proportions
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%
Over 50 - Very Dense	16 to 30 - Very Stiff	
	Over 30 - Hard	

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FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
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3) Cobbles and/or boulders were inferred based on observed auger chatter from about 0 to 4 feet below grade.

APPENDIX H

Grading and Drainage Plan

benesch

GRADING LEGEND

- DIRECTION OF SURFACE DRAINAGE FLOW
- PROPOSED INTERMEDIATE CONTOUR
- PROPOSED INDEX CONTOUR
- PROPOSED SPOT ELEVATION (TW 123.45 / BW 122.45)
- MATCH EXISTING SPOT ELEVATION (123.45 (ME))
- FLUSH CONDITION
- ACCESSIBLE ROUTE
- SOIL BORING LOCATION (B-#)

DRAINAGE AND UTILITIES LEGEND

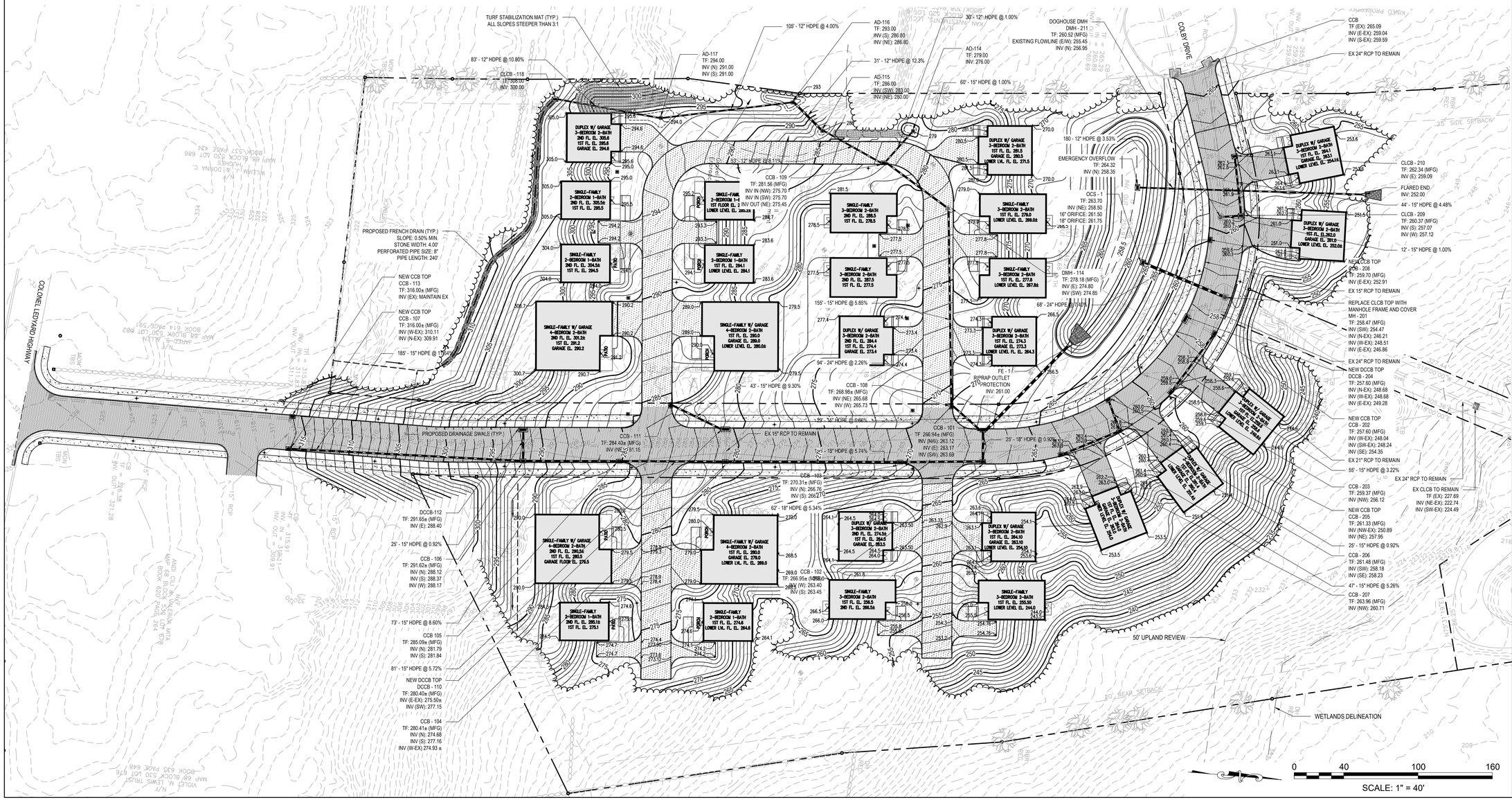
- STORM DRAINAGE PIPE
- CATCH BASIN
- DRAINAGE MANHOLE
- AREA/YARD DRAIN
- TREATMENT UNIT
- ROOF LEADER
- SANITARY MANHOLE
- SAN — SANITARY SEWER
- VENT — VENT LINE
- CLEANOUT
- W — WATER LINE / FIRE LINE
- W — WATER LINE DOMESTIC
- WATER GATE VALVE
- WATER TAPPING SLEEVE
- WATER METER
- ELECTRIC / COMM. DUCT BANK
- E — ELECTRIC / COMM. DUCT BANK
- GAS LINE
- GAS METER
- CO_2 SUPPLY
- COMMUNICATION CONDUITS
- EXISTING DRINKING WATER WELL
- EXISTING LEACHING FIELD
- EXISTING SEPTIC TANK

ACCESSIBILITY NOTES

1. SLOPES ALONG THE ACCESSIBLE ROUTE SHALL BE LESS THAN 1:20 (5%) AND THE CROSS SLOPES SHALL NOT EXCEED 1:50 (2%). CHANGES IN LEVELS SHALL NOT BE GREATER THAN ¼ INCH.
2. LANDINGS SHALL NOT HAVE A SLOPE GREATER THAN 1:50 (2%) IN ANY DIRECTION.
3. SLOPES WITHIN THE ACCESSIBLE PARKING SPACE SHALL NOT EXCEED 1:50 (2%) IN ANY DIRECTION.

DRAINAGE NOTES

1. CONTRACTOR SHALL NOTIFY "CALL BEFORE YOU DIG" (1-800-922-4455) AND VERIFY UTILITY MARK-OUT WITH THE OWNER PRIOR TO THE INITIATION OF ANY SITE DISTURBANCE.
2. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR VERIFICATION OF THE LOCATION AND NATURE OF ALL SUBSURFACE UTILITIES AT THE PROJECT WHICH MAY BE AFFECTED BY THE WORK. COORDINATE WITH RESPECTIVE UTILITY OWNERS AND PERFORM VERIFICATION OF TYPE, LOCATION, AND INVERTS AS REQUIRED.
3. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY AND ALL DISCREPANCIES BETWEEN EXISTING CONDITIONS AND THE CONTRACT DOCUMENTS BEFORE PROCEEDING WITH THAT PORTION OF THE WORK.
4. THE LOCATIONS OF EXISTING SITE FEATURES AS SHOWN HAVE BEEN OBTAINED FROM MAPS, SURVEYS, FIELD INSPECTIONS, AND OTHER AVAILABLE INFORMATION. THEY MUST BE CONSIDERED APPROXIMATE BOTH TO LOCATION, SIZE, AND AS-BUILT CONDITION AND ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ACTUAL FIELD CONDITIONS.
5. THE DIMENSIONS SHOWN ON THE PLANS, INCLUDING THE INTENDED DIMENSIONS OF THE WORK, MAY VARY FROM ACTUAL EXISTING CONDITIONS IN THE FIELD. THE CONTRACTOR SHALL TAKE APPROPRIATE MEASUREMENTS TO VERIFY ALL DIMENSIONS SHOWN ON THE DRAWINGS AS WELL AS OTHER DIMENSIONS HE MAY DEEM APPROPRIATE TO FACILITATE THE COMPLETION OF THE WORK. NOTIFY THE ENGINEER OF ANY DISCREPANCIES BETWEEN EXISTING CONDITIONS AND THE CONTRACT DOCUMENTS BEFORE PROCEEDING WITH THAT PORTION OF THE WORK.
6. UNLESS OTHERWISE INDICATED, ALL DISTURBED AREAS SHALL BE RESTORED WITH SIX (6) INCHES OF LOAM, SEEDED, FERTILIZED, AND MULCHED. PROVIDE ADDITIONAL EROSION CONTROLS AS REQUIRED.
7. COMPLY WITH CONNECTICUT BUILDING CODE FOR ALL SITE CONSTRUCTION, INCLUDING HANDICAPPED ACCESSIBILITY.
8. THE CROSS-SLOPE OF ALL SIDEWALKS AND WALKWAYS SHALL BE LESS THAN 1V:50H (2.00%). UNLESS OTHERWISE INDICATED, THE MAXIMUM RUNNING SLOPE OF ALL SIDEWALKS AND WALKWAYS SHALL BE LESS THAN 1V:20H (5%). VERIFY GRADES AND SLOPES PRIOR TO CONCRETE PLACEMENT. REPORT DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
10. ENGAGE A CONNECTICUT-LICENSED LAND SURVEYOR TO PERFORM LAND-SURVEYING SERVICES REQUIRED, INCLUDING, BUT NOT LIMITED TO VERIFICATION AND LAYOUT OF BASELINES, PROPOSED IMPROVEMENTS, DIMENSIONS AND ELEVATIONS. REPORT DISCREPANCIES TO THE ENGINEER.
11. PROPOSED GRADES INDICATE DESIGN INTENT. VERIFY ELEVATIONS AND MAKE ADJUSTMENTS TO MEET FIELD CONDITIONS. DO NOT PROCEED WITH ANY ADJUSTMENT OR FIELD MODIFICATION UNTIL APPROVED BY THE ENGINEER.
12. GRADE TRANSITION BETWEEN TOPOGRAPHIC LINES AND SPOT GRADES SHALL BE UNIFORM UNLESS OTHERWISE INDICATED.
13. MAXIMUM LANDSCAPE SLOPES SHALL BE 3(H):1(V) UNLESS OTHERWISE INDICATED.
14. ALL DRAINAGE PIPE SHALL BE HIGH DENSITY POLYETHYLENE PIPE (HDPE), UNLESS OTHERWISE INDICATED. SEE SPECIFICATIONS. ALL PROPOSED DRAINAGE PIPE UNDER ROADWAY WITH LESS THAN TWO (2) FEET OF COVER SHALL BE CLASS V RCP.
15. ALL CATCH BASINS SET AGAINST CURBS SHALL BE CONNDOT TYPE "C" AND THOSE NOT AGAINST CURBING SHALL BE CONNDOT TYPE "C-L".
16. GRADE ELEVATIONS ADJACENT BUILDINGS SHALL BE NO HIGHER THAN 8" BELOW FINISH FLOOR EXCEPT AT BUILDING ENTRANCES.
17. AT THE CONCLUSION OF THE WORK, CONTRACTOR SHALL REMOVE ALL ACCUMULATED SEDIMENT MATERIAL FROM ALL PORTIONS OF THE STORM DRAINAGE SYSTEM



Prepared by:

benesch

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120 Hebron Avenue, 2nd Floor
Glastonbury, Connecticut 06033
860-633-8341

Prepared for:

Habitat for Humanity® of Eastern Connecticut

HABITAT FOR HUMANITY RESIDENTIAL DEVELOPMENT LOTS 8, 9 & 11

COLBY DRIVE — LEDYARD, CT

DATE:	REVISION:

KEY PLAN

PROJECT NO.: **0725 500010.00**
SCALE: **AS SHOWN**
DATE: **12/20/2024**
DRAWN BY: **GSL, TRS**
CHECKED BY: **WGW**

GRADING & DRAINAGE PLAN

DRAWING NO.: **C3.0**