Drainage Report

Municipal Parking Lot
501 Main Street, Sturbridge, MA

CHA Project Number: 065470.000

Prepared for:
Town of Sturbridge
308 Main Street
Sturbridge, MA 01566

Prepared by:

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October 29, 2020
Revised December 10, 2020

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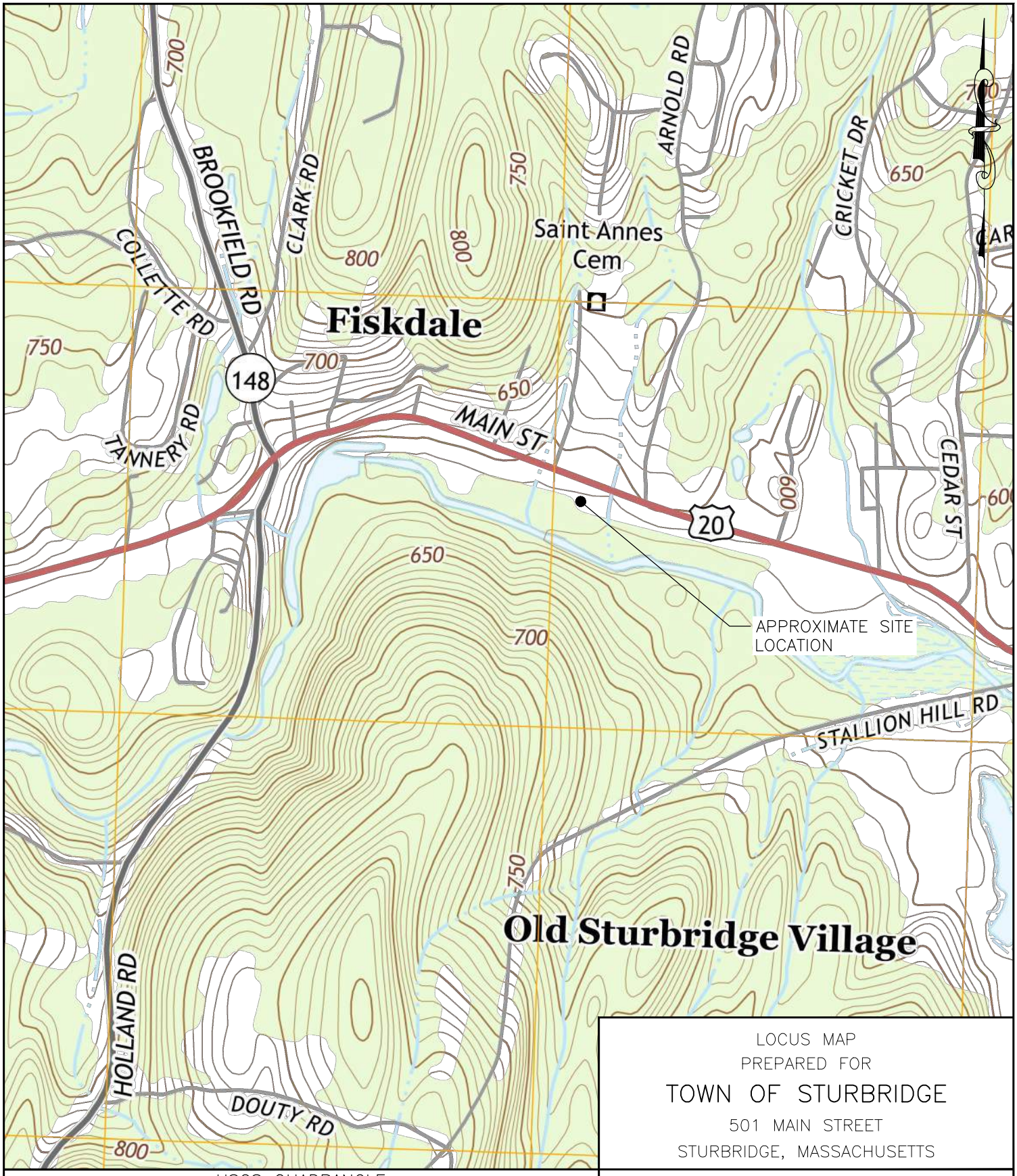
LOCUS & SUMMARY



LOCUS MAP
PREPARED FOR
TOWN OF STURBRIDGE
501 MAIN STREET
STURBRIDGE, MASSACHUSETTS

USGS QUADRANGLE
SOUTHBRIDGE, MA
2015

1000 500 0 1000
GRAPHIC SCALE IN FEET

DATE: 09/29/2020	SCALE: 1" = 1000'	SHEET: 1 OF 1

CHA
33 Wilbur Cross Way, Mansfield, CT 06268
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860-885-1055 | www.chacompanies.com

SUMMARY

The Town of Sturbridge, proposes to construct a new Municipal Parking Lot on a previously developed site, located at 501 Main Street. The location of the site is on the south side of Main Street (Route 20) approximately 500-feet west of the Arnold Road intersection. The majority of storm flows from the existing site flow to the south towards the Quinebaug River, with a smaller area draining to Main Street. Available USDA soils mapping (See Section G) indicates that soils in the proposed development area consist of fine sandy loams with a hydrologic soil group of 'B'.

The proposed project will consist of paved parking, sidewalks, and lighting. Storm flows from the majority of the proposed parking area will be collected by a pair of catch basins and discharged into a proposed rain garden. The remainder of the parking area will sheet flow into the proposed rain garden via a section of flush curb. Overflow from the rain garden will discharge towards the southern boundary and the Quinebaug River, similar to existing conditions. Previous development on the site included approximately 13,120 square feet of impervious area, with no known stormwater treatment systems, and the proposed plan includes 10,210 square feet of impervious area. Therefore, the project qualifies as a Redevelopment Project under Massachusetts Stormwater Standard 7. Water Quality Treatment and Recharge to Groundwater are provided for the proposed parking area and sidewalks pursuant to Standards 1 and 3.

CHA utilized a computer model, HydroCAD®, to perform drainage calculations. The model used the Soil Conservation Service TR-20 method with NOAA 24-hour rainfall data to calculate the runoff. The design points for calculating the existing and proposed peak storm flows are Main Street and the Southern Property Boundary. Calculations for the 2, 10, 25, and 100-year storm events are provided. Peak storm flows for existing and proposed conditions are listed in Table 1-1.

Table 1-1. Existing & Proposed Peak Storm Flows

Storm Event	Existing to Main Street	Proposed to Main Street	Existing to South	Proposed to South
2 Year Storm	0.2 cfs	0 cfs	1.0 cfs	0.5 cfs
10 Year Storm	0.3 cfs	0 cfs	1.9 cfs	1.8 cfs
25 Year Storm	0.4 cfs	0 cfs	2.4 cfs	2.3 cfs
100 Year Storm	0.5 cfs	0 cfs	3.2 cfs	3.2 cfs

Peak Flows to both Design Points will be reduced or maintained through the 100-year storm event.

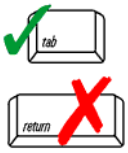
MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION CHECKLIST FOR STORMWATER REPORT

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

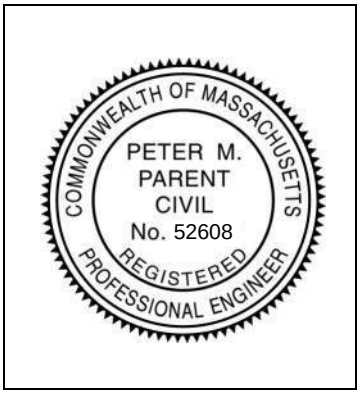
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



10/29/2020

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- [X] No disturbance to any Wetland Resource Areas
- [ ] Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- [X] Reduced Impervious Area (Redevelopment Only)
- [ ] Minimizing disturbance to existing trees and shrubs
- [ ] LID Site Design Credit Requested:
  - [ ] Credit 1
  - [ ] Credit 2
  - [ ] Credit 3
- [ ] Use of "country drainage" versus curb and gutter conveyance and pipe
- [X] Bioretention Cells (includes Rain Gardens)
- [ ] Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- [ ] Treebox Filter
- [ ] Water Quality Swale
- [X] Grass Channel
- [ ] Green Roof
- [ ] Other (describe): _____

Standard 1: No New Untreated Discharges

- [X] No new untreated discharges
- [X] Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- [X] Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☐ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☒ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☒ The NPDES Multi-Sector General Permit does ***not*** cover the land use. Under 1/2 Acre of Disturbance

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☒ The project is ***not*** covered by a NPDES Construction General Permit. Under 1/2 Acre of Disturbance

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

ILLICIT DISCHARGE COMPLIANCE STATEMENT

501 Main Street, Sturbridge, MA – Proposed Municipal Parking Lot

In accordance with Massachusetts Stormwater Standard 10:

- There are no known existing or any proposed non-stormwater connections to the site's stormwater management system.
- The Operation and Maintenance Plan is designed to prevent discharge of non-stormwater to the stormwater management system.
- Any Illicit Discharges identified during or after construction will be immediately disconnected.

WATER QUALITY VOLUME, GROUNWATER RECHARGE VOLUME, & TSS REMOVAL CALCULATIONS

Water Quality Volume

Project Name: 501 Main Street Parking Project # 065470

Date: October 29, 2020

Following Guidelines From "Massachusetts Stormwater Management Technical Handbook"

Standard 4
Eqn. 3

$V_{WQ} = (D_{WQ} / 12) * (A_{IMP})$

Where:

V_{WQ} = Required Water Quality Volume (cu-ft)

D_{WG} = Water Quality Depth (ft)

A_{IMP} = Impervious Area (sf)

Rain Garden

D_{WG} = 0.5 inches

Areas From AutoCAD

	SQ. FT	Acres
Impervious	9,970	0.229
Pervious	7,480	0.172
Total (A)	17,450	0.401

WQV REQUIRED = **415 cf**

WQV PROVIDED= **606 cf** at Elev 583.85

Prepared By: PMP Checked By: C. EATON

Stage-Area-Storage for Pond 21P: Rain Garden

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
583.00	490	0
583.02	499	10
583.04	509	20
583.06	518	30
583.08	528	41
583.10	537	51
583.12	547	62
583.14	557	73
583.16	567	84
583.18	577	96
583.20	587	108
583.22	597	119
583.24	608	131
583.26	618	144
583.28	628	156
583.30	639	169
583.32	650	182
583.34	660	195
583.36	671	208
583.38	682	222
583.40	693	235
583.42	704	249
583.44	715	264
583.46	726	278
583.48	738	293
583.50	749	307
583.52	761	323
583.54	772	338
583.56	784	353
583.58	796	369
583.60	808	385
583.62	819	402
583.64	831	418
583.66	844	435
583.68	856	452
583.70	868	469
583.72	880	487
583.74	893	504
583.76	905	522
583.78	918	541
583.80	931	559
583.82	944	578
583.84	957	597
583.86	970	616
583.88	983	636
583.90	996	655
583.92	1,009	675
583.94	1,022	696
583.96	1,036	716
583.98	1,049	737
584.00	**1,063**	758
584.02	1,063	779

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
584.04	1,063	801
584.06	1,063	822
584.08	1,063	843
584.10	1,063	865
584.12	1,063	886
584.14	1,063	907
584.16	1,063	928
584.18	1,063	950
584.20	1,063	971
584.22	1,063	992
584.24	1,063	1,013
584.26	1,063	1,035
584.28	1,063	1,056
584.30	1,063	1,077
584.32	1,063	1,098
584.34	1,063	1,120
584.36	1,063	1,141
584.38	1,063	1,162
584.40	1,063	1,183
584.42	1,063	1,205
584.44	1,063	1,226
584.46	1,063	1,247
584.48	1,063	1,268
584.50	1,063	1,290
584.52	1,063	1,311
584.54	1,063	1,332
584.56	1,063	1,354
584.58	1,063	1,375
584.60	1,063	1,396
584.62	1,063	1,417
584.64	1,063	1,439
584.66	1,063	1,460
584.68	1,063	1,481
584.70	1,063	1,502
584.72	1,063	1,524
584.74	1,063	1,545
584.76	1,063	1,566
584.78	1,063	1,587
584.80	1,063	1,609
584.82	1,063	1,630
584.84	1,063	1,651
584.86	1,063	1,672
584.88	1,063	1,694
584.90	1,063	1,715
584.92	1,063	1,736
584.94	1,063	1,757
584.96	1,063	1,779
584.98	1,063	1,800
585.00	1,063	**1,821**

RECHARGE VOLUME

Project Name: 501 Main Street Parking Project # 065470

Date: October 29, 2020

Following Guidelines From "Massachusetts Stormwater Management Technical Handbook"

Recharge Volume

Rv = F * Impervious Area

Where:

Rv = Required Recharge Volume

F = Target Depth Factor

Areas From AutoCAD	Hydrologic Soil Group	Recharge Factor	Acres
	A	0.60	0.000
	B	0.35	0.234
	C	0.25	0.000
	D	0.10	0.000

Rv REQUIRED = 0.007 ac ft

297 cf

Available Storage

Volumes From HydroCAD: Rain Garden to Elev. 583.85 → 606 cu.ft.

Total Available Storage = **606** cu.ft.

606 ≥ 297

Drawdown

T = Rv / K (Btm Area)

Where:

T = Time (hrs)

Rv = Required Recharge Volume

K = Saturated Hydraulic Conductivity

Table 2.3.3
K=Rawls Rates for Type "C" Silt Loam

T = 606 / (0.27 * (490 / 12))

T = **55.0 hrs**

55.0 ≤ 72

Prepared By: PMP Checked By: C. EATON

RAWL'S RATES

Excerpt From "Massachusetts Stormwater Management Technical Handbook",
Volume 3: Documenting Compliance

Table 2.3.3 1982 Rawls Rates

Texture Class	NRCS Hydrologic Soil Group	Infiltration Rate (Inches/Hour)
Sand	A	8.27
Loamy Sand	A	2.41
Sandy Loam	B	1.02
Loam	B	0.52
Silt Loam	C	0.27
Sandy Clay Loam	C	0.17
Clay Loam	D	0.09
Silty Clay Loam	D	0.06
Sandy Clay	D	0.05
Silty Clay	D	0.04
Clay	D	0.02

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: 501 Main Street

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Bioretention Area	**0.90**	**1.00**	**0.90**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**

Total TSS Removal = **90%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

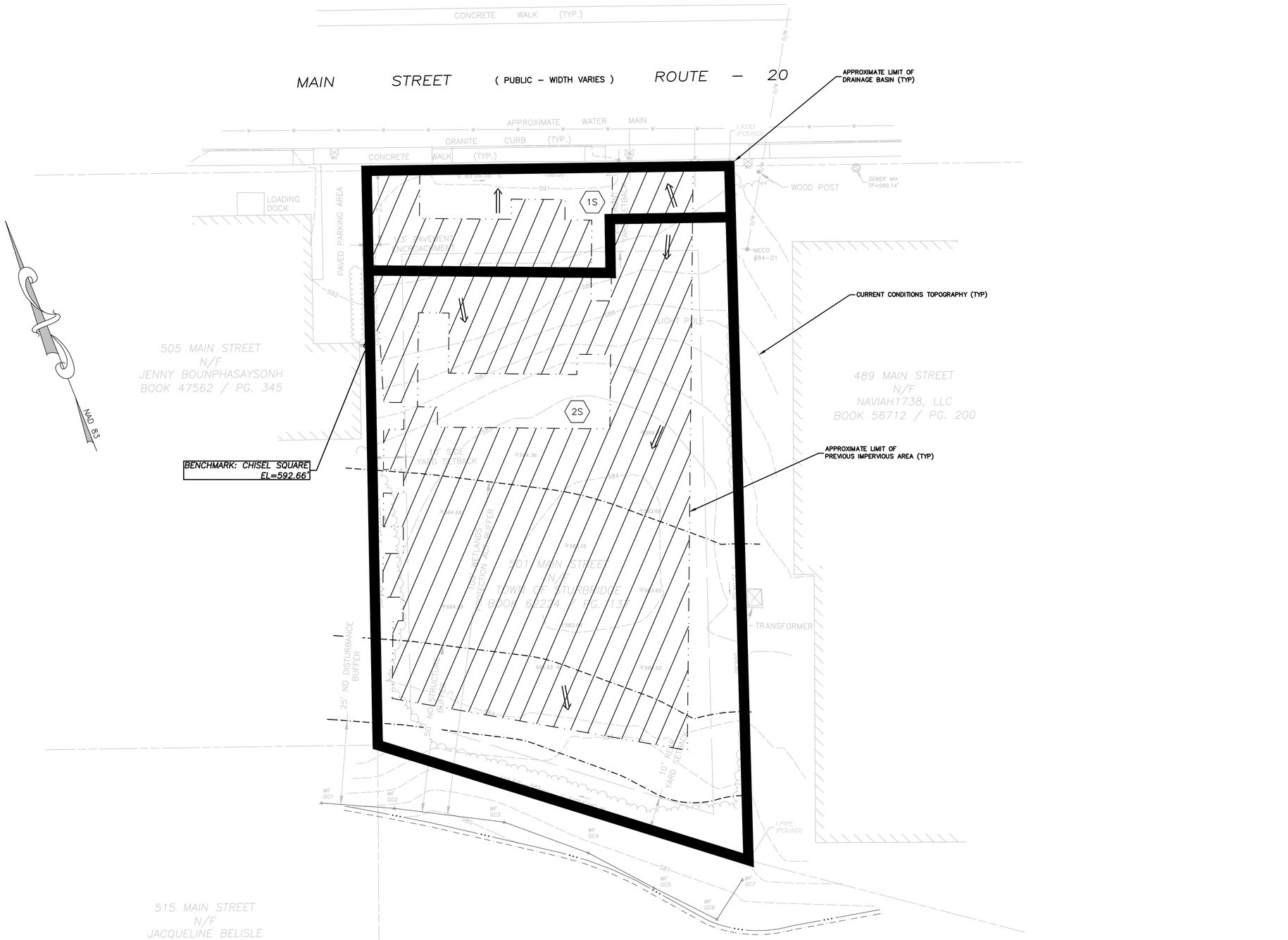
Project: **Municipal Parking Lot**
Prepared By: **P.Parent**
Date: **12/10/2020**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

EXISTING CONDITIONS DRAINAGE CALCULATIONS



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33 Wilbur Cross Way, Mansfield, CT 06268
101 East River Drive, 1st Floor
East Hartford, CT 06108
860-885-1055 | www.chacompanies.com

SITE DEVELOPMENT PLAN
PREPARED FOR:

TOWN OF STURBRIDGE

501 MAIN STREET
STURBRIDGE, MA

No.	Submittal / Revision	App'd.	By	Date

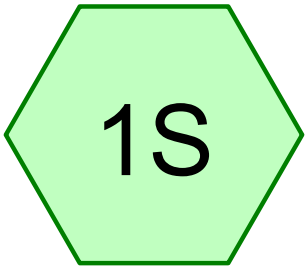
EXISTING CONDITIONS
DRAINAGE BASIN MAP

Designed By:	Drawn By:	Checked By:
PMP	ZBC/PMP	
Issue Date:	Project No:	Scale:
10/29/2020	065470	1" = 15'

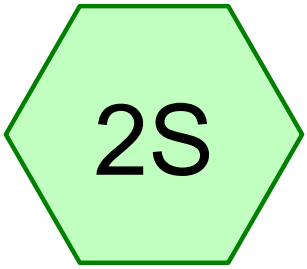
Drawing No.:

SHEET 1 OF 2

File: U:\MUNI_MA\STURBRIDGE\065470_-STURBRIDGE_PARKING_LOT_DESIGN\DWG\065470_DBM.DWG



Existing to Main Street



Existing to Southern Boundary

Subcat Reach Pond Link

Routing Diagram for 501 Main Street Parking
Prepared by CHA Companies, Inc., Printed 10/26/2020

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
6,840	61	>75% Grass cover, Good, HSG B (1S, 2S)
13,120	98	Roofs & Pavement (1S, 2S)
1,085	55	Woods, Good, HSG B (2S)
21,045	**84**	**TOTAL AREA**

Summary for Subcatchment 1S: Existing to Main Street

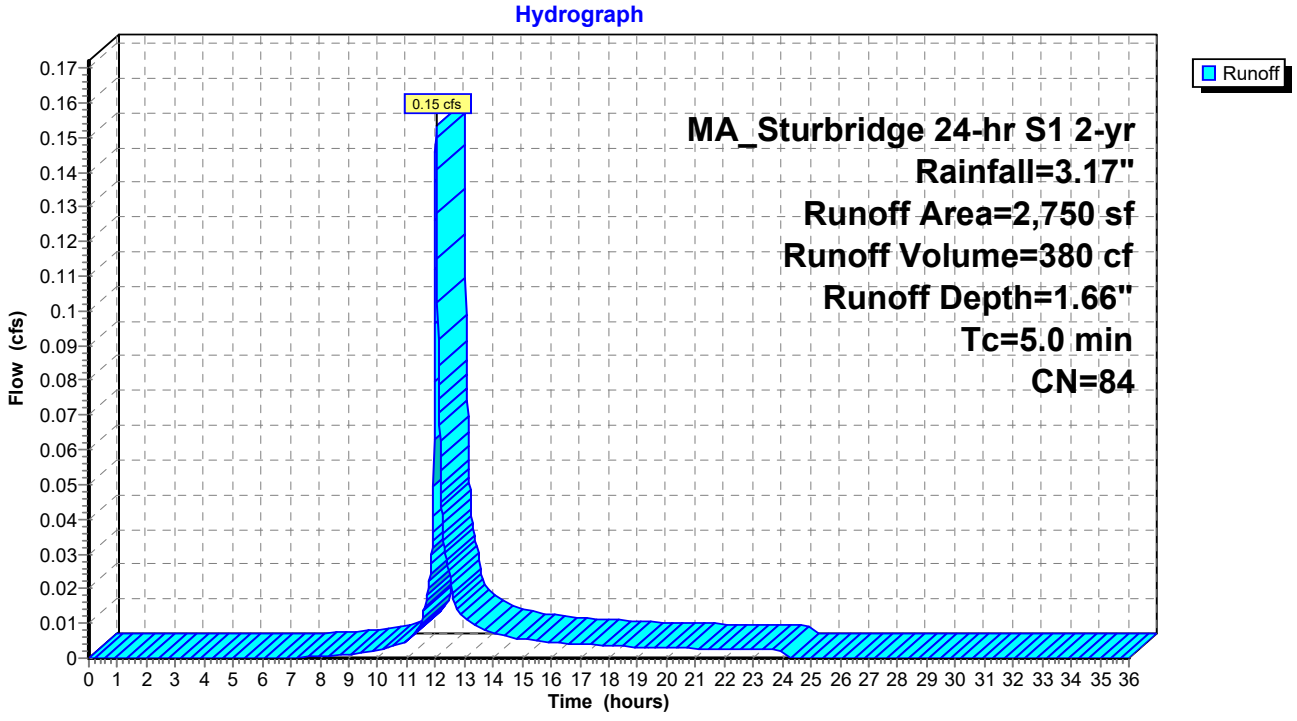
Runoff = 0.15 cfs @ 12.03 hrs, Volume= 380 cf, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MA_Sturbridge 24-hr S1 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
*	1,725	98	Roofs & Pavement
	1,025	61	>75% Grass cover, Good, HSG B
	2,750	84	Weighted Average
	1,025		37.27% Pervious Area
	1,725		62.73% Impervious Area

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

Subcatchment 1S: Existing to Main Street



Summary for Subcatchment 2S: Existing to Southern Boundary

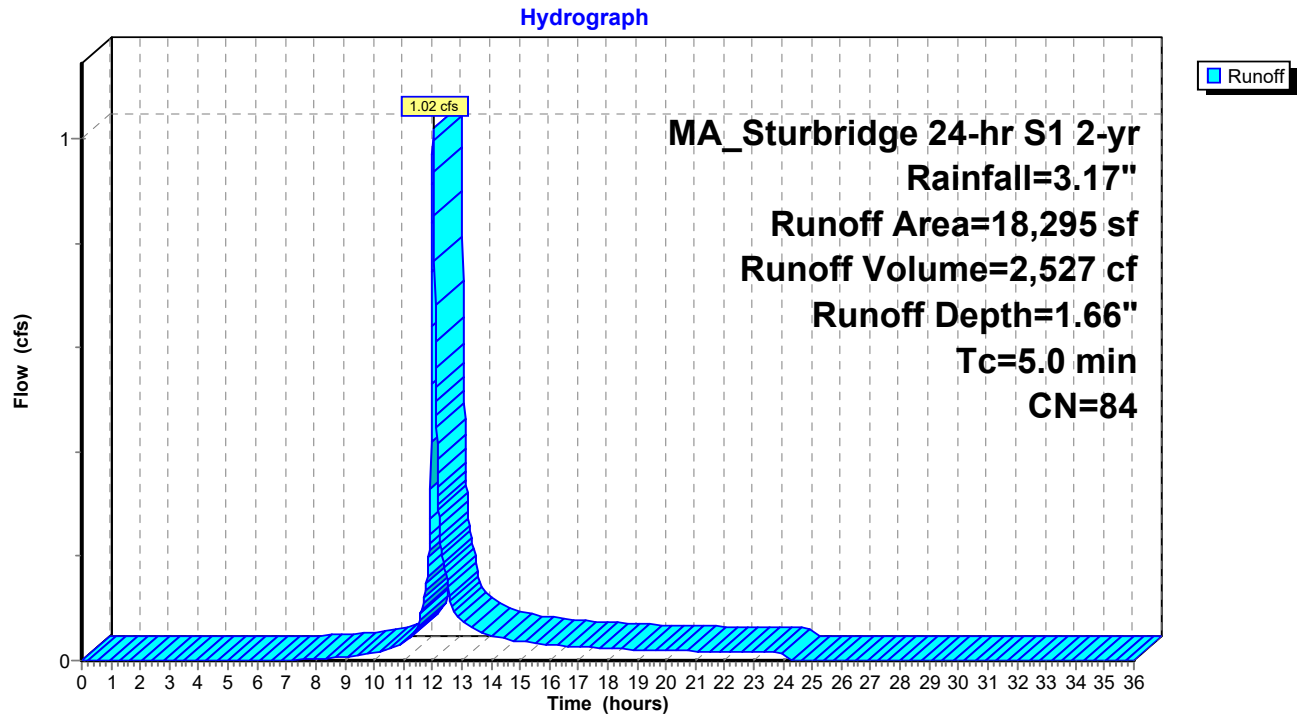
Runoff = 1.02 cfs @ 12.03 hrs, Volume= 2,527 cf, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MA_Sturbridge 24-hr S1 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
*	11,395	98	Roofs & Pavement
	5,815	61	>75% Grass cover, Good, HSG B
	1,085	55	Woods, Good, HSG B
	18,295	84	Weighted Average
	6,900		37.72% Pervious Area
	11,395		62.28% Impervious Area

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

Subcatchment 2S: Existing to Southern Boundary



Summary for Subcatchment 1S: Existing to Main Street

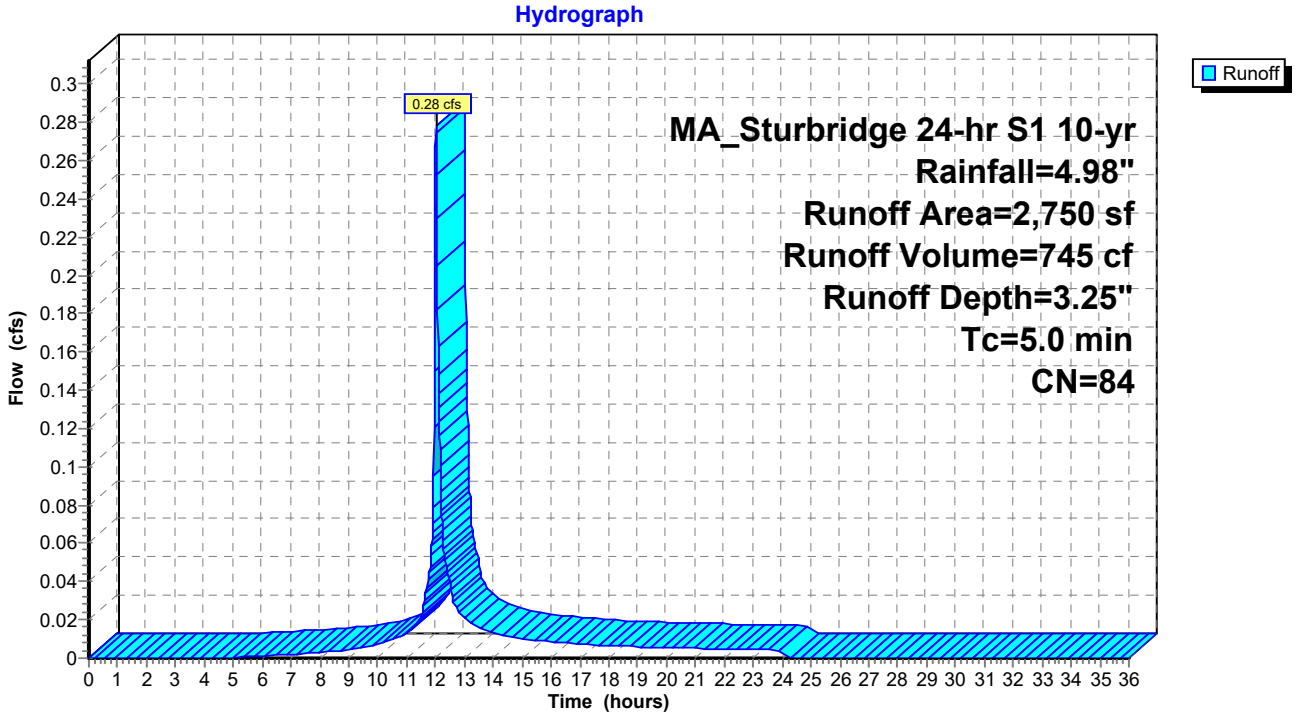
Runoff = 0.28 cfs @ 12.03 hrs, Volume= 745 cf, Depth= 3.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MA_Sturbridge 24-hr S1 10-yr Rainfall=4.98"

	Area (sf)	CN	Description
*	1,725	98	Roofs & Pavement
	1,025	61	>75% Grass cover, Good, HSG B
	2,750	84	Weighted Average
	1,025		37.27% Pervious Area
	1,725		62.73% Impervious Area

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

Subcatchment 1S: Existing to Main Street



Summary for Subcatchment 2S: Existing to Southern Boundary

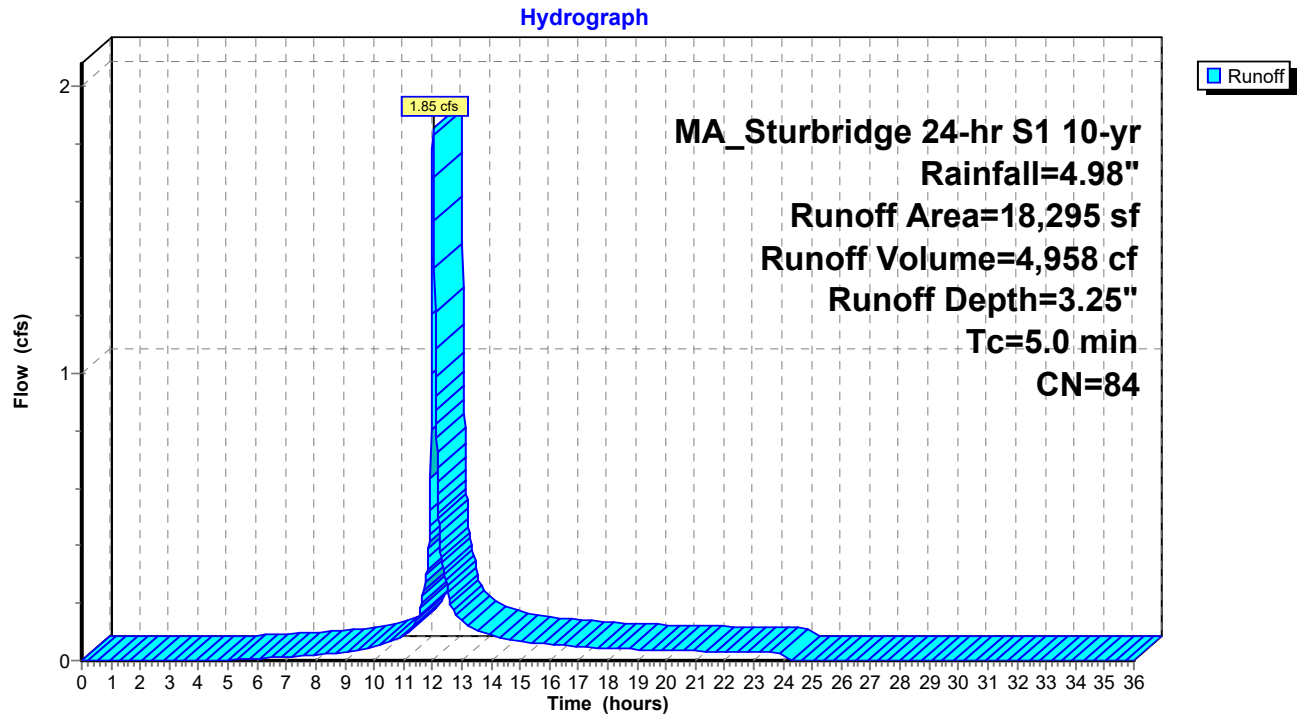
Runoff = 1.85 cfs @ 12.03 hrs, Volume= 4,958 cf, Depth= 3.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MA_Sturbridge 24-hr S1 10-yr Rainfall=4.98"

	Area (sf)	CN	Description
*	11,395	98	Roofs & Pavement
	5,815	61	>75% Grass cover, Good, HSG B
	1,085	55	Woods, Good, HSG B
	18,295	84	Weighted Average
	6,900		37.72% Pervious Area
	11,395		62.28% Impervious Area

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

Subcatchment 2S: Existing to Southern Boundary



Summary for Subcatchment 1S: Existing to Main Street

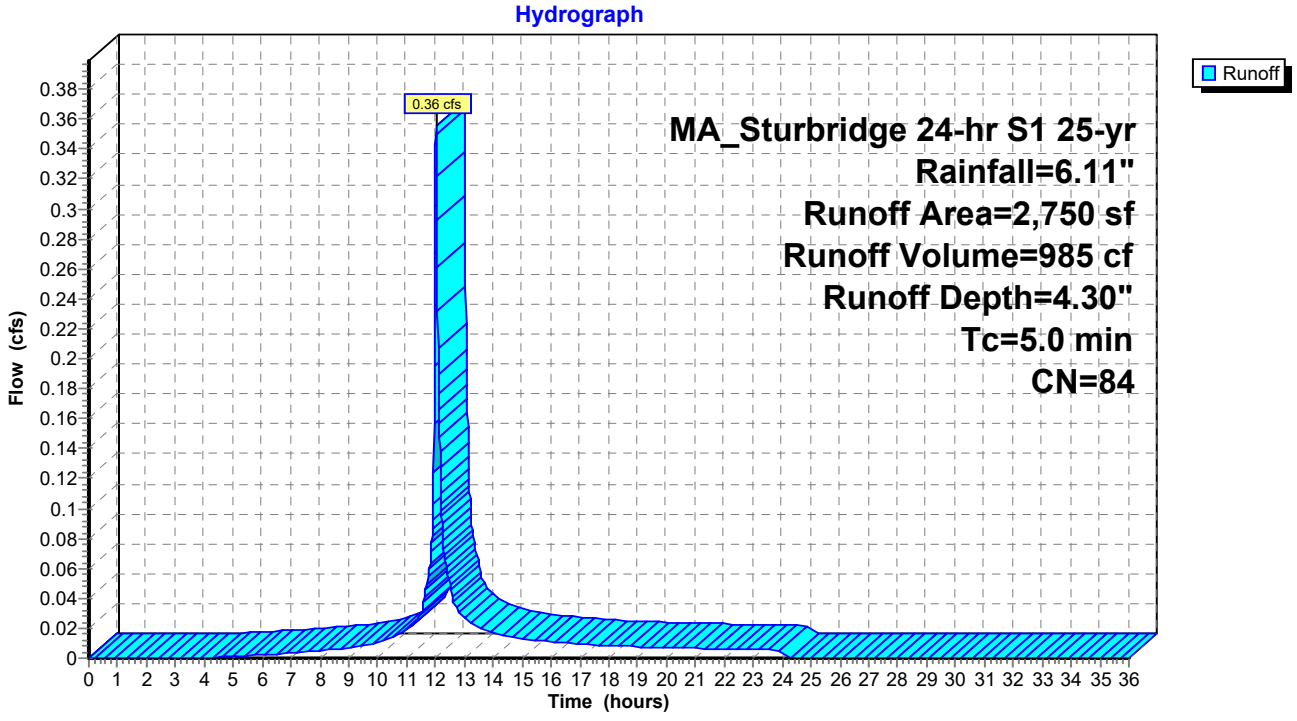
Runoff = 0.36 cfs @ 12.03 hrs, Volume= 985 cf, Depth= 4.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MA_Sturbridge 24-hr S1 25-yr Rainfall=6.11"

	Area (sf)	CN	Description
*	1,725	98	Roofs & Pavement
	1,025	61	>75% Grass cover, Good, HSG B
	2,750	84	Weighted Average
	1,025		37.27% Pervious Area
	1,725		62.73% Impervious Area

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

Subcatchment 1S: Existing to Main Street



Summary for Subcatchment 2S: Existing to Southern Boundary

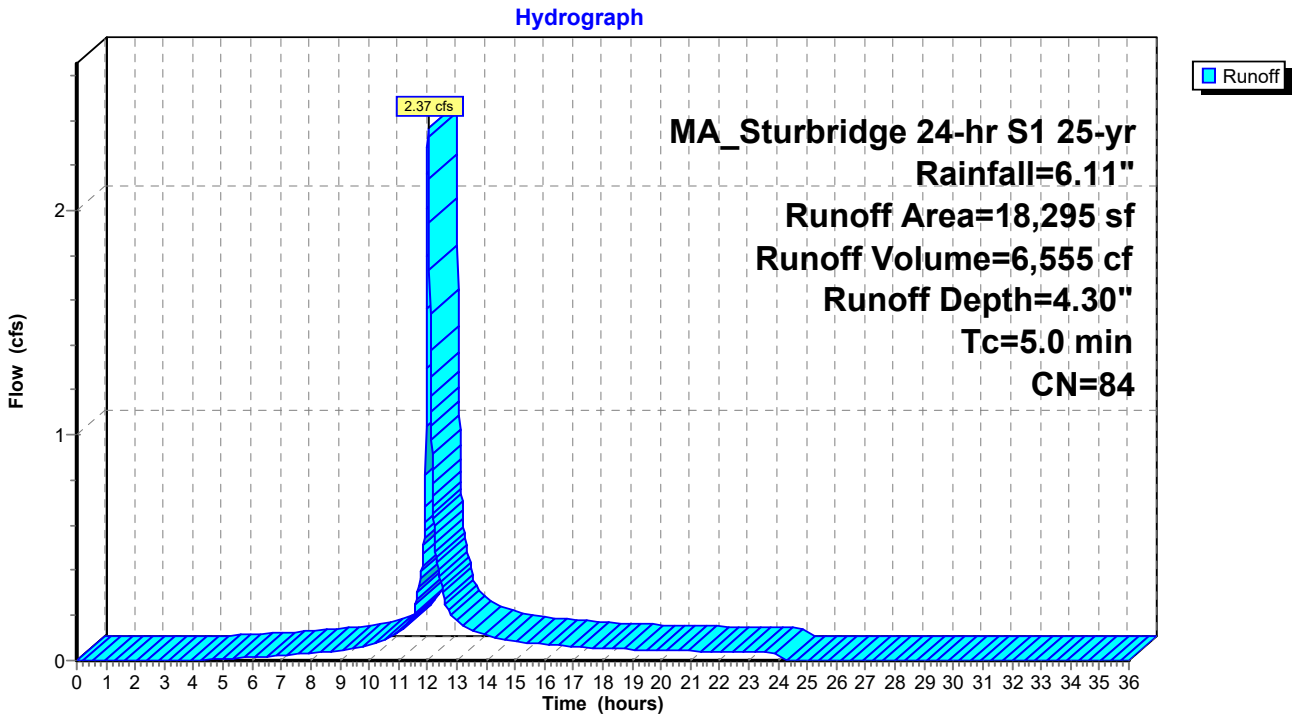
Runoff = 2.37 cfs @ 12.03 hrs, Volume= 6,555 cf, Depth= 4.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MA_Sturbridge 24-hr S1 25-yr Rainfall=6.11"

	Area (sf)	CN	Description
*	11,395	98	Roofs & Pavement
	5,815	61	>75% Grass cover, Good, HSG B
	1,085	55	Woods, Good, HSG B
	18,295	84	Weighted Average
	6,900		37.72% Pervious Area
	11,395		62.28% Impervious Area

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

Subcatchment 2S: Existing to Southern Boundary



Summary for Subcatchment 1S: Existing to Main Street

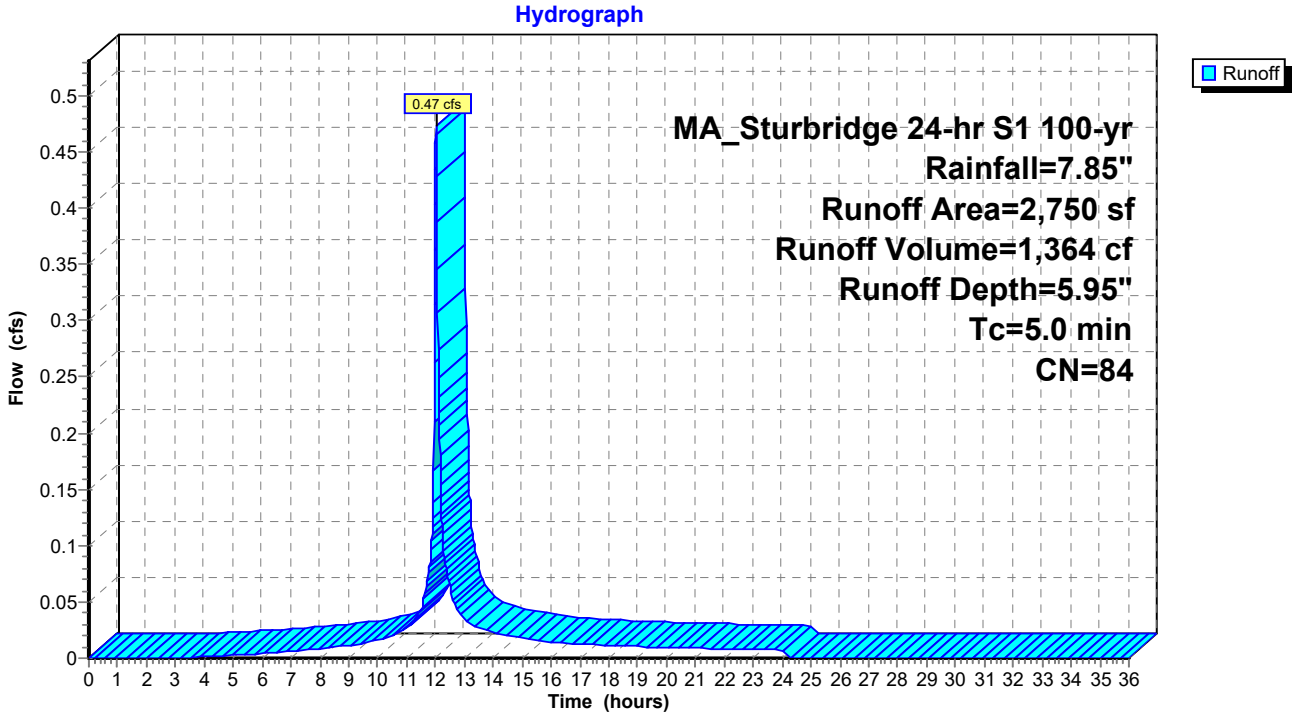
Runoff = 0.47 cfs @ 12.03 hrs, Volume= 1,364 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MA_Sturbridge 24-hr S1 100-yr Rainfall=7.85"

	Area (sf)	CN	Description
*	1,725	98	Roofs & Pavement
	1,025	61	>75% Grass cover, Good, HSG B
	2,750	84	Weighted Average
	1,025		37.27% Pervious Area
	1,725		62.73% Impervious Area

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

Subcatchment 1S: Existing to Main Street



Summary for Subcatchment 2S: Existing to Southern Boundary

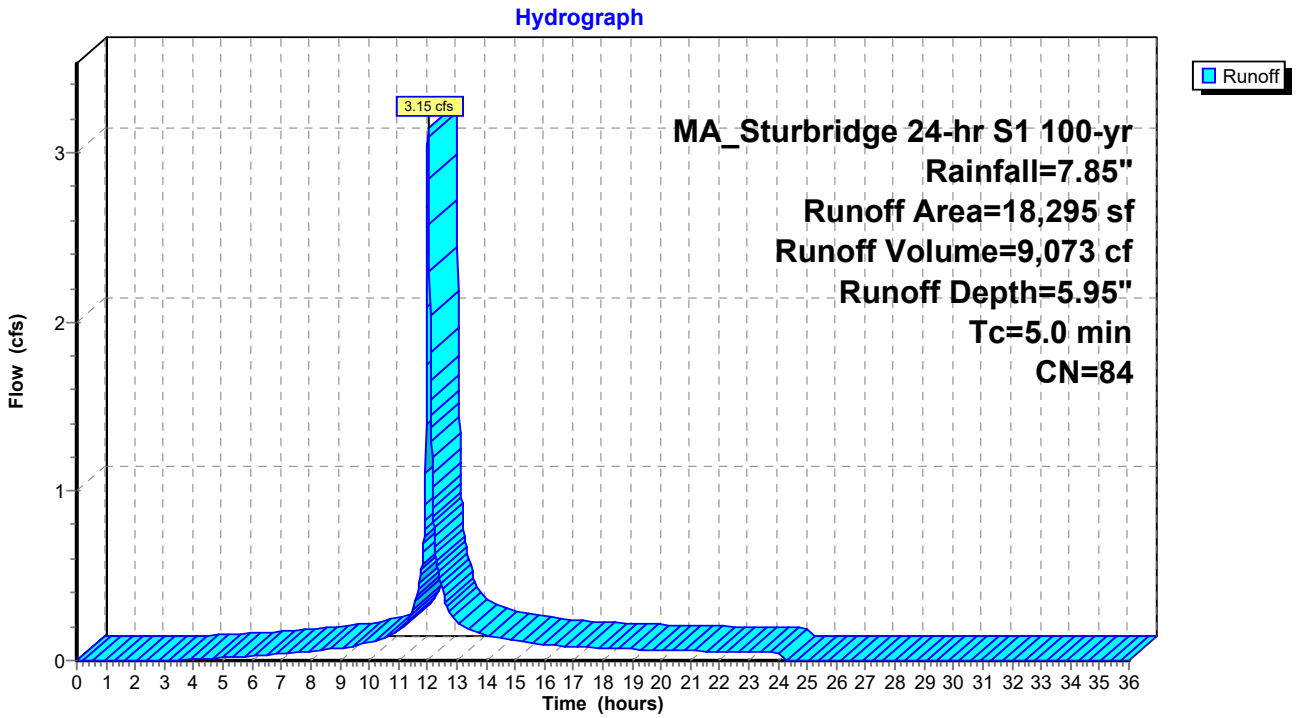
Runoff = 3.15 cfs @ 12.03 hrs, Volume= 9,073 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MA_Sturbridge 24-hr S1 100-yr Rainfall=7.85"

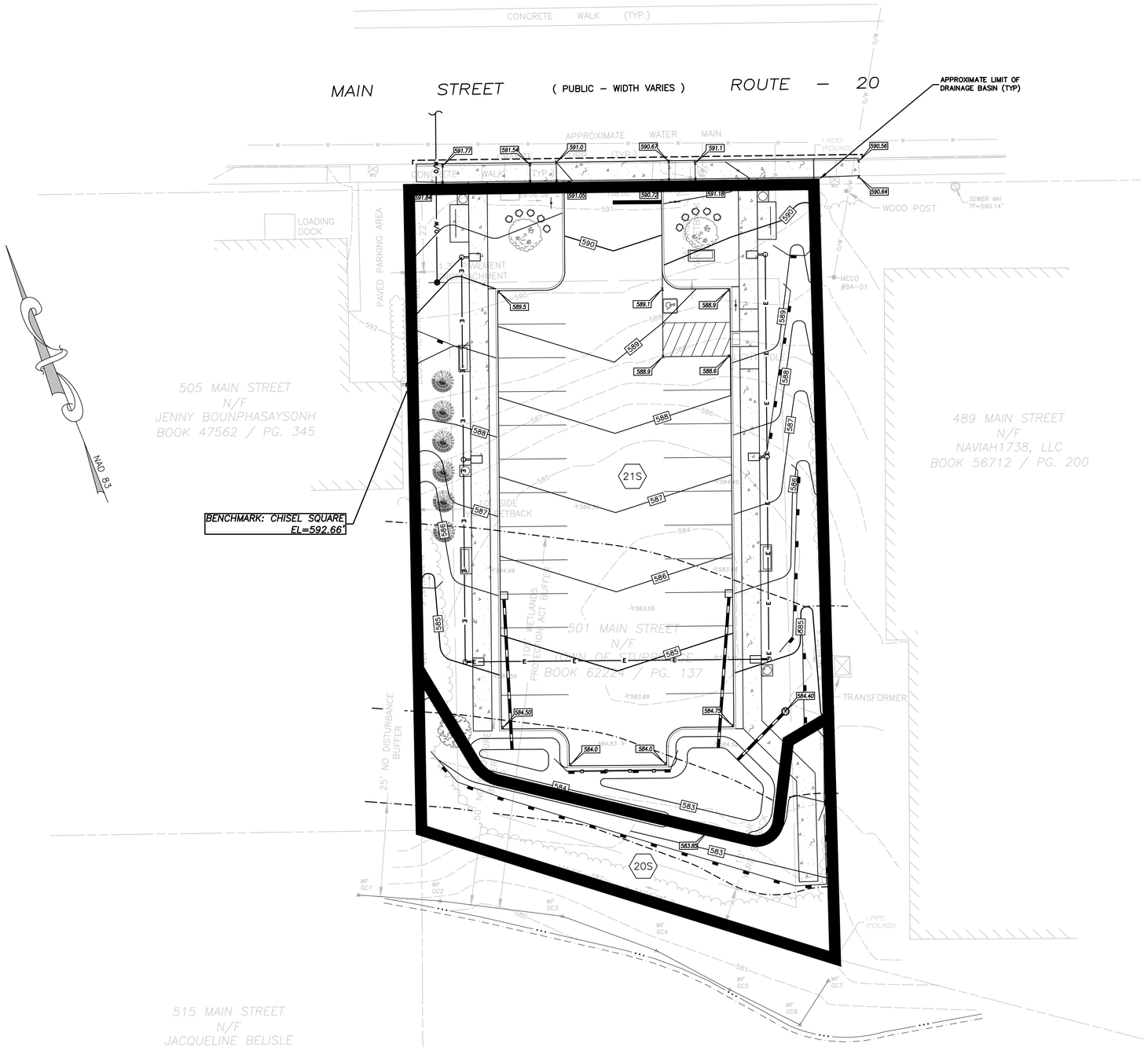
	Area (sf)	CN	Description
*	11,395	98	Roofs & Pavement
	5,815	61	>75% Grass cover, Good, HSG B
	1,085	55	Woods, Good, HSG B
	18,295	84	Weighted Average
	6,900		37.72% Pervious Area
	11,395		62.28% Impervious Area

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

Subcatchment 2S: Existing to Southern Boundary



PROPOSED CONDITIONS DRAINAGE CALCULATIONS



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SITE DEVELOPMENT PLAN
PREPARED FOR:

TOWN OF STURBRIDGE

501 MAIN STREET
STURBRIDGE, MA

No.	Submittal / Revision	App'd.	By	Date

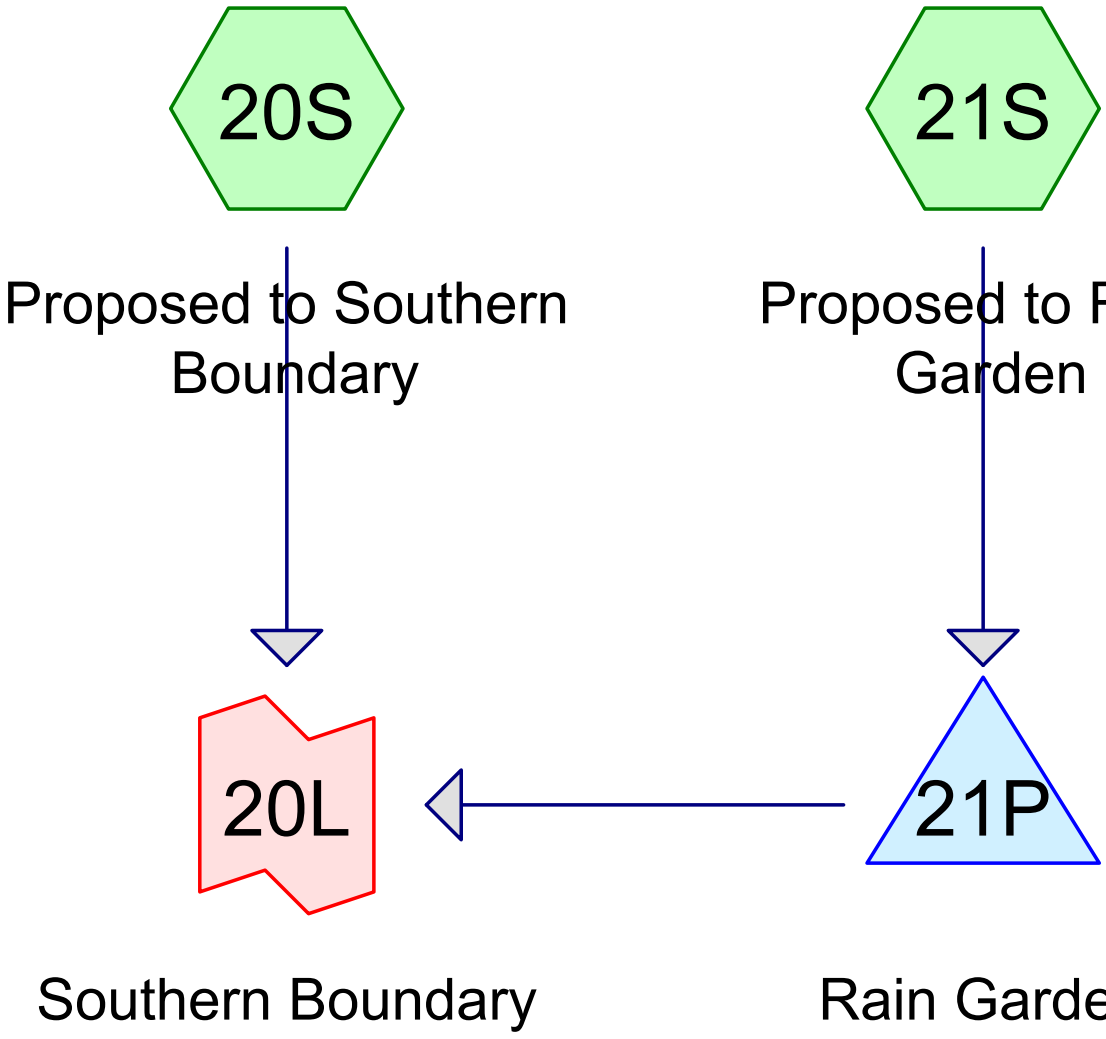
PROPOSED CONDITIONS
DRAINAGE BASIN MAP

Designed By:	Drawn By:	Checked By:
PMP	ZBC/PMP	
Issue Date:	Project No:	Scale:
09/29/2020	065470	1" = 15'

Drawing No.:

SHEET 2 OF 2

File: U:\MUNI_MA\STURBRIDGE\065470_STURBRIDGE_PARKING_LOT_DESIGN\DWG\065470_DBM.DWG



Subcat Reach Pond Link

Routing Diagram for 501 Main Street Parking
Prepared by CHA Companies, Inc., Printed 10/26/2020

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
9,795	61	>75% Grass cover, Good, HSG B (20S, 21S)
8,460	98	Paved (21S)
1,750	98	Sidewalk (20S, 21S)
1,040	55	Woods, Good, HSG B (20S)
21,045	**79**	**TOTAL AREA**

Summary for Subcatchment 20S: Proposed to Southern Boundary

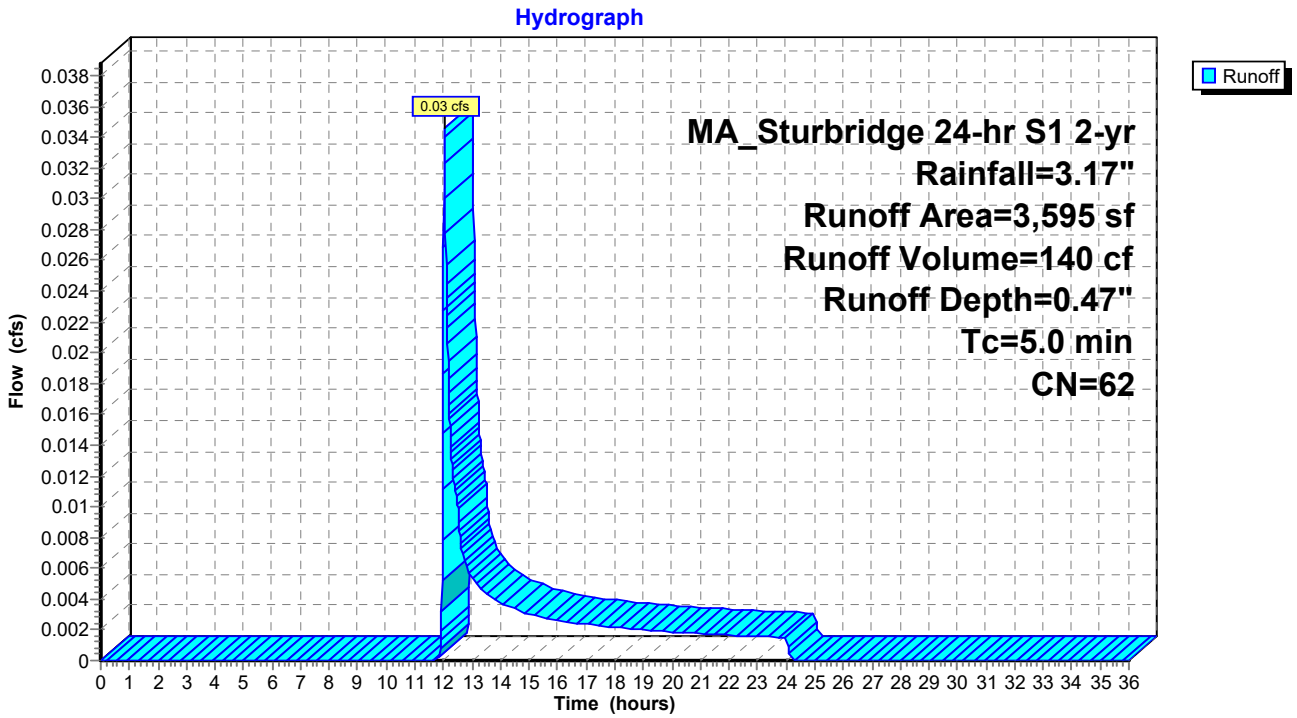
Runoff = 0.03 cfs @ 12.04 hrs, Volume= 140 cf, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MA_Sturbridge 24-hr S1 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
*	240	98	Sidewalk
	2,315	61	>75% Grass cover, Good, HSG B
	1,040	55	Woods, Good, HSG B
	3,595	62	Weighted Average
	3,355		93.32% Pervious Area
	240		6.68% Impervious Area

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

Subcatchment 20S: Proposed to Southern Boundary



Summary for Subcatchment 21S: Proposed to Rain Garden

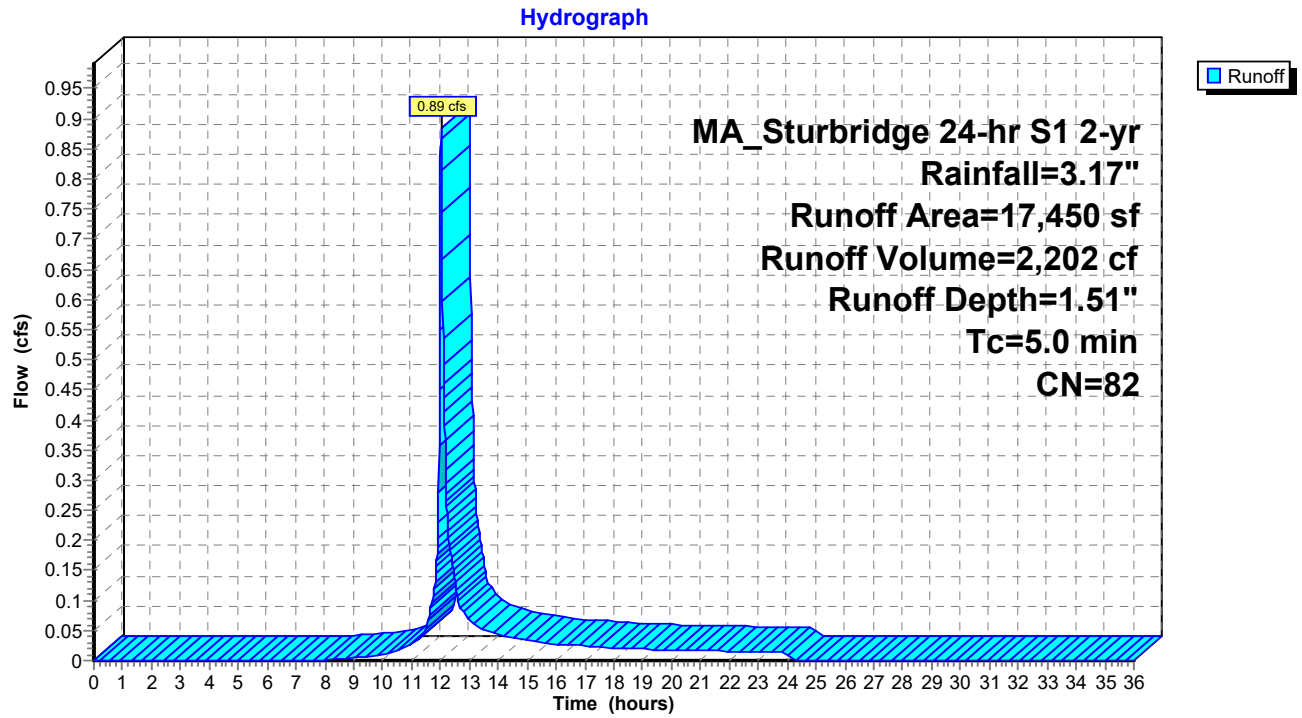
Runoff = 0.89 cfs @ 12.03 hrs, Volume= 2,202 cf, Depth= 1.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MA_Sturbridge 24-hr S1 2-yr Rainfall=3.17"

	Area (sf)	CN	Description
*	8,460	98	Paved
*	1,510	98	Sidewalk
	7,480	61	>75% Grass cover, Good, HSG B
	17,450	82	Weighted Average
	7,480		42.87% Pervious Area
	9,970		57.13% Impervious Area

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

Subcatchment 21S: Proposed to Rain Garden



Summary for Pond 21P: Rain Garden

Inflow Area = 17,450 sf, 57.13% Impervious, Inflow Depth = 1.51" for 2-yr event
Inflow = 0.89 cfs @ 12.03 hrs, Volume= 2,202 cf
Outflow = 0.52 cfs @ 12.09 hrs, Volume= 1,595 cf, Atten= 42%, Lag= 4.0 min
Primary = 0.52 cfs @ 12.09 hrs, Volume= 1,595 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 583.91' @ 12.09 hrs Surf.Area= 1,000 sf Storage= 662 cf

Plug-Flow detention time= 178.4 min calculated for 1,595 cf (72% of inflow)
Center-of-Mass det. time= 66.9 min (924.9 - 858.0)

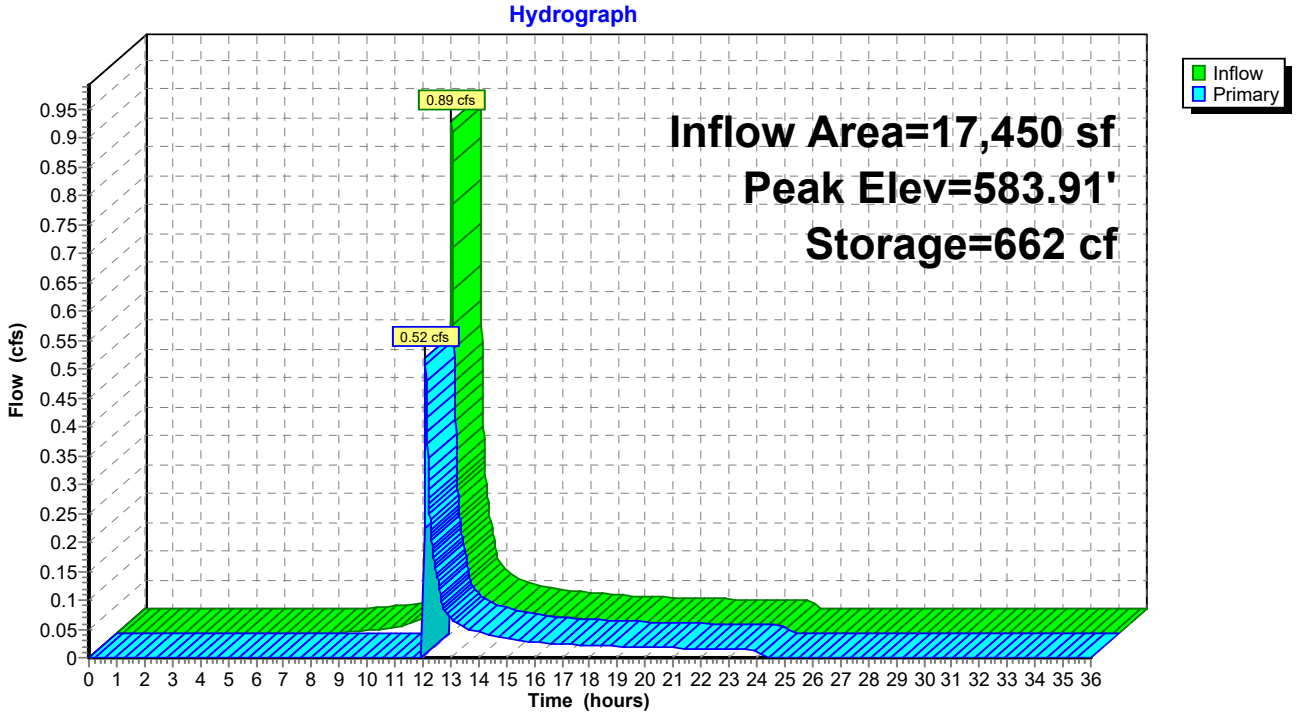
Volume	Invert	Avail.Storage	Storage Description
#1	583.00'	1,821 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
583.00	490	105.6	0	0	490
584.00	1,063	197.1	758	758	2,699
585.00	1,063	197.1	1,063	1,821	2,896

Device	Routing	Invert	Outlet Devices
#1	Primary	583.85'	**15.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.51 cfs @ 12.09 hrs HW=583.91' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.51 cfs @ 0.60 fps)

Pond 21P: Rain Garden

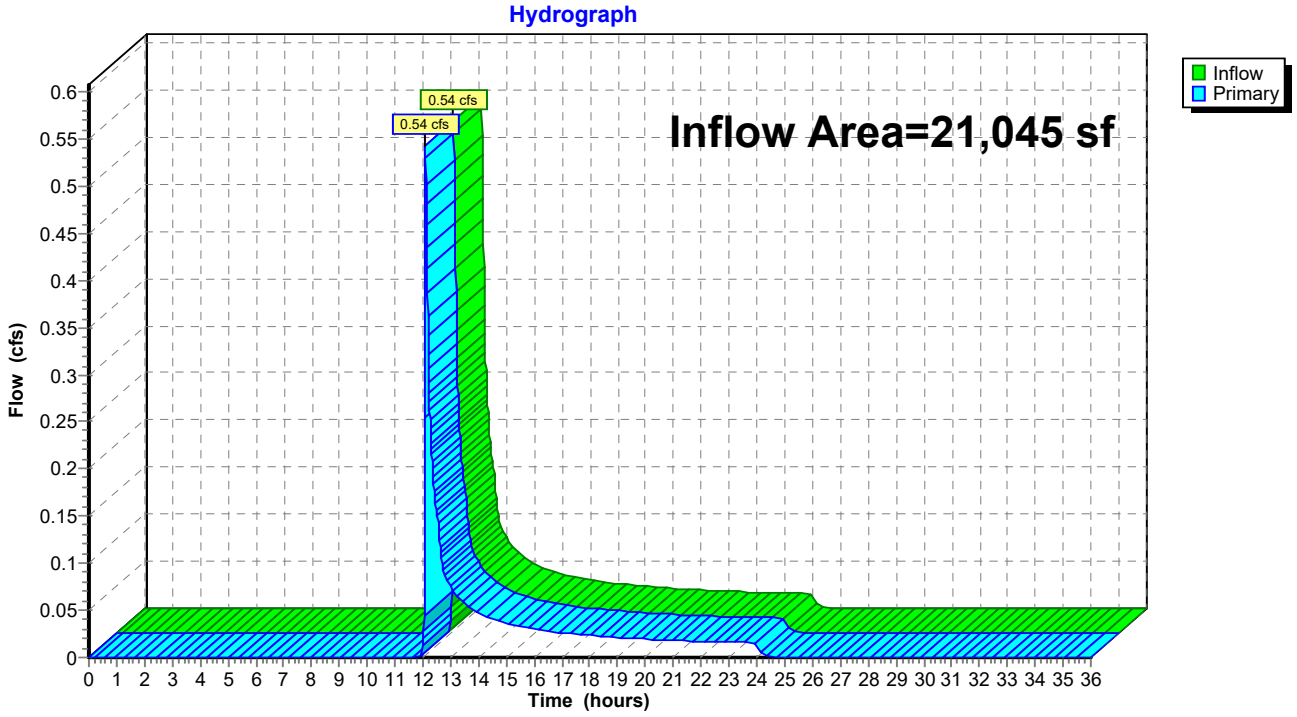


Summary for Link 20L: Southern Boundary

Inflow Area = 21,045 sf, 48.52% Impervious, Inflow Depth = 0.99" for 2-yr event
Inflow = 0.54 cfs @ 12.09 hrs, Volume= 1,736 cf
Primary = 0.54 cfs @ 12.09 hrs, Volume= 1,736 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 20L: Southern Boundary



Summary for Subcatchment 20S: Proposed to Southern Boundary

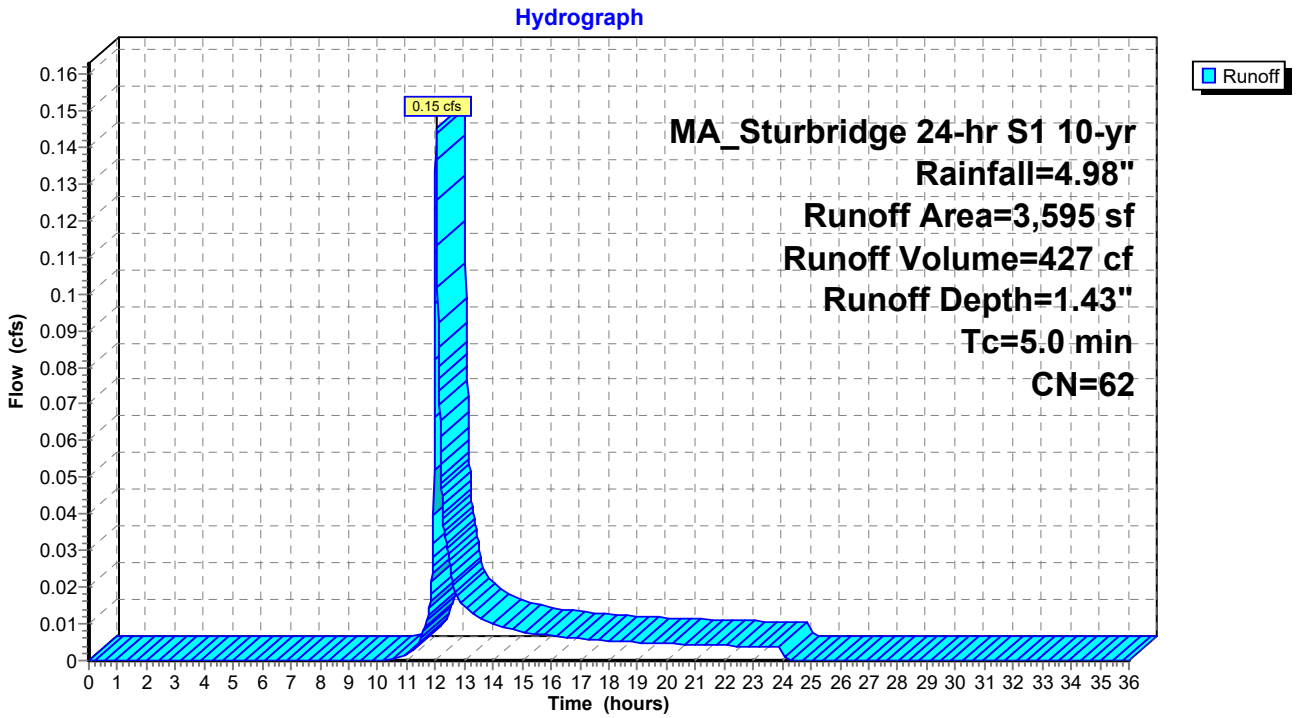
Runoff = 0.15 cfs @ 12.03 hrs, Volume= 427 cf, Depth= 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MA_Sturbridge 24-hr S1 10-yr Rainfall=4.98"

	Area (sf)	CN	Description
*	240	98	Sidewalk
	2,315	61	>75% Grass cover, Good, HSG B
	1,040	55	Woods, Good, HSG B
	3,595	62	Weighted Average
	3,355		93.32% Pervious Area
	240		6.68% Impervious Area

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

Subcatchment 20S: Proposed to Southern Boundary



Summary for Subcatchment 21S: Proposed to Rain Garden

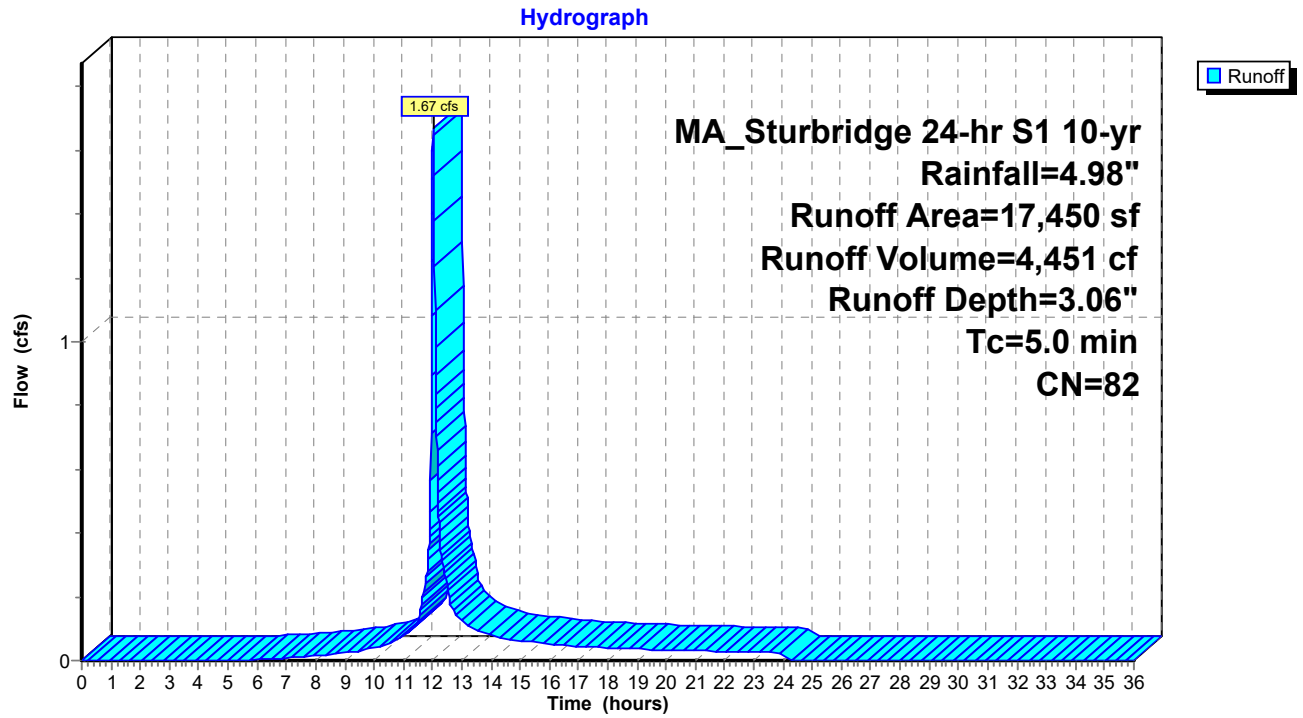
Runoff = 1.67 cfs @ 12.03 hrs, Volume= 4,451 cf, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MA_Sturbridge 24-hr S1 10-yr Rainfall=4.98"

	Area (sf)	CN	Description
*	8,460	98	Paved
*	1,510	98	Sidewalk
	7,480	61	>75% Grass cover, Good, HSG B
	17,450	82	Weighted Average
	7,480		42.87% Pervious Area
	9,970		57.13% Impervious Area

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

Subcatchment 21S: Proposed to Rain Garden



Summary for Pond 21P: Rain Garden

Inflow Area = 17,450 sf, 57.13% Impervious, Inflow Depth = 3.06" for 10-yr event
Inflow = 1.67 cfs @ 12.03 hrs, Volume= 4,451 cf
Outflow = 1.62 cfs @ 12.04 hrs, Volume= 3,845 cf, Atten= 3%, Lag= 0.8 min
Primary = 1.62 cfs @ 12.04 hrs, Volume= 3,845 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 583.97' @ 12.04 hrs Surf.Area= 1,044 sf Storage= 729 cf

Plug-Flow detention time= 109.4 min calculated for 3,845 cf (86% of inflow)
Center-of-Mass det. time= 40.9 min (878.0 - 837.1)

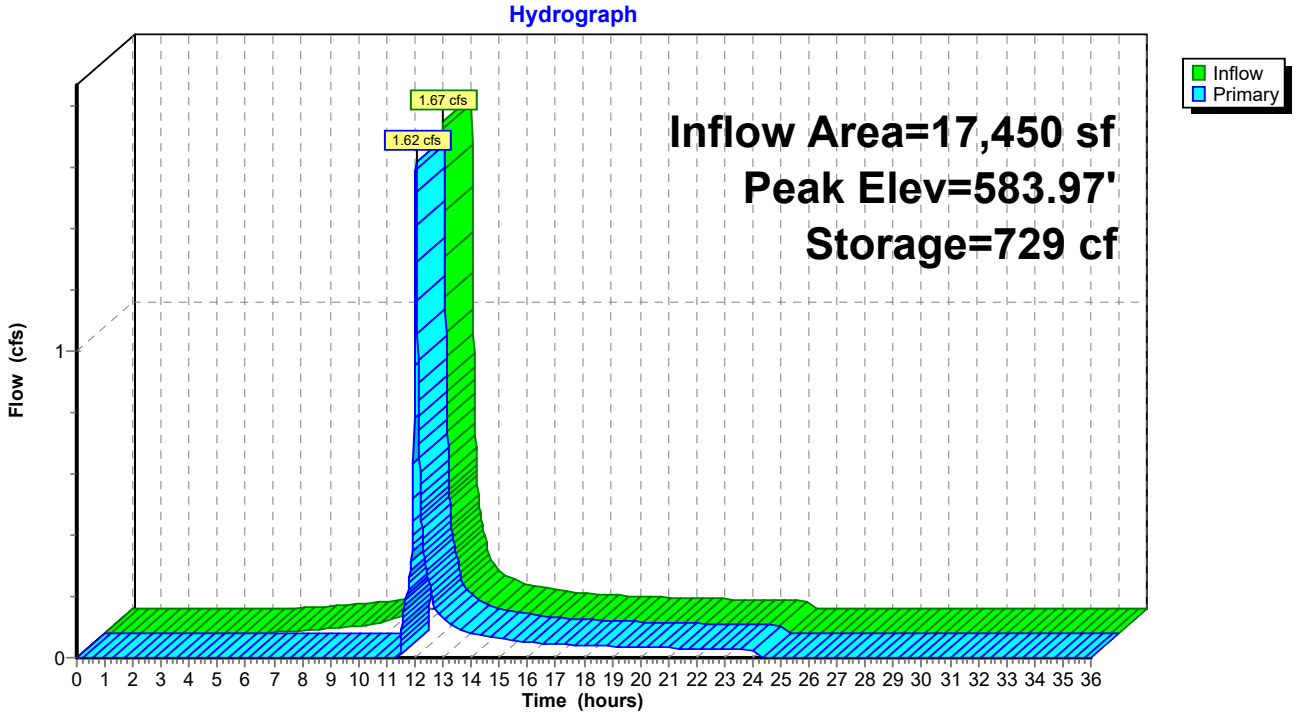
Volume	Invert	Avail.Storage	Storage Description
#1	583.00'	1,821 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
583.00	490	105.6	0	0	490
584.00	1,063	197.1	758	758	2,699
585.00	1,063	197.1	1,063	1,821	2,896

Device	Routing	Invert	Outlet Devices
#1	Primary	583.85'	**15.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=1.62 cfs @ 12.04 hrs HW=583.97' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 1.62 cfs @ 0.89 fps)

Pond 21P: Rain Garden

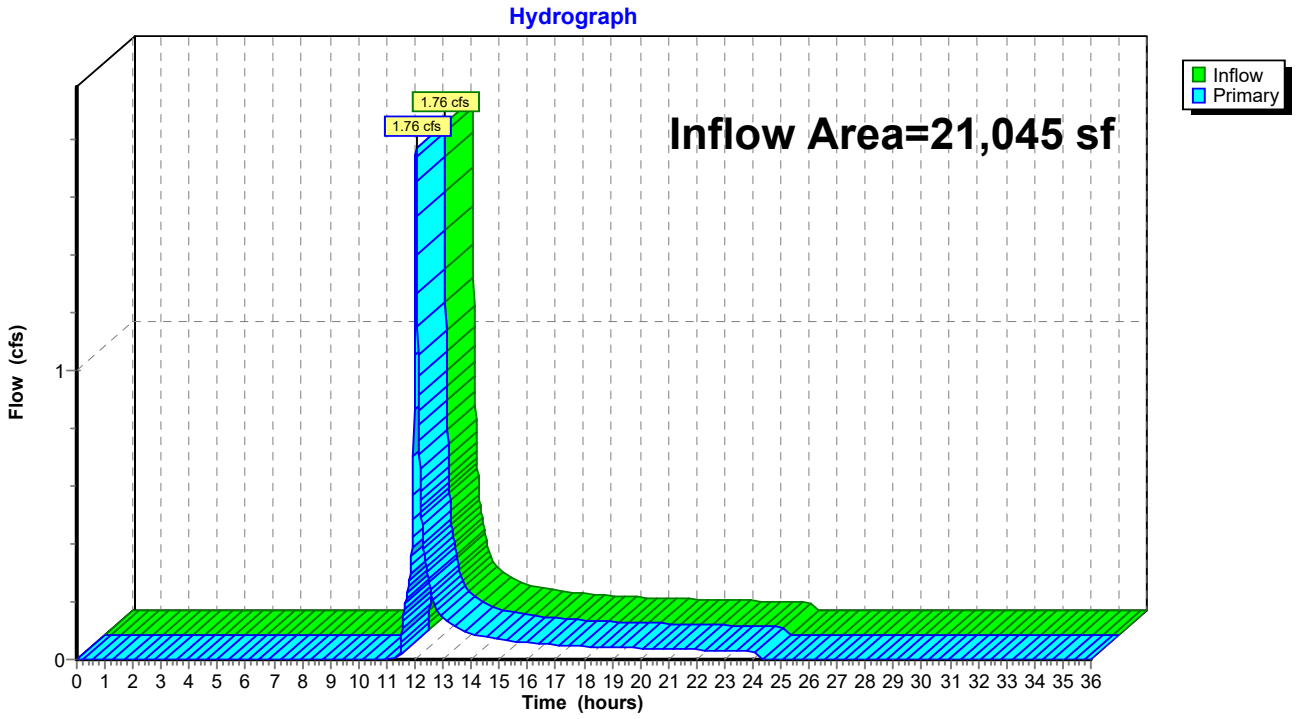


Summary for Link 20L: Southern Boundary

Inflow Area = 21,045 sf, 48.52% Impervious, Inflow Depth = 2.44" for 10-yr event
Inflow = 1.76 cfs @ 12.04 hrs, Volume= 4,272 cf
Primary = 1.76 cfs @ 12.04 hrs, Volume= 4,272 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 20L: Southern Boundary



Summary for Subcatchment 20S: Proposed to Southern Boundary

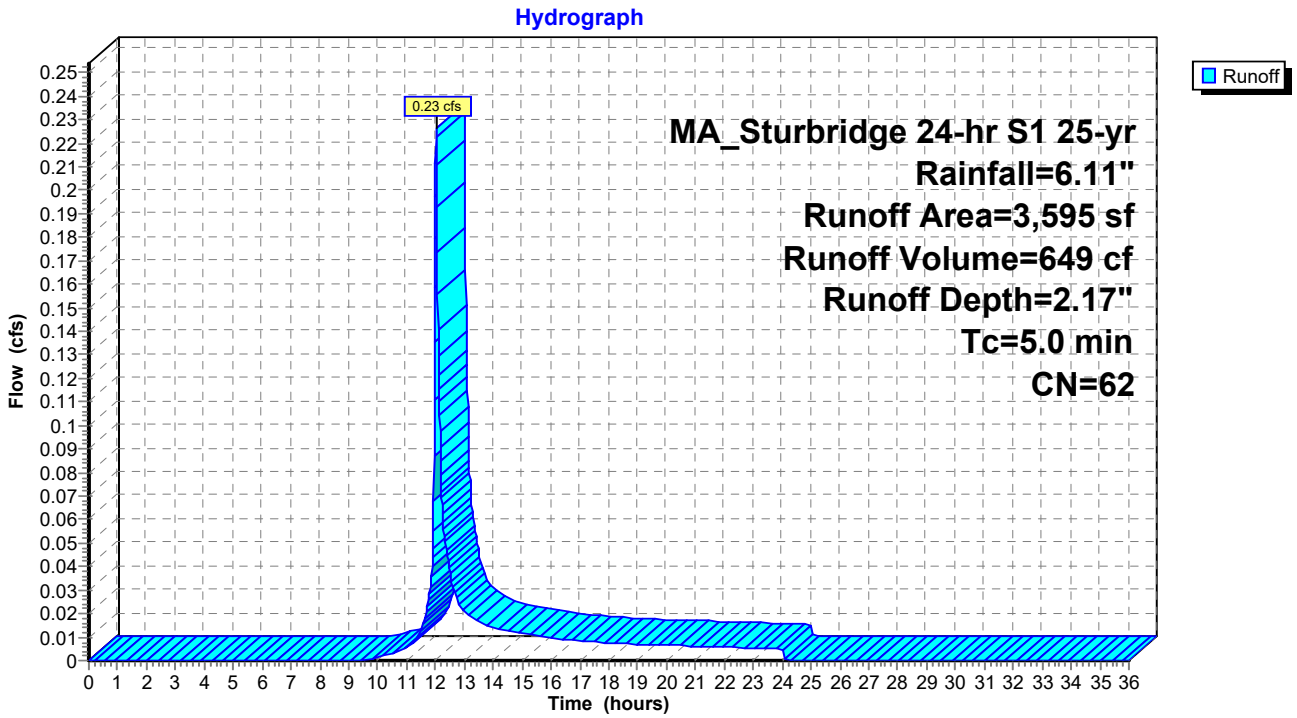
Runoff = 0.23 cfs @ 12.03 hrs, Volume= 649 cf, Depth= 2.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MA_Sturbridge 24-hr S1 25-yr Rainfall=6.11"

	Area (sf)	CN	Description
*	240	98	Sidewalk
	2,315	61	>75% Grass cover, Good, HSG B
	1,040	55	Woods, Good, HSG B
	3,595	62	Weighted Average
	3,355		93.32% Pervious Area
	240		6.68% Impervious Area

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

Subcatchment 20S: Proposed to Southern Boundary



Summary for Subcatchment 21S: Proposed to Rain Garden

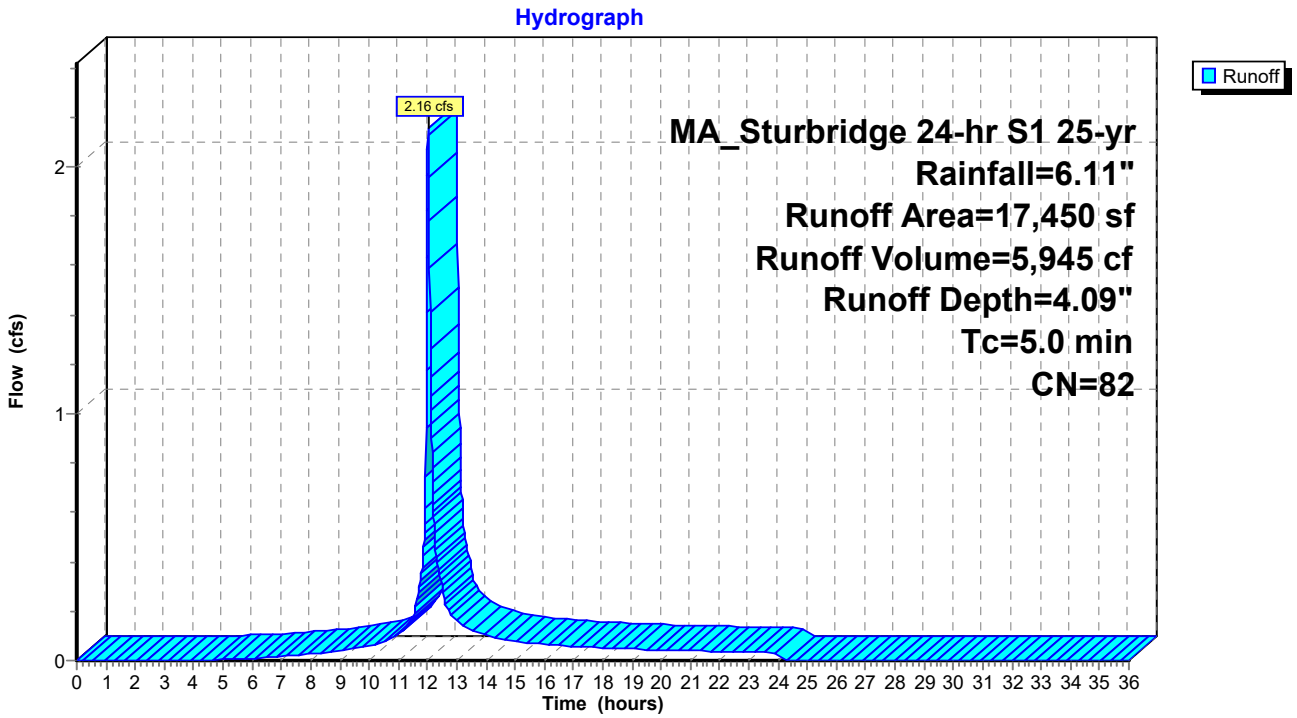
Runoff = 2.16 cfs @ 12.03 hrs, Volume= 5,945 cf, Depth= 4.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MA_Sturbridge 24-hr S1 25-yr Rainfall=6.11"

	Area (sf)	CN	Description
*	8,460	98	Paved
*	1,510	98	Sidewalk
	7,480	61	>75% Grass cover, Good, HSG B
	17,450	82	Weighted Average
	7,480		42.87% Pervious Area
	9,970		57.13% Impervious Area

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

Subcatchment 21S: Proposed to Rain Garden



Summary for Pond 21P: Rain Garden

Inflow Area = 17,450 sf, 57.13% Impervious, Inflow Depth = 4.09" for 25-yr event
Inflow = 2.16 cfs @ 12.03 hrs, Volume= 5,945 cf
Outflow = 2.11 cfs @ 12.04 hrs, Volume= 5,339 cf, Atten= 3%, Lag= 0.7 min
Primary = 2.11 cfs @ 12.04 hrs, Volume= 5,339 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 584.00' @ 12.04 hrs Surf.Area= 1,060 sf Storage= 753 cf

Plug-Flow detention time= 90.7 min calculated for 5,339 cf (90% of inflow)
Center-of-Mass det. time= 36.1 min (863.2 - 827.1)

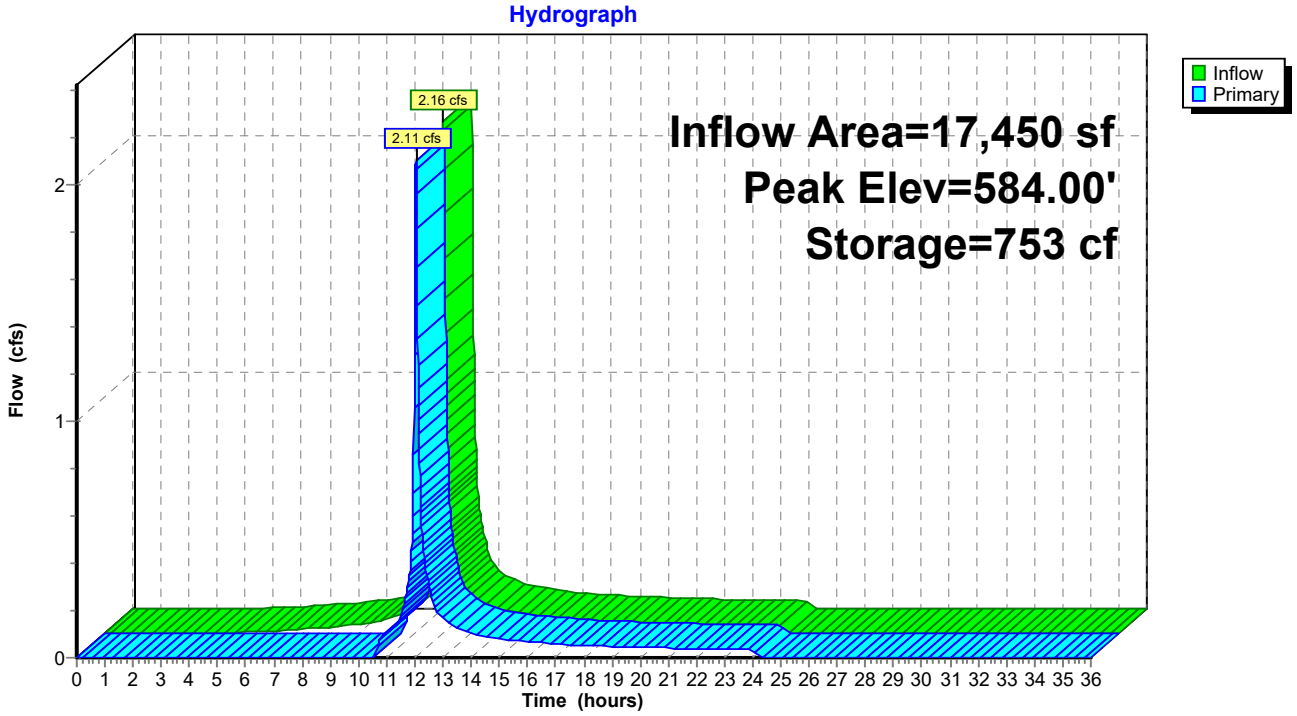
Volume	Invert	Avail.Storage	Storage Description
#1	583.00'	1,821 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
583.00	490	105.6	0	0	490
584.00	1,063	197.1	758	758	2,699
585.00	1,063	197.1	1,063	1,821	2,896

Device	Routing	Invert	Outlet Devices
#1	Primary	583.85'	**15.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=2.10 cfs @ 12.04 hrs HW=583.99' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 2.10 cfs @ 0.97 fps)

Pond 21P: Rain Garden

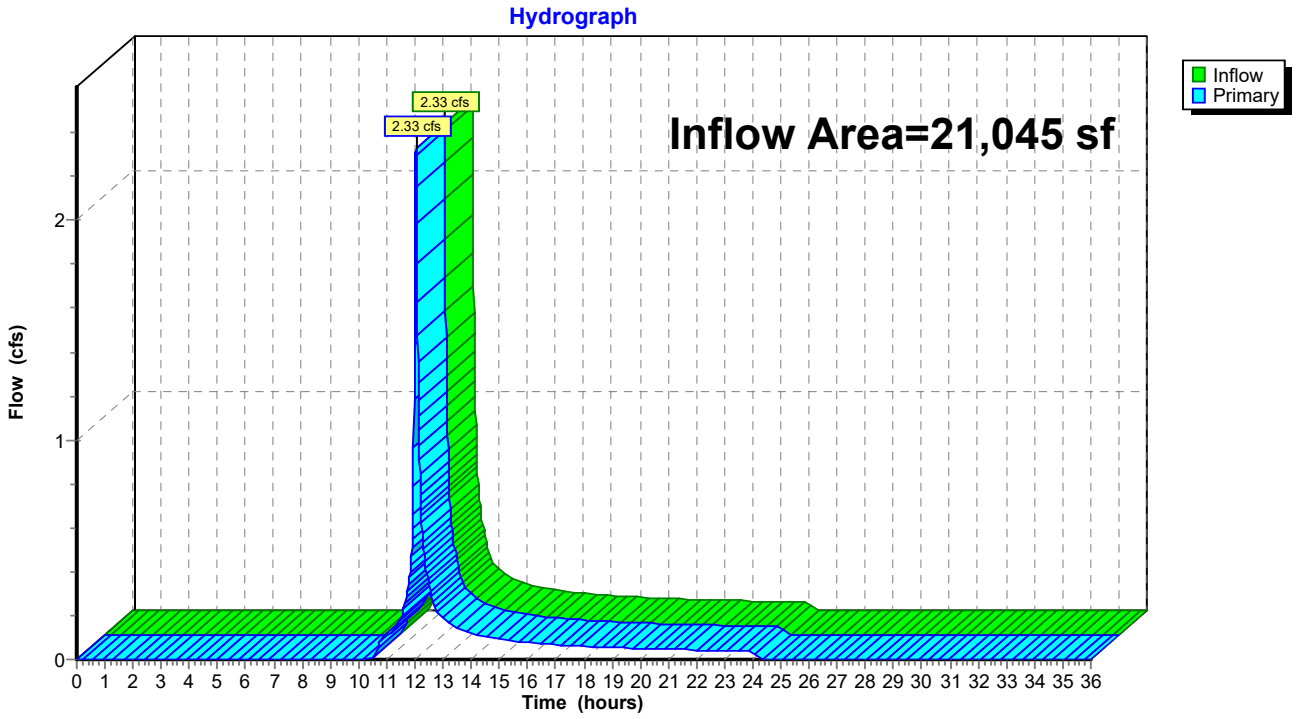


Summary for Link 20L: Southern Boundary

Inflow Area = 21,045 sf, 48.52% Impervious, Inflow Depth = 3.41" for 25-yr event
Inflow = 2.33 cfs @ 12.04 hrs, Volume= 5,988 cf
Primary = 2.33 cfs @ 12.04 hrs, Volume= 5,988 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 20L: Southern Boundary



Summary for Subcatchment 20S: Proposed to Southern Boundary

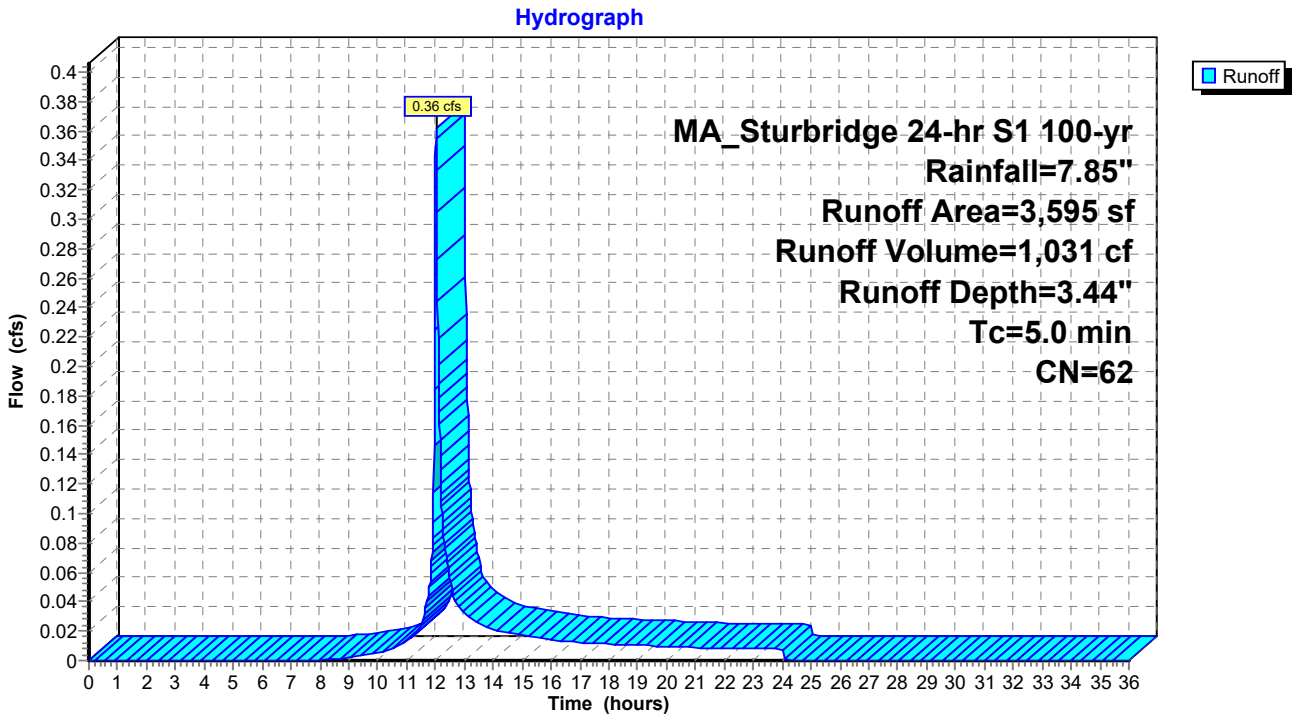
Runoff = 0.36 cfs @ 12.03 hrs, Volume= 1,031 cf, Depth= 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MA_Sturbridge 24-hr S1 100-yr Rainfall=7.85"

	Area (sf)	CN	Description
*	240	98	Sidewalk
	2,315	61	>75% Grass cover, Good, HSG B
	1,040	55	Woods, Good, HSG B
	3,595	62	Weighted Average
	3,355		93.32% Pervious Area
	240		6.68% Impervious Area

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

Subcatchment 20S: Proposed to Southern Boundary



Summary for Subcatchment 21S: Proposed to Rain Garden

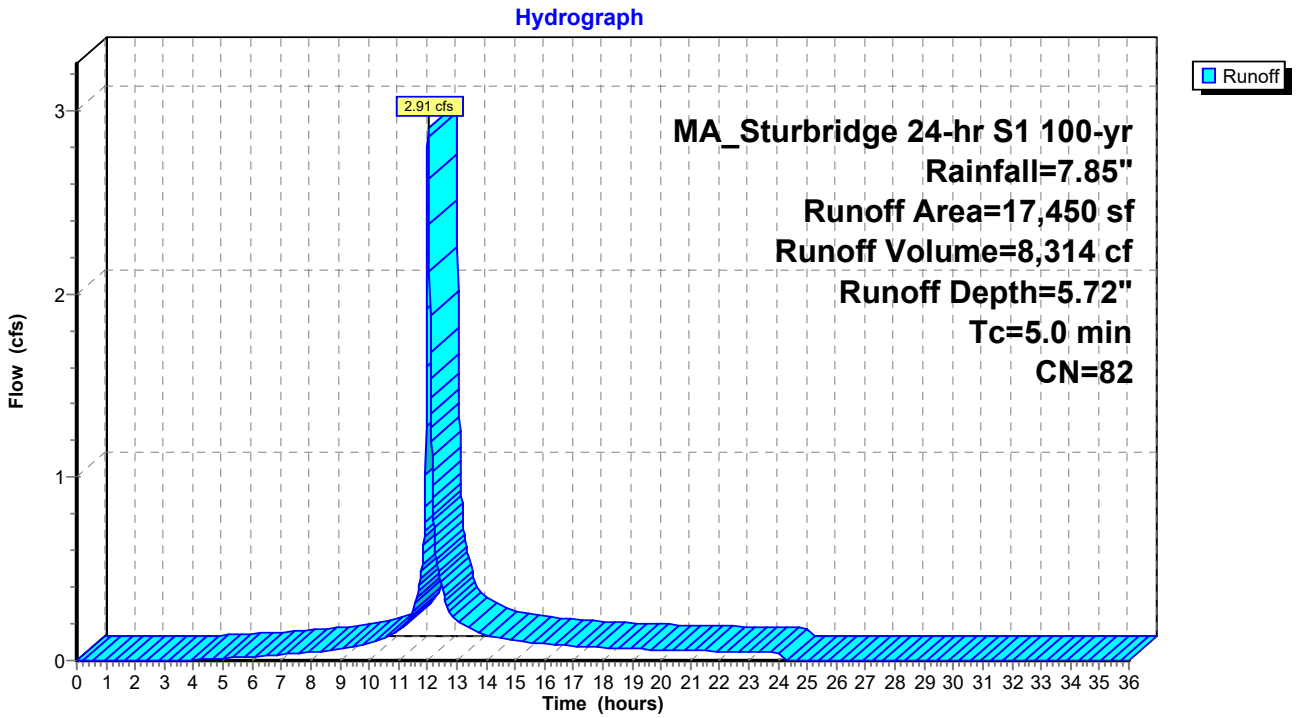
Runoff = 2.91 cfs @ 12.03 hrs, Volume= 8,314 cf, Depth= 5.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
MA_Sturbridge 24-hr S1 100-yr Rainfall=7.85"

	Area (sf)	CN	Description
*	8,460	98	Paved
*	1,510	98	Sidewalk
	7,480	61	>75% Grass cover, Good, HSG B
	17,450	82	Weighted Average
	7,480		42.87% Pervious Area
	9,970		57.13% Impervious Area

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

Subcatchment 21S: Proposed to Rain Garden



Summary for Pond 21P: Rain Garden

Inflow Area = 17,450 sf, 57.13% Impervious, Inflow Depth = 5.72" for 100-yr event
Inflow = 2.91 cfs @ 12.03 hrs, Volume= 8,314 cf
Outflow = 2.85 cfs @ 12.04 hrs, Volume= 7,708 cf, Atten= 2%, Lag= 0.7 min
Primary = 2.85 cfs @ 12.04 hrs, Volume= 7,708 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 584.03' @ 12.04 hrs Surf.Area= 1,063 sf Storage= 787 cf

Plug-Flow detention time= 72.5 min calculated for 7,706 cf (93% of inflow)
Center-of-Mass det. time= 31.3 min (846.5 - 815.3)

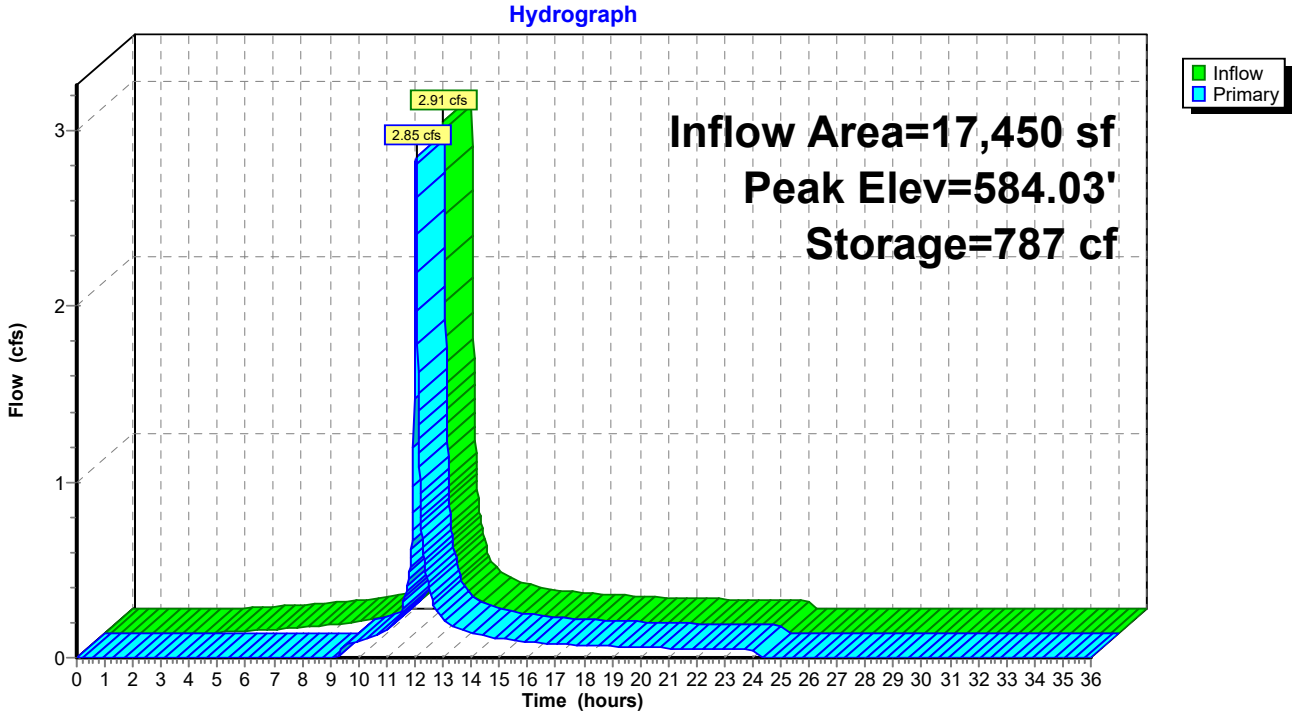
Volume	Invert	Avail.Storage	Storage Description
#1	583.00'	1,821 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
583.00	490	105.6	0	0	490
584.00	1,063	197.1	758	758	2,699
585.00	1,063	197.1	1,063	1,821	2,896

Device	Routing	Invert	Outlet Devices
#1	Primary	583.85'	**15.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=2.84 cfs @ 12.04 hrs HW=584.03' TW=0.00' (Dynamic Tailwater)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 2.84 cfs @ 1.07 fps)

Pond 21P: Rain Garden

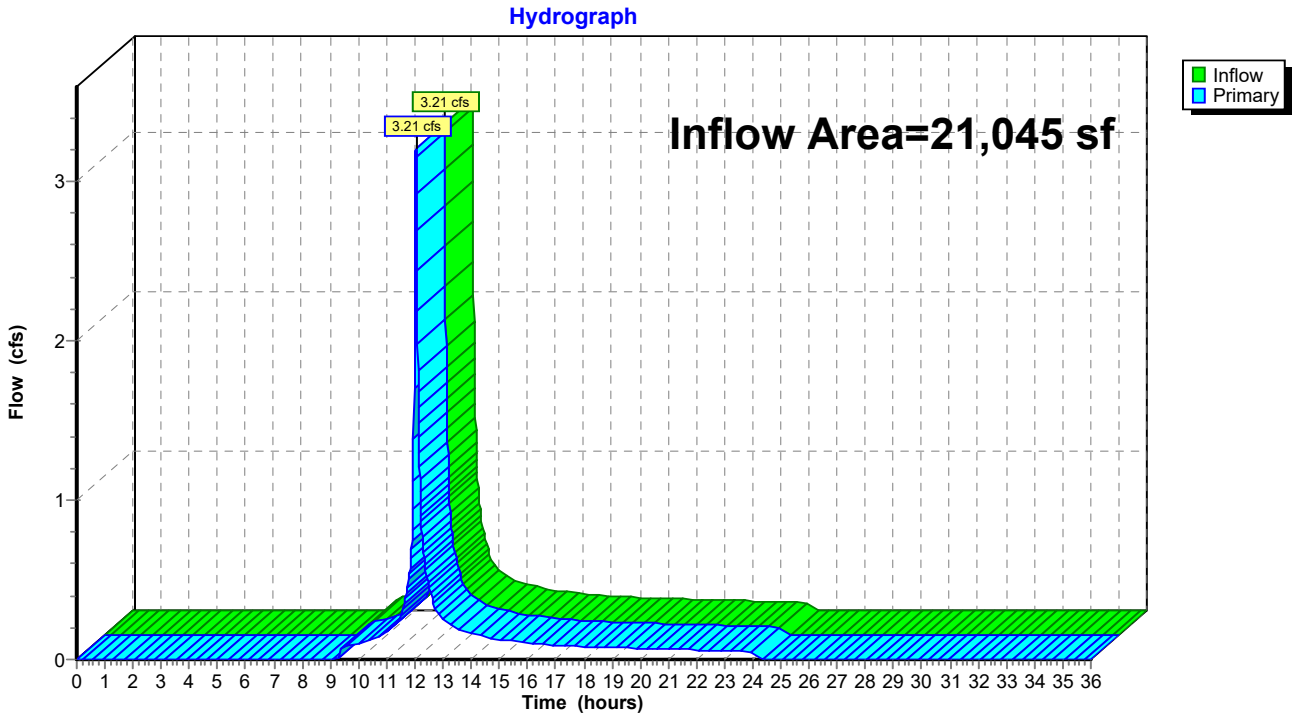


Summary for Link 20L: Southern Boundary

Inflow Area = 21,045 sf, 48.52% Impervious, Inflow Depth = 4.98" for 100-yr event
Inflow = 3.21 cfs @ 12.04 hrs, Volume= 8,739 cf
Primary = 3.21 cfs @ 12.04 hrs, Volume= 8,739 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link 20L: Southern Boundary

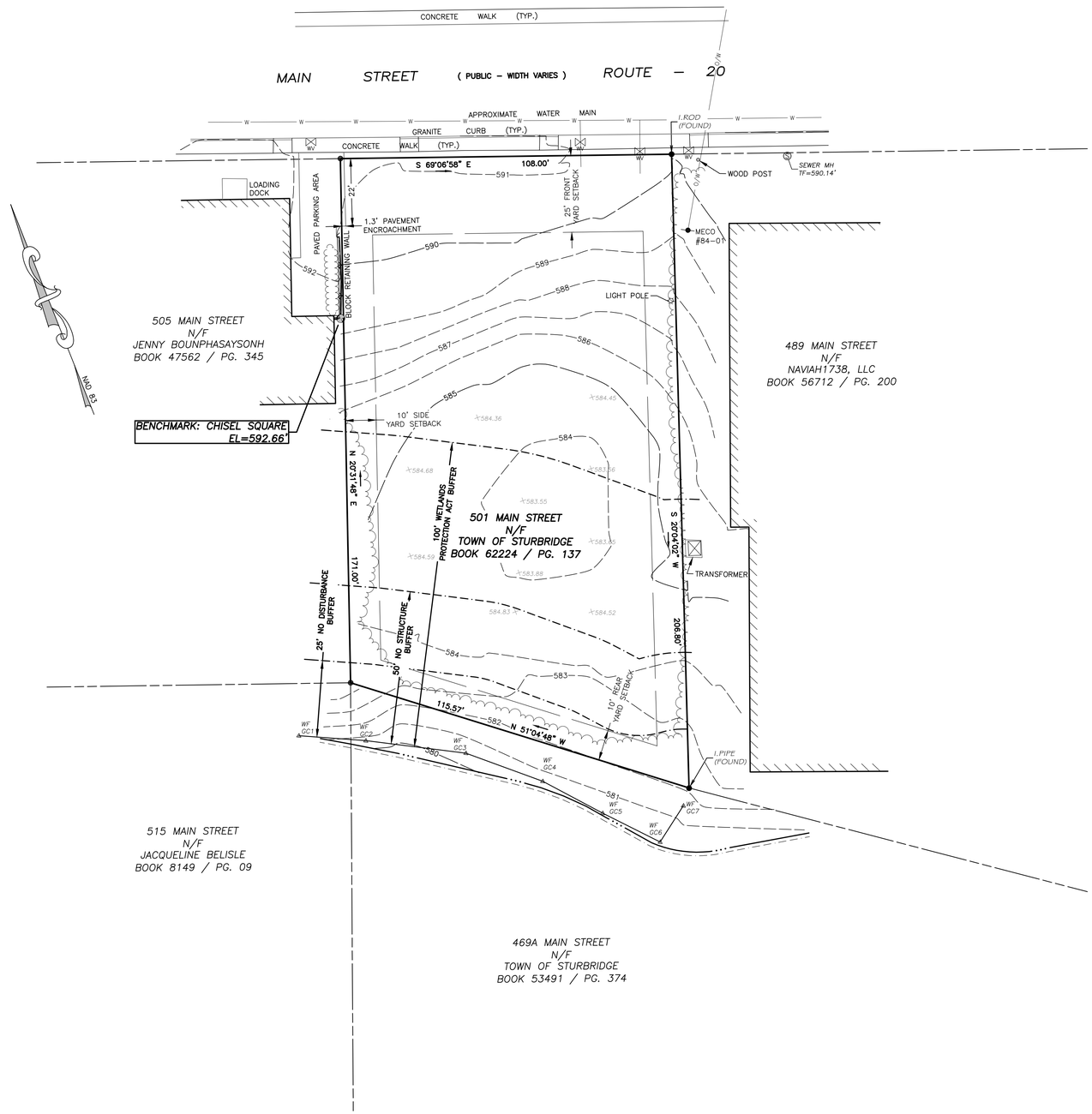


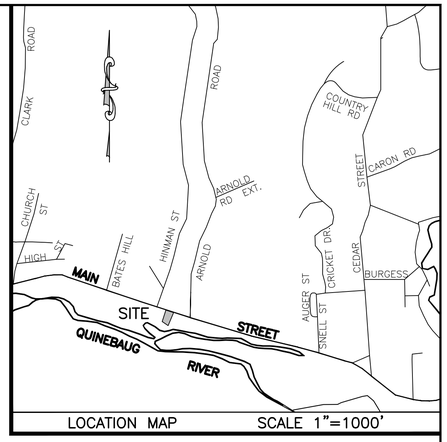
DESIGN PLANS

(Includes Construction Period Pollution Prevention Plan, Erosion & Sedimentation Control Plan, and Post Construction Operation & Maintenance Plan)

LEGEND

RIGHT OF WAY LINE
ABUTTERS LINE
EDGE OF PAVEMENT
EXISTING CONTOUR — 555 —
RETAINING WALL
TREE LINE
NOW OR FORMERLY — N/F
UTILITY POLE
BOUNDARY POINT
IRON MONUMENT
WATER VALVE — WV





LOCATION MAP SCALE 1"=1000'

MAP REFERENCES

1. STURBRIDGE–1925 LAYOUT, SCALE: 1"=40', SHEETS 6 & 7 OF 14

2. "EXISTING SITE PLAN FOR JENNY C. BOUNPHASAYSONH, THAI ORCHARD VILLAGE RESTAURANT, 505 MAIN STREET, STURBRIDGE, MA," SCALE: 1"=20', DATE: 1/20/16, DRAWING NUMBER 12023, SHEET 2 OF 7, REVISION 3, BY JALBERT ENGINEERING, INC.

NOTES

1. THE TYPE OF SURVEY PERFORMED IS A BOUNDARY AND TOPOGRAPHIC SURVEY CONFORMING TO THE STANDARDS OF ACCURACY FOR A HORIZONTAL CLASS A–2 AND VERTICAL CLASS T–2 AND IS A RESURVEY OF THE SUBJECT PROPERTY.

THIS SURVEY WAS PREPARED TO DEPICT THE BOUNDARY AND EXISTING CONDITIONS OF THE SUBJECT PROPERTY.

2. OWNER OF RECORD: TOWN OF STURBRIDGE RECORDED IN VOLUME 62224, PAGE 137 ON 04/17/2020 OF THE WORCESTER SOUTH DISTRICT REGISTRY OF DEEDS AND IS SHOWN ON THE STURBRIDGE TAX ASSESSOR MAP No. 415 AS LOT 501 OF BLOCK 2432.

3. TOTAL AREA OF PROPERTY = 0.47± ACRES (20,542± SQUARE FEET).

4. SITE IS LOCATED IN ZONE COMMERCIAL TOURIST DISTRICT. SETBACKS: FRONT=25', SIDE=10', REAR=10', LOT AREA=10,000 S.F.

5. SITE CONDITIONS DEPICTED ARE BASED ON AN ON THE GROUND SURVEY COMPLETED ON 8/5/2020.

6. ELEVATIONS ARE BASED ON VERTICAL DATUM NAVD88.

7. UNDERGROUND UTILITY, STRUCTURE AND FACILITY LOCATIONS DEPICTED AND NOTED HEREON HAVE BEEN COMPILED, IN PART, FROM RECORD MAPPING SUPPLIED BY THE RESPECTIVE UTILITY COMPANIES OR GOVERNMENTAL AGENCIES, FROM PAROL TESTIMONY AND FROM OTHER SOURCES. THESE LOCATIONS MUST BE CONSIDERED AS APPROXIMATE IN NATURE. ADDITIONALLY, OTHER SUCH FEATURES MAY EXIST ON THE SITE. THE EXISTENCE OF WHICH ARE UNKNOWN TO CME ASSOCIATES, INC. THE SIZE, LOCATION AND EXISTENCE OF ALL SUCH FEATURES MUST BE FIELD DETERMINED AND VERIFIED BY THE APPROPRIATE AUTHORITIES PRIOR TO CONSTRUCTION. CALL BEFORE YOU DIG 1–800–922–4455.

I CERTIFY THAT THIS PLAN CONFORMS TO THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS, AND THE PROPERTY LINES SHOWN ARE THE LINES OF EXISTING OWNERSHIP, AND THE LINES OF STREETS AND WAYS ARE THOSE OF PUBLIC OR PRIVATE STREETS AND WAYS ALREADY ESTABLISHED, AND THAT NO LINES FOR DIVISION OF EXISTING OWNERSHIP OR FOR NEW WAYS ARE SHOWN.

_____ DATE:_____
WILLIAM J. DORGAN PLS# 49622

20 10 0 20
GRAPHIC SCALE IN FEET

CHA
33 Wilbur Cross Way, Mansfield, CT 06268
101 East River Drive, 1st Floor
East Hartford, CT 06108
860-885-1055 | www.chacompanies.com

SITE DEVELOPMENT PLAN PREPARED FOR:

TOWN OF STURBRIDGE

501 MAIN STREET
STURBRIDGE, MA

No.	Submittal / Revision	App'd.	By	Date

EXISTING CONDITIONS

Designed By:	Drawn By:	Checked By:
PMP	ZBC/PMP	
Issue Date:	Project No:	Scale:
10/29/2020	065470	1" = 20'

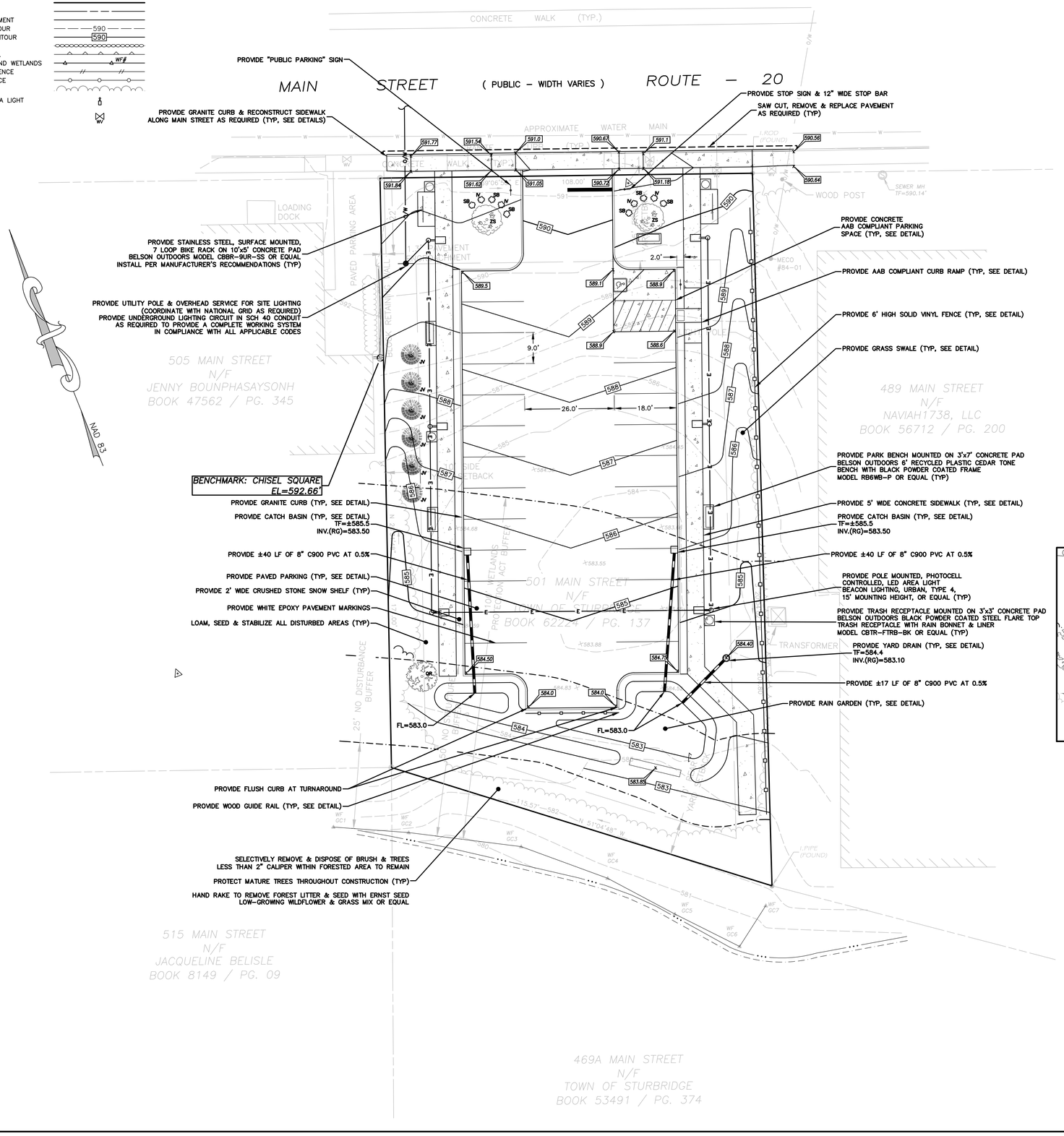
Drawing No.:

SHEET 1 OF 5

File: U:\MUNI_MA\STURBRIDGE\065470_STURBRIDGE_PARKING_LOT_DESIGN\DWG\065470_TPO.DWG

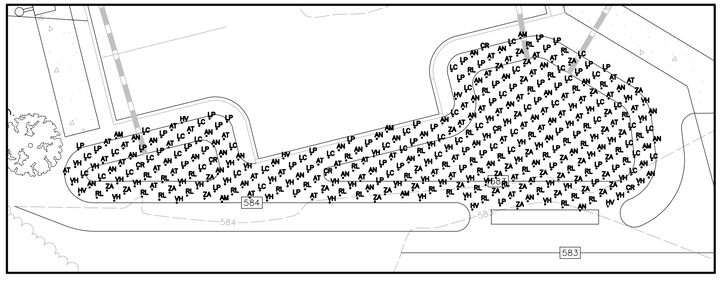
LEGEND

PROPERTY LINE
ABUTTERS LINE
EDGE OF PAVEMENT
EXISTING CONTOUR — 590 —
PROPOSED CONTOUR 590
STONE WALL
RETAINING WALL
LIMITS OF INLAND WETLANDS WF#
ORNAMENTAL FENCE
CHAINLINK FENCE
TREE LINE
PROPOSED AREA LIGHT
WATER VALVE WV



DIMENSIONAL REQUIREMENTS COMMERCIAL TOURIST DISTRICT ACCESSORY MUNICIPAL PARKING		
ZONING CRITERIA	REQUIRED	PROVIDED
MINIMUM LOT AREA	10,000 SF	±20,542 SF
LOT FRONTAGE	100'	108'
FRONT YARD SETBACK	25'	NO STRUCTURE (±27' TO PARKING)
SIDE YARD SETBACK	10'	NO STRUCTURE (±15' TO SIDEWALK)
REAR YARD SETBACK	10'	NO STRUCTURE (±15' TO PARKING)
MAXIMUM LOT COVERAGE	30%	0%
BUFFER LANDSCAPING	FRONT YARD SETBACK	FRONT YARD SETBACK
INTERIOR PARKING LANDSCAPING	5% (20 TO 99 SPACES) 425 SF	>1,000 SF
SHADE TREES	3 (1 PER 10 SPACES)	3 EXISTING MATURE TREES TO REMAIN ALONG SOUTHERN PROPERTY LINE

PLANTING SCHEDULE					
TREES					
COMMON NAME	SCIENTIFIC NAME	PLAN CODE	SPECIMEN	SPACING	QUANTITY
MUSASHINO JAPANESE ZELKOVA	ZELKOVA SERRATA 'MUSASHINO'	ZS	2" CALIPER	AS REQ'D	2
RED OAK	QUERCUS RUBRA	QR	2" CALIPER	AS REQ'D	1
EASTERN RED CEDAR	JUNIPERUS VIRGINIANA	JV	6–8' HT	8' O.C.	6
SHRUBS					
COMMON NAME	SCIENTIFIC NAME	PLAN CODE	SPECIMEN	SPACING	QUANTITY
DWARF PINK SPIREA	SPIREA BUMALDA 'ANTHONY WATERER'	SB	18–24"	3' O.C.	6
HENRY'S GARNET SUMMERSWEET	ITEA VIRGINICUS 'HENRY'S GARNET'	IV	18–24"	3' O.C.	4
BLACK CHOKEBERRY	ARONIA MELANOCARPA	AM	18–24"	AS REQ'D	6
GREY DOGWOOD	CORNUS RACEMOSA	CR	18–24"	AS REQ'D	6
WITCHHAZEL	HAMAMELIS VIRGINIANA	HV	18–24"	AS REQ'D	6
HERBACEOUS PERENNIALS					
COMMON NAME	SCIENTIFIC NAME	PLAN CODE	SPECIMEN	SPACING	QUANTITY
BLUE VERVAIN	VERBENA HASTATA	VH	2" PLUG	18–24" O.C.	50
BUTTERFLY MILKWEED	ASCLEPIAS TUBEROSA	AT	2" PLUG	18–24" O.C.	50
CARDINAL FLOWER	LOBELIA CARINALIS	LC	2" PLUG	18–24" O.C.	50
GOLDEN ALEXANDERS	ZIZIA AUREA	ZA	2" PLUG	18–24" O.C.	50
GREEN-HEADED CONEFLOWER	RUDBECKIA LACINIATA	RL	2" PLUG	18–24" O.C.	50
NEW ENGLAND ASTER	ASTER NOVAE-ANGLIAE	AN	2" PLUG	18–24" O.C.	50
WLD BLUE LUPINE	LUPINUS PERENNIS	LP	2" PLUG	18–24" O.C.	50



RAIN GARDEN PLANTING LAYOUT
1"=10'

GRAPHIC SCALE IN FEET
15 7.5 0 15

CHA
33 Wilbur Cross Way, Mansfield, CT 06268
101 East River Drive, 1st Floor
East Hartford, CT 06108
860-885-1055 | www.chacompanies.com

SITE DEVELOPMENT PLAN PREPARED FOR:

TOWN OF STURBRIDGE

501 MAIN STREET
STURBRIDGE, MA

No.	Submittal / Revision	App'd.	By	Date

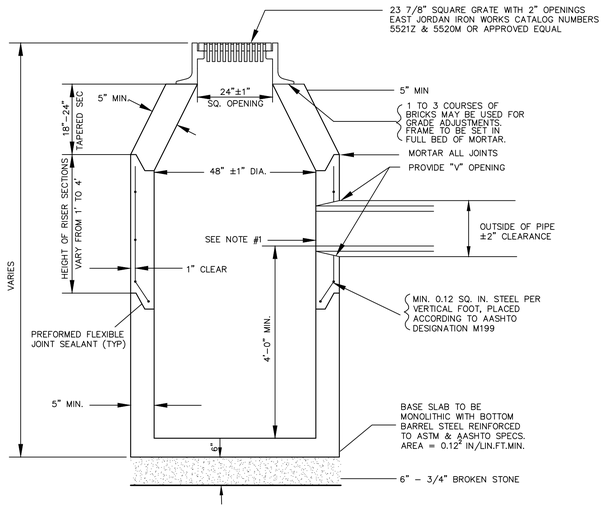
SITE PLAN

Designed By:	Drawn By:	Checked By:
PMP	ZBC/PMP	
Issue Date:	Project No:	Scale:
10/29/2020	065470	1" = 15'

Drawing No.:

SHEET 2 OF 5

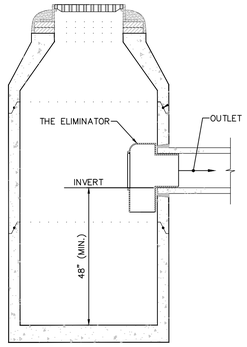
File: U:\MUNI_MA\STURBRIDGE\065470_STURBRIDGE_PARKING_LOT_DESIGN\DWG\065470 STP.DWG



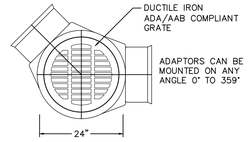
PRECAST CONCRETE CATCH BASIN
NOT TO SCALE

NOTES:

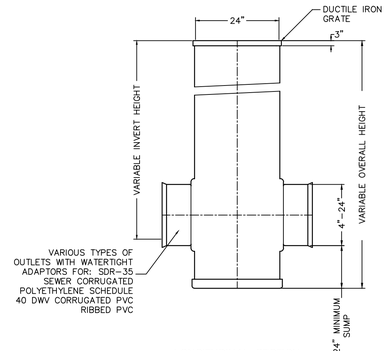
1. FACE OF PIPE SHALL BE FLUSH OR NOT TO PROJECT MORE THAN 4" FROM FACE OF WALL ALONG CENTERLINE OF PIPE.
2. FOR DESCRIPTION, MATERIALS, AND CONSTRUCTION METHODS SEE MASSDOT "STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES" AND CONSTRUCTION STANDARDS AND THE CONTRACT DOCUMENT SPECIFICATIONS.
3. MINIMUM DEPTH OF SUMP TO BE 4'.
4. WHEN A CURB INLET IS INSTALLED, THE OPENING IS TO BE 24" ±1" X 27" ±1".
5. ALL CATCH BASINS SHALL INCLUDE A CATCH BASIN HOOD FOR THE OUTLET PIPE.
6. CATCH BASIN AND ALL APPURTENANCES SHALL MEET H-20 LOADING.



CATCH BASIN HOOD
NOT TO SCALE

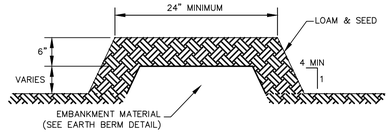


PLAN VIEW

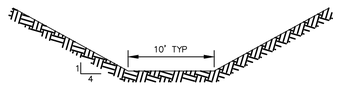


LONGITUDINAL SECTION

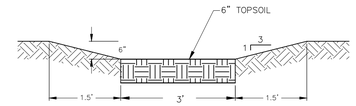
YARD DRAIN
NYLOPLAST 24" DRAIN BASIN
NOT TO SCALE



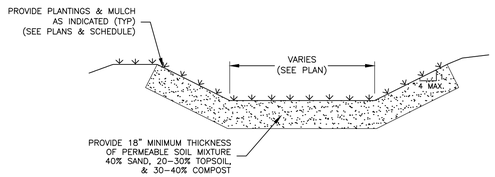
SPILLWAY
NOT TO SCALE



SPILLWAY CROSS SECTION
NOT TO SCALE



GRASS SWALE
NOT TO SCALE



RAIN GARDEN
NOT TO SCALE

NOTES:

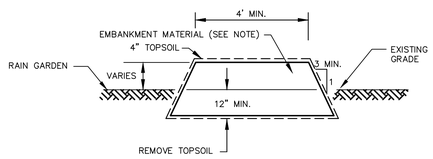
1.) PERMEABLE SOIL MIXTURE SHALL NOT BE COMPACTED AND THE ENTIRE RAIN GARDEN SHALL BE PROTECTED FROM HEAVY EQUIPMENT TRAFFIC THROUGHOUT CONSTRUCTION.

2.) THE CONTRACTOR SHALL BE LIABLE FOR THE REPLACEMENT OF THE PERMEABLE SOIL MIXTURE IF E&S CONTROLS ARE NOT INSTALLED & MAINTAINED AS INDICATED.

3.) PLANT SUBSTITUTIONS MUST BE APPROVED BY THE ENGINEER PRIOR TO THE START OF CONSTRUCTION.

4.) CONTRACTOR MAY SUBSTITUTE LARGER OR SMALLER SPECIMENS, AT THE DISCRETION OF THE ENGINEER, IF INDICATED SIZE IS NOT READILY AVAILABLE. MODIFICATIONS TO PLANTING DENSITY MUST BE COORDINATED WITH ENGINEER.

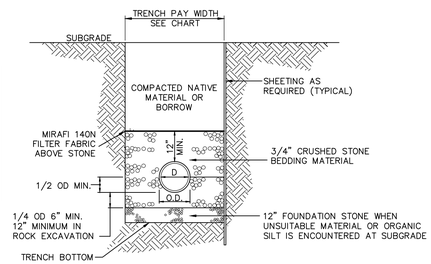
5.) PROVIDE A TWO INCH THICK LAYER OF SHREDDED BARK MULCH FOR WEED CONTROL. DO NOT BURY THE CROWNS OF PLANTINGS.



NOTE: EMBANKMENT MATERIAL SHALL CONTAIN AT LEAST 15% PASSING THE #200 SIEVE AND NOT MORE THAN 50% PASSING THE #200 SIEVE. NO STONES LARGER THAN 6 INCHES SHALL BE ALLOWED WITHIN THE COMPACTED EMBANKMENT. WITHIN TWO FEET OF ANY STRUCTURE, THE MAXIMUM SIZE SHALL BE 3 INCHES. CONSTRUCTION SHALL NOT TAKE PLACE DURING COLD PERIODS WHERE TEMPERATURES ARE CONSISTENTLY LOWER THAN 40 DEGREES FAHRENHEIT. EMBANKMENT MATERIAL TO BE COMPACTED IN LIFTS TO 95% MAXIMUM DRY DENSITY.

EARTH BERM DETAIL
NTS

PIPE DIAMETER	MAXIMUM TRENCH WIDTH
6"	2'-6"
8"	3'-0"
10"	3'-0"
12"	3'-0"
15"	3'-3"
18"	3'-6"
21"	4'-0"
24"	4'-6"
30"	5'-0"



TRENCH SECTION FOR STORM DRAINS
NOT TO SCALE

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SITE DEVELOPMENT PLAN
PREPARED FOR:

TOWN OF STURBRIDGE

501 MAIN STREET
STURBRIDGE, MA

No.	Submittal / Revision	App'd.	By	Date

CONSTRUCTION
DETAILS

Designed By:	Drawn By:	Checked By:
PMP	ZBC/PMP	
Issue Date:	Project No:	Scale:
10/29/2020	065470	AS NOTED

Drawing No.:

SHEET 3 OF 5

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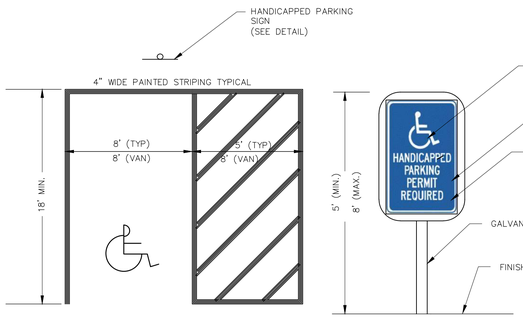
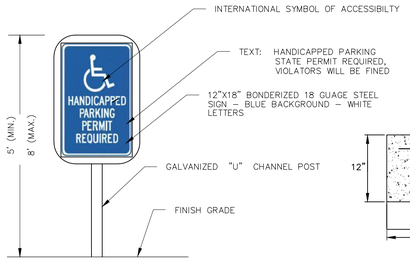
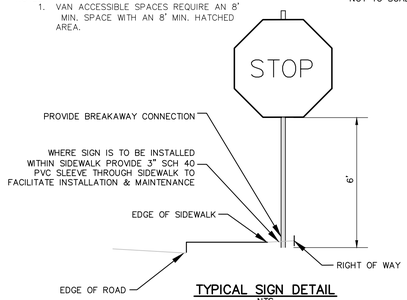


HANDICAP PARKING LAYOUT
NOT TO SCALE



HANDICAPPED PARKING SIGN
NOT TO SCALE

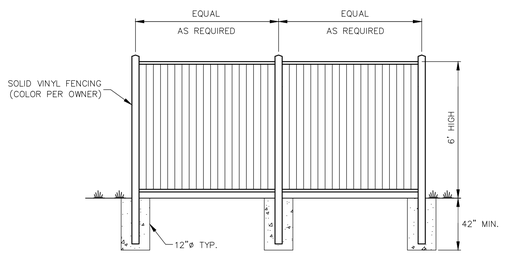
NOTES:
1. VAN ACCESSIBLE SPACES REQUIRE AN 8' MIN. SPACE WITH AN 8' MIN. HATCHED AREA.



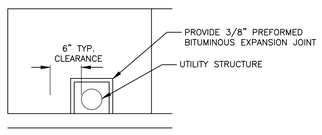
TYPICAL SIGN DETAIL
NTS

NOTES:

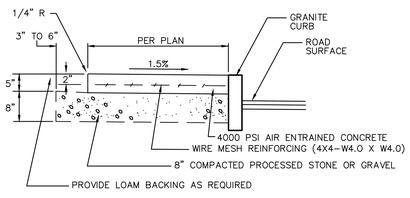
1. MINIMUM DISTANCE FROM EDGE OF TRAVELED WAY TO SIGN SHALL BE 2'



FENCE DETAIL
NOT TO SCALE



BOX OUT AT UTILITY

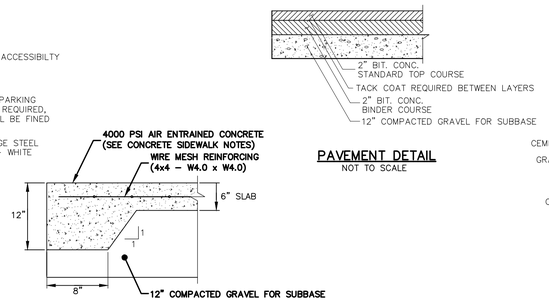


SECTION

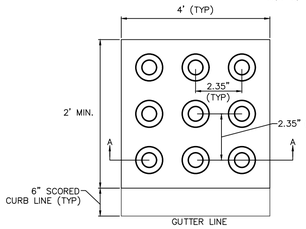
STANDARD CONCRETE SIDEWALK DETAIL
NTS

CONCRETE SIDEWALK NOTES:

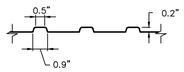
1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS, A MAXIMUM WATER–CEMENT RATIO OF 0.45, & 7% (±1.0%) ENTRAINED AIR.
2. MAXIMUM PERMITTED SLUMP FOR SIDEWALK CONCRETE IS 3". THE CONTRACTOR MAY CHOOSE TO USE WATER REDUCING ADMIXTURES TO IMPROVE WORKABILITY.
3. THE ADDITION OF SUPERFICIAL WATER TO THE SURFACE OF THE CONCRETE TO ASSIST IN FINISHING OPERATIONS SHALL NOT BE PERMITTED.
4. CONCRETE SHALL BE SEALED WITH CRETEDEFENDER OR EQUAL FOLLOWING ALL MANUFACTURER'S RECOMMENDATIONS FOR APPLICATION TIMING AND RATES.
5. UNLESS OTHERWISE DIRECTED BY THE ENGINEER, CONTRACTOR TO PROVIDE A 2'x2' SQUARE BOX OUT AROUND ALL UTILITY POLES & HYDRANTS. THE 2'x2' SQUARE SHALL BE POURED INDEPENDENTLY OF THE ADJACENT SIDEWALK WITH ⅜" ASPHALT IMPREGNATED EXPANSION JOINT ON ALL SIDES ABUTTING CONCRETE.
6. MINIMUM SIDEWALK WIDTH AT UTILITY POLES & HYDRANTS SHALL BE 32".



CONCRETE PAVING DETAIL (HANDICAP PARKING SPACE)
NOT TO SCALE



DETAIL OF DETECTABLE WARNING PANEL

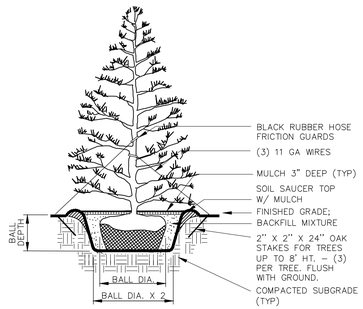


SECTION A–A

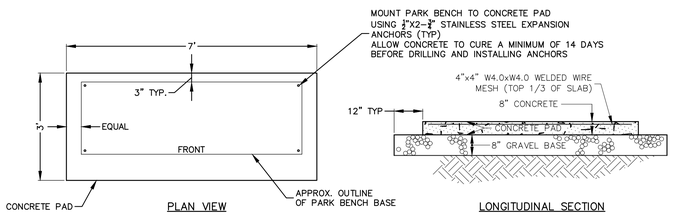
NOTE:
DETECTABLE WARNING PANELS SHALL BE YELLOW.

WHEELCHAIR RAMP NOTES

1.) DETECTABLE WARNING PANELS SHALL BE CAST IN PLACE OR OTHER SUITABLE MATERIAL PERMANENTLY APPLIED TO RAMP (SURFACE APPLIED SYSTEMS WILL NOT BE PERMITTED). DETECTABLE WARNING SURFACES SHALL CONTRAST VISUALLY WITH ADJACENT WALKING SURFACES EITHER LIGHT–ON–DARK, OR DARK–ON–LIGHT. DETECTABLE WARNING PANELS SHALL BE YELLOW. DETECTABLE WARNING PANELS ARE REQUIRED ON ALL PROPOSED WHEELCHAIR RAMPS.



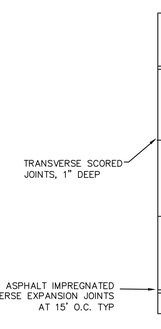
TREE PLANTING DETAIL
NOT TO SCALE



PLAN VIEW

LONGITUDINAL SECTION

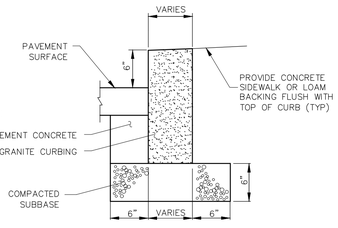
PARK BENCH ON CONCRETE PAD
NOT TO SCALE



ROADWAY PROFILE GRADE	* HIGH SIDE TRANSITION LENGTH
%	ENGLISH UNITS
=0%	6'-6"
>0% TO 1%	7'-8"
>1% TO 2%	9'-0"
>2% TO 3%	11'-0"
>3% TO 4%	14'-0"
>4% TO 5%	15'-0" Max

TABLE OF HIGH SIDE TRANSITION LENGTHS FROM MASSDOT CONSTRUCTION STANDARD E 107.9.0

PAVEMENT DETAIL
NOT TO SCALE



SECTION A–A

GRANITE CURB DETAIL
NOT TO SCALE

NOTES:

1. CURBING SHALL BE TYPE VB.
2. MORTAR CURBING JOINTS WITH NON–SHRINK GROUT
3. INSTALLATION SHALL CONFORM TO MASSDOT CONSTRUCTION STANDARD E106.3.0
4. CEMENT CONCRETE SHALL EXTEND UNDER TAPERED ENDS OF CURBING TO PROVIDE ADDITIONAL SUPPORT AT JOINTS.

WHEELCHAIR RAMP NOTES

1.) SIDEWALK CROSS SLOPES, AS INDICATED IN THE STANDARD SPECIFICATIONS, WILL BE AT 1.6% MAXIMUM, 1.5% PREFERRED FOR BRICK, CEMENT CONCRETE AND BITUMINOUS CONCRETE. THE ONLY EXCEPTION TO SIDEWALK CROSS SLOPES ON BRIDGES WHICH WILL BE 1% (REFER TO STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, SECTION 700). IN ACCORDANCE WITH THE ARCHITECTURAL ACCESS BOARD (AAB) RULES AND REGULATIONS THE SIDEWALK CROSS SLOPE CANNOT EXCEED 2.0%

2.) AN UNOBSTRUCTED PATH OF TRAVEL WITH A MINIMUM WIDTH OF 3' SHALL BE MAINTAINED. THE DESIRABLE MINIMUM WIDTH IS 3'–3".

3.) THE WHEELCHAIR RAMP SLOPE AND SIDE SLOPES (TRANSITIONS) MUST NOT EXCEED 1:12. (8.0% MAXIMUM 7.5% PREFERRED) HOWEVER THESE SLOPES MAY BE FLATTER THAN 1:12 WHEN WARRANTED BY SURROUNDING CONDITIONS.

4.) HIGH SIDE CURB TRANSITION LENGTH (Lth) SHALL BE DETERMINED BASED ON ROADWAY PROFILE GRADE. SEE MASSDOT CONSTRUCTION STANDARD E 107.9.0. (SEE TABLE)

5.) IN NO CASE, WHERE A STOP LINE IS WARRANTED, SHALL A RAMP BE PLACED BEHIND THE STOP LINE.

6.) FIXED OBJECTS (i.e. UTILITY POLES, HYDRANTS, ETC.) MUST NOT ENCROACH ON ANY PART OF A WHEELCHAIR RAMP, INCLUDING TRANSITION SLOPES.

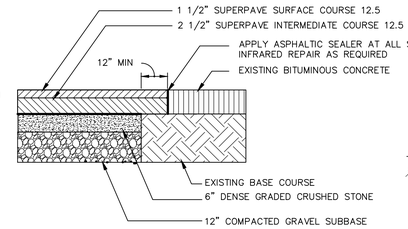
7.) AT NO TIME IS ANY PART OF THE WHEELCHAIR RAMP, EXCLUDING CURB TRANSITIONS, TO BE LOCATED OUTSIDE OF THE CROSSWALK. WHEELCHAIR RAMP ENTRANCE IS TO BE CENTERED IN THE CROSSWALK WHENEVER POSSIBLE.

8.) CATCH BASINS WHICH ARE TO BE LOCATED IN THE VICINITY OF A WHEELCHAIR RAMP SHALL BE LOCATED UP–GRADE OF WHEELCHAIR RAMP ENTRANCE.

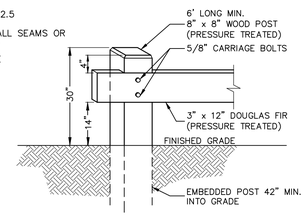
9.) THE ENTRANCE OF A WHEELCHAIR RAMP SHALL BE FLUSH WITH THE ROADWAY.

10.) TESTING SURFACE: WHEN TESTING WITH A STRAIGHTEDGE PLACED PARALLEL TO THE LINE OF SLOPE, THERE SHALL BE NO DEVIATION FROM A TRUE SURFACE IN EXCESS OF 1/4".

11.) ALL WHEELCHAIR RAMPS SHALL BE CEMENT CONCRETE.

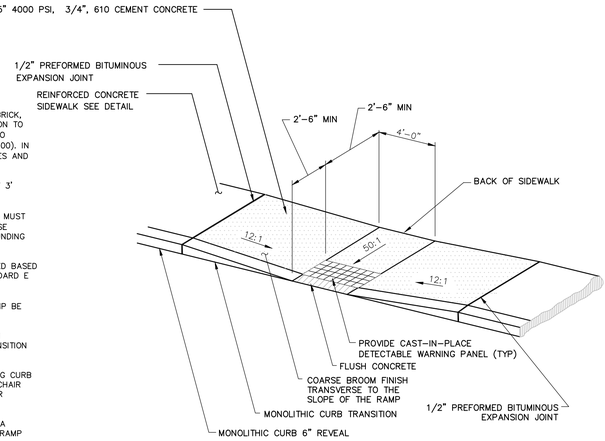


ROADWAY PAVEMENT REPAIR DETAIL
NTS



WOOD GUIDE RAIL
NOT TO SCALE

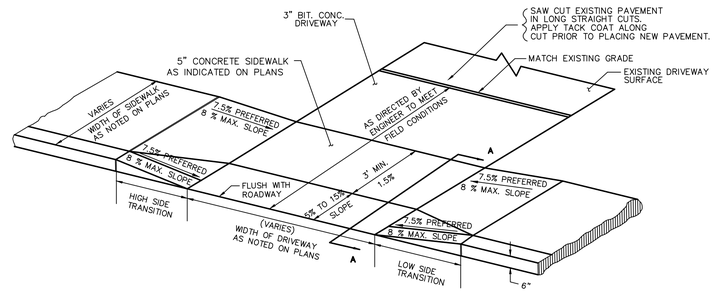
NOTE:
1. ALL PAVEMENT SHALL CONFORM TO PAVEMENT SPECIFICATION INCLUDED IN THE CONTRACT DOCUMENTS.
2. ALL SEAMS SHALL BE SAWCUT AND STRAIGHT.

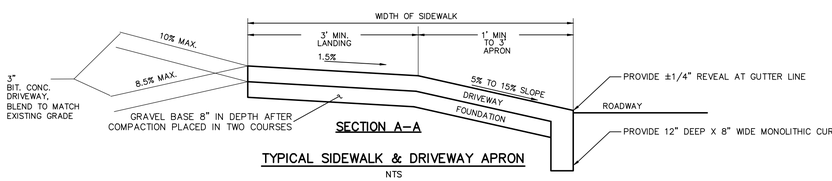


TYPE B RAMP
NTS

NOTES:

1. CARE SHALL BE TAKEN TO ASSURE A UNIFORM GRADE ON THE RAMP, FREE OF SAGS AND SHORT GRADE CHANGES.
2. THE BOTTOM OF THE RAMP (GUTTER LINE) SHALL BE BEVELED AND CENTERED ON PAINTED CROSSWALK.
3. CONSTRUCTION SHALL CONFORM TO MASSDOT CONSTRUCTION STANDARD E 107.2.1R & E 107.9.0 UNLESS OTHERWISE DIRECTED.





SECTION A–A

TYPICAL SIDEWALK & DRIVEWAY APRON
NTS

NOTE:

1. CONSTRUCTION SHALL CONFORM TO MASSDOT CONSTRUCTION STANDARD E 107.7.0R & E 107.9.0 UNLESS OTHERWISE DIRECTED.

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SITE DEVELOPMENT PLAN PREPARED FOR:

TOWN OF STURBRIDGE

501 MAIN STREET
STURBRIDGE, MA

No.	Submittal / Revision	App'd.	By	Date

CONSTRUCTION DETAILS

Designed By:	Drawn By:	Checked By:
PMP	ZBC/PMP	
Issue Date:	Project No:	Scale:
10/29/2020	065470	AS NOTED

Drawing No.:

SHEET 4 OF 5

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EROSION AND SEDIMENTATION CONTROL DETAILS

PROJECT NARRATIVE

THIS PROJECT CONSISTS OF THE CONSTRUCTION OF PUBLIC PARKING AND PEDESTRIAN ACCESS ON ±0.5 ACRES IN THE TOWN OF STURBRIDGE, MASSACHUSETTS. THE LOCATION OF THE SITE IS ON THE SOUTH SIDE OF MAIN STREET (ROUTE 20) APPROXIMATELY 500' WEST OF ARNOLD ROAD. THIS PROJECT WILL CONSIST OF PAVED PARKING, CONCRETE SIDEWALKS, AND LIGHTING.

IT IS ANTICIPATED THAT APPROXIMATELY 0.45 ACRES OF THE 0.5 ACRE SITE WILL BE DISTURBED DURING THE CONSTRUCTION OF THE FACILITY.

THE PROJECT SHALL BE DEVELOPED IN A SINGLE PHASE, HOWEVER, DISTURBED AREAS SHALL BE STABILIZED AT MILESTONE POINTS DURING CONSTRUCTION. ALL WORK SHALL BE SCHEDULED SUCH THAT STABILIZATION COINCIDES WITH THE ABILITY TO VEGETATE DISTURBED AREAS, APRIL 1 THROUGH JUNE 15 AND AUGUST 15 THROUGH OCTOBER 1.

THIS PROJECT REQUIRES THE FOLLOWING APPROVALS:
CONSERVATION COMMISSION
PLANNING BOARD

ESTIMATED CONSTRUCTION SCHEDULE

A. INSTALL EROSION AND SEDIMENT CONTROL SYSTEMS – APRIL, 2021

B. ROUGH GRADE SITE – APRIL, 2021

C. CONSTRUCT PARKING – MAY, 2021

D. FINISH GRADE SITE AND INSTALL LANDSCAPING – JUNE, 2021

GENERAL NOTES

A. ELEVATIONS ARE BASED ON AN ASSUMED DATUM.

B. ALL UTILITIES SHALL BE APPROVED BY LOCAL UTILITY COMPANIES PRIOR TO CONSTRUCTION; ALL UTILITIES SHALL BE CONSTRUCTED TO UTILITY COMPANY SPECIFICATIONS.

C. ALL CONSTRUCTION SHALL BE TO TOWN SPECIFICATIONS & REGULATIONS.

D. NO CHANGES CAN BE MADE TO THESE PLANS WITHOUT THE TOWN'S APPROVAL.

E. CONTRACTOR SHALL OBTAIN ALL REQUIRED LOCAL & STATE PERMITS PRIOR TO BEGINNING ANY CONSTRUCTION.

F. FIELD CHANGES SHALL HAVE PRIOR APPROVAL OF THE TOWN.

G. CATCH BASIN TOPS SHALL NOT BE CEMENTED DOWN UNTIL FINAL GRADES ARE SET.

H. UNLESS OTHERWISE NOTED OR SPECIFIED, ALL ROADWAYS & STORM DRAINAGE SHALL BE CONSTRUCTED IN CONFORMANCE WITH THE COMMONWEALTH OF MASSACHUSETTS, D.O.T. "STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, 1995". SIMILARLY PERTINENT CONSTRUCTION DETAILS THAT ARE NOT INCLUDED WITH THESE DRAWINGS SHALL CONFORM TO THE COMMONWEALTH OF MASSACHUSETTS, D.O.T. STANDARD ROADWAY DRAWINGS.

I. CONTRACTOR SHALL NOTIFY THE TOWN OF CONSTRUCTION SCHEDULE SO THAT INSPECTION MAY BE PROVIDED.

J. UNDERGROUND UTILITY, STRUCTURE AND FACILITY LOCATIONS DEPICTED ON PLANS HAVE BEEN COMPILED, IN PART, FROM RECORD MAPPING SUPPLIED BY THE RESPECTIVE UTILITY COMPANIES OR GOVERNMENTAL AGENCIES, FROM PAROL TESTIMONY, FIELD MEASUREMENTS AND FROM OTHER SOURCES. THESE LOCATIONS MUST BE CONSIDERED APPROXIMATE IN NATURE. ADDITIONALLY, OTHER SUCH FEATURES MAY EXIST ON THE SITE, THE EXISTENCE OF WHICH ARE UNKNOWN TO CHA THE SIZE, LOCATION AND EXISTENCE OF ALL SUCH FEATURES MUST BE FIELD DETERMINED AND VERIFIED BY THE APPROPRIATE AUTHORITIES PRIOR TO CONSTRUCTION.

K. CONTACT "DIG SAFE" AT 1–888–344–7233 TWO (2) WORKING DAYS PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY.

SEEDING SPECIFICATIONS

A. IF GROUND HAS BEEN PREVIOUSLY MULCHED, MULCH MUST BE REMOVED OR ADDITIONAL NITROGEN MUST BE ADDED.

B. REMOVE ALL SURFACE STONES 2" OR LARGER AS WELL AS ALL DEBRIS SUCH AS WIRE, CABLE, TREE ROOTS, PIECES OF CONCRETE, CLODS, CLUMPS, OR OTHER UNSUITABLE MATERIAL.

C. APPLY FERTILIZER AT 7.5 POUNDS PER 1,000 SQUARE FEET AND LIME AT 200 POUNDS PER 1,000 SQUARE FEET UNLESS SOIL TESTING FOR REQUIREMENTS IS PERFORMED.

D. NO MOWING IS TO BE UNDERTAKEN UNTIL THE MAJORITY OF THE VEGETATION IS AT LEAST 6" HIGH. MOWING SHOULD CUT THE TOP 1/3 OF VEGETATION. DO NOT UNDER ANY CIRCUMSTANCES CUT VEGETATION BELOW 3".

E. DO NOT APPLY ANY FORM OF WEED CONTROL UNTIL GRASS HAS BEEN MOWED AT LEAST 4 TIMES.

F. THESE SEEDING MEASURES ARE NOT TO BE USED ON SLOPES IN EXCESS OF 2:1 GRADING.

G. PERMANENT SEEDING MEASURES ARE TO BE USED INSTEAD OF TEMPORARY SEEDING MEASURES WHERE WORK IS TO BE SUSPENDED FOR A PERIOD OF TIME LONGER THAN 1 YEAR.

H. IF THERE IS NO EROSION, BUT SEED SURVIVAL IS LESS THAN 100 PLANTS PER SQUARE FOOT AFTER 4 WEEKS OF GROWTH, RE–SEED AS PLANTING SEASON ALLOWS.

SILT FENCE SPECIFICATIONS

A. SYNTHETIC FILTER FABRIC SHALL BE A PERVIOUS SHEET OF PROPYLENE, NYLON, POLYESTER, ETHYLENE, OR SIMILAR FILAMENTS AND SHALL BE CERTIFIED BY THE MANUFACTURER OR SUPPLIER AS CONFORMING TO THE FOLLOWING MINIMUM REQUIREMENTS:

1. FILTERING EFFICIENCY	75 PERCENT (MIN)
2. GRAB TENSILE STRENGTH	100 POUNDS
3. ELONGATION AT FAILURE	15 PERCENT
4. MULLEN BURST STRENGTH	250 POUNDS PER SQUARE INCH
5. PUNCTURE STRENGTH	50 POUNDS
6. APPARENT OPENING SIZE	0.60mm< X <0.90mm
7. FLOW RATE	0.2 GALLONS PER SQUARE FOOT PER MINUTE
8. PERMITTIVITY	0.05 PER SECOND (MIN)
9. ULTRAVIOLET RADIATION STABILITY	70 PERCENT AFTER 500 HOURS OF EXPOSURE (MIN)

B. STAKES ARE TO BE MADE OUT OF HARDWOOD WITH A MINIMUM CROSS SECTIONAL AREA OF 1.5 SQUARE INCHES OR STEEL POSTS WITH A MINIMUM WEIGHT OF 0.5 POUNDS PER LINEAR FOOT.

C. TORN OR PUNCTURED GEOTEXTILES SHALL NOT BE USED.

D. ON SLOPES WHERE SURFACE FLOW FOLLOWS THE SILT FENCE LINE, PERPENDICULAR SILT FENCE CHECKS SHALL BE INSTALLED AT 50 FOOT INTERVALS.

E. LINES OF SILT FENCE SHOULD FOLLOW CONTOUR LINES 5–10 FEET DOWN GRADIENT FROM THE SLOPE. WHERE CONTOUR LINES CAN NOT BE FOLLOWED PERPENDICULAR WINGS SHOULD BE PLACED AT 50 FOOT INTERVALS.

CONSTRUCTION SEQUENCE

A. STAKEOUT LIMIT OF DISTURBANCE.

B. HOLD A PRECONSTRUCTION MEETING.

C. CONTACT "DIG SAFE" AT 1–888–344–7233 TWO (2) WORKING DAYS PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY.

D. INSTALL THE CONSTRUCTION ENTRANCE.

E. INSTALL PERIMETER FILTER (SILT FENCE).

F. PERFORM ALL NECESSARY CLEARING AND GRUBBING OPERATIONS.

G. EXCAVATE & DISPOSE OF ALL STUMPS OFF SITE.

H. STRIP ALL TOPSOIL WITHIN THE FOOTPRINT OF THE CONSTRUCTION SITE. STOCKPILE OFF–SITE.

I. ROUGH GRADE SITE. REMOVE & DISPOSE OF UNSUITABLE SOILS & REPLACE WITH GRAVEL BORROW AS REQUIRED.

J. PRIOR TO INSTALLATION OF SURFACE WATER CONTROLS SUCH AS TEMPORARY DIVERSIONS AND STONE DIKES, INSPECT EXISTING CONDITIONS TO ENSURE DISCHARGE LOCATIONS ARE STABLE. IF NOT STABLE, REVIEW DISCHARGE CONDITIONS WITH THE DESIGN ENGINEER AND IMPLEMENT ADDITIONAL STABILIZATION MEASURES PRIOR TO INSTALLING WATER SURFACE CONTROLS.

K. STABILIZE CUT AND FILL SLOPES.

L. PLACE BINDER COURSE PAVEMENT.

M. INSTALL GRANITE CURBING.

N. CONSTRUCT CONCRETE SIDEWALKS.

O. CONSTRUCT STORMWATER BASIN

P. PLACE TOPSOIL WHERE REQUIRED. INSTALL PERIMETER LANDSCAPE PLANTINGS.

Q. FINISH GRADE SIDE SLOPES, SEED AND MULCH.

R. PLACE TOP COURSE PAVEMENT.

S. COMPLETE THE BALANCE OF SITE WORK AND STABILIZATION OF ALL OTHER DISTURBED AREAS.

T. REMOVE TREE PROTECTION MEASURES.

U. ALL REMAINING EXPOSED AREAS SHALL BE LOAMED, SEEDED AND MULCHED OR SODDED WITHIN 14 DAYS OF FINAL GRADING.

V. REMOVE TEMPORARY EROSION AND SEDIMENT CONTROLS.

W. CONTRACTOR TO REMOVE ANY ACCUMULATED SEDIMENT FROM DRAINAGE STRUCTURES OR BASINS.

NOTE: SEVERAL OF THE ABOVE ACTIVITIES MAY BE DONE SIMULTANEOUSLY.

EROSION & SEDIMENT CONTROL OPERATIONS & MAINTENANCE

A. EROSION AND SEDIMENTATION CONTROL AND RESTORATION MEASURES SHALL CONFORM TO THE "1997 MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS", PUBLISHED BY THE MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION, BUREAU OF RESOURCE PROTECTION; AND TO TOWN REGULATIONS.

B. INSTALLATION OF SEDIMENT AND EROSION CONTROLS SUCH AS WATTLES AND SILT FENCES SHALL BE ESTABLISHED PRIOR TO COMMENCING ANY LAND DISTURBANCE ACTIVITIES.

C. ALL STOCKPILED MATERIAL SHALL BE RINGED WITH WATTLES OR SILT FENCES. ANY MATERIAL TO BE STOCKPILED LONGER THAN 14 DAYS SHALL BE STABILIZED WITH TEMPORARY SEEDING OR JUTE NETTING.

D. PAVEMENT AND CURBING SHOULD BE INSTALLED AS SOON AS POSSIBLE AFTER STORM DRAINAGE IS INSTALLED.

E. CATCH BASINS SHALL BE PROTECTED FROM SEDIMENTATION UNTIL ALL AREAS ARE PERMANENTLY VEGETATED OR STABILIZED.

F. CATCH BASIN SUMPS SHALL BE CLEANED OF SILT PERIODICALLY DURING CONSTRUCTION.

G. WATTLES OR SILT FENCE SHALL BE PLACED 5–10 FEET FROM THE TOE OF ALL CRITICAL SLOPES AS SHOWN ON THE PLAN. THESE SHALL BE CHECKED BY THE CONTRACTOR REGULARLY AND REPAIRED WHENEVER THEY FAIL TO ENSURE CLEAN RUN–OFF FROM THE SITE.

H. ADDITIONAL CONTROL MEASURES IF REQUESTED BY THE CITY SHALL BE INSTALLED IMMEDIATELY UPON REQUEST.

I. ALL DISTURBED AREAS SHALL BE PROTECTED WITH A MINIMUM VEGETATION COVER AS SHOWN IN ACCOMPANYING CHART.

J. THE CONTRACTOR SHALL PLAN ALL LAND DISTURBING ACTIVITIES IN A MANNER AS TO MINIMIZE THE EXTENT OF THE DISTURBED AREAS.

K. THE CONTRACTOR SHALL MAKE DAILY INSPECTIONS OF THE SITE TO INSURE EFFECTIVENESS OF EROSION AND SEDIMENTATION CONTROL MEASURES AND WILL IMMEDIATELY MAKE NECESSARY REPAIRS IF REQUIRED BY THE CITY.

L. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE INSPECTED AT A MINIMUM OF ONCE A WEEK AND WITHIN 24 HOURS OF THE END OF A STORM WITH A RAINFALL AMOUNT OF 0.1 INCHES OR GREATER TO DETERMINE MAINTENANCE NEEDS.

M. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE REPLACED WITHIN 24 HOURS OF AN OBSERVED FAILURE.

N. ALL CONSTRUCTION TRAFFIC SHALL ENTER AND LEAVE BY THE DESIGNATED ENTRANCE. THIS ENTRANCE SHALL BE CONSTRUCTED OF CRUSHED STONE TO HELP FREE TIRES OF SOIL WHEN LEAVING THE SITE. THE CONTRACTOR SHALL INSTRUCT ALL VEHICLE DRIVERS TO CLEAN SOIL MATERIAL FROM TIRES IN FRONT OF THE SITE. ALL SOIL, MISCELLANEOUS DEBRIS, OR OTHER MATERIAL SPILLED, DUMPED OR OTHERWISE DEPOSITED ON PUBLIC STREETS, HIGHWAYS, SIDEWALKS OR OTHER PUBLIC THOROUGHFARES DURING TRANSIT TO OR FROM THE SITE SHALL BE REMOVED PROMPTLY.

O. THE CONTRACTOR HEREBY ACKNOWLEDGES HIS RESPONSIBILITY TO INSTALL SOIL EROSION AND SEDIMENTATION CONTROL MEASURES ON THIS SITE AND THAT HIS FAILURE TO INSTALL AND MAINTAIN THESE DEVICES COULD RESULT IN FINES OR SUSPENSION OF WORK BY THE CITY.

P. MINIMIZE OR ELIMINATE ANY UNNECESSARY LAND DISTURBANCE OR CLEARING.

STORMWATER OPERATION AND MAINTENANCE

STORMWATER FACILITY
OPERATION AND MAINTENANCE PLAN:

OWNER: TOWN OF STURBRIDGE, 308 MAIN STREET, STURBRIDGE, MASSACHUSETTS.

RESPONSIBILITY:

OWNER OR ITS ASSIGNS SHALL BE RESPONSIBLE FOR IMPLEMENTATION OF THE OPERATION AND MAINTENANCE PLAN FOR THE MUNICIPAL PARKING LOT AT 501 MAIN STREET AND FOR ANY CORRECTIVE ACTION REQUIRED.

CONSTRUCTION PHASE

GENERAL PROVISIONS:

1. CONTRACTOR TO INSTALL AND MAINTAIN DRAINAGE FACILITIES AS SHOWN ON THE PLAN SET TITLED: "SITE DEVELOPMENT PLAN, PREPARED FOR, TOWN OF STURBRIDGE, 501 MAIN STREET, STURBRIDGE, MASSACHUSETTS", DATED SEPTEMBER 29, 2020, PREPARED BY CHA.
2. PRIOR TO CONSTRUCTION, ALL EROSION/SILTATION CONTROL DEVICES SHOWN ON ABOVE PLAN SHALL BE INSTALLED. TO PREVENT SILT INTRUSION INTO THE DRAINAGE SYSTEM DURING CONSTRUCTION, THE CONTRACTOR IS TO INSTALL INLET PROTECTION AT ALL CATCH BASINS AND SET SILT FENCE AT ALL SLOPES WHICH MAY ERODE IN THE DIRECTION OF ANY OPEN DRAINAGE FACILITIES. SUCH PREVENTIVE MEASURES ARE TO BE MAINTAINED THROUGHOUT THE CONSTRUCTION PROCESS.
3. EROSION CONTROLS ARE TO BE INSPECTED ON A DAILY BASIS. UPON DISCOVERY, THE CONTRACTOR SHALL REMOVE ANY SEDIMENT FROM AN EROSION CONTROL STRUCTURE.
4. ALL EXPOSED SOILS SHALL BE IMMEDIATELY STABILIZED TO PREVENT EROSION.
5. UPON INSTALLATION OF CATCH BASINS, INLET PROTECTION SHALL BE INSTALLED AND MAINTAINED UNTIL READY FOR PAVING.
6. PRIOR TO CONSTRUCTION OF IMPERVIOUS AREAS, ALL DRAINAGE STRUCTURES AND PIPES SHALL BE INSTALLED AND INSPECTED FOR PROPER FUNCTION. DURING CONSTRUCTION OF OTHER SITE FEATURES, DRAINAGE FACILITIES SHALL BE INSPECTED ON A DAILY BASIS AND CLEANED/REPAIRED IMMEDIATELY UPON DISCOVERY OF SEDIMENT BUILD–UP OR DAMAGE.
7. AFTER PAVING IS INSTALLED, IT SHALL BE SWEPT CLEAN ON A MONTHLY BASIS.

RAIN GARDEN:

1. CONTRACTOR TO INSPECT WEEKLY OR AFTER EACH 0.5 INCH RAIN EVENT.
2. CONTRACTOR RESPONSIBLE FOR ALL ASSOCIATED MOWING DURING CONSTRUCTION. (MOWING SHOULD BE PERFORMED WHEN GROUND IS DRY TO AVOID RUTS AND COMPACTION)
3. CONTRACTOR SHALL CLEAN AND INSPECT RAIN GARDEN AFTER SITE IS COMPLETELY STABILIZED. ANY ACCUMULATED DEBRIS OR SEDIMENT SHALL BE REMOVED PRIOR TO TRANSFER TO OWNER.

POST–DEVELOPMENT PHASE

SNOW STOCKPILING:

SNOW ACCUMULATIONS REMOVED FROM STREETS AND PARKING LOTS SHALL BE PLACED IN UPLAND AREAS, WHERE SAND AND DEBRIS WILL REMAIN AFTER SNOW MELT FOR LATER REMOVAL. CARE SHOULD BE TAKEN NOT TO DEPOSIT SNOW IN THE IMMEDIATE VICINITY OF CATCH BASINS, DRAINAGE SWALES, OR SLOPES LEADING TO BODIES OF WATER, AND DRINKING WATER WELL SUPPLIES.

PAVEMENT SWEEPING:

STREETS AND PARKING LOTS SHOULD BE SWEPT CLEAN AT LEAST TWICE ANNUALLY, PREFERABLY IMMEDIATELY AFTER WINTER SNOW MELT AND BEFORE SPRING RAINS. SWEEPING DURING THIS PERIOD CAPTURES PEAK SEDIMENT LOADS AND EXTENDS THE SERVICE LIFE OF THE STORM WATER MANAGEMENT SYSTEM.

RAIN GARDEN:

RAIN GARDENS SHALL BE INSPECTED AT LEAST ANNUALLY TO ENSURE THAT THE POND IS OPERATING AS INTENDED. THE OUTLET STRUCTURE SHOULD BE INSPECTED FOR EVIDENCE OF CLOGGING OR OUTFLOW RELEASE VELOCITIES GREATER THAN DESIGN FLOW. POTENTIAL PROBLEMS THAT SHOULD BE CHECKED INCLUDE:

- § SUBSIDENCE
- § EROSION
- § CRACKING OR TREE GROWTH ON THE EMBANKMENT
- § DAMAGE TO THE EMERGENCY SPILLWAY
- § SEDIMENT ACCUMULATION AROUND OUTLET

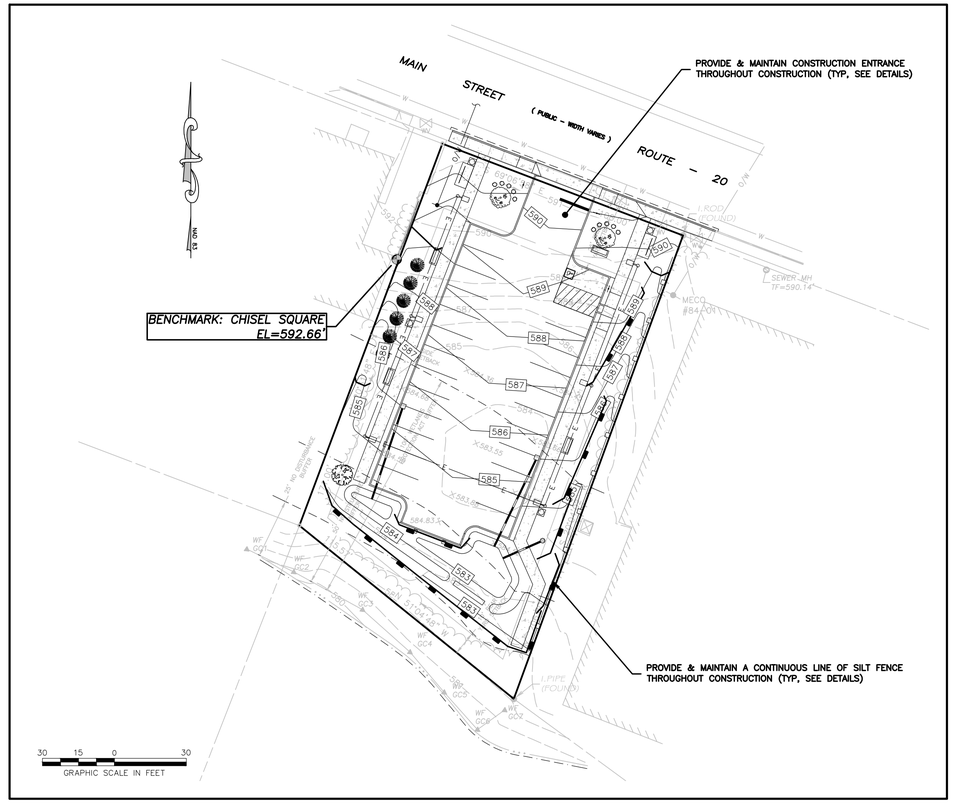
ANY NECESSARY REPAIRS SHALL BE MADE IMMEDIATELY. TRASH SHALL BE REMOVED AND THE BANKS MOWED AT LEAST TWICE PER YEAR. (MOWING SHOULD BE PERFORMED WHEN GROUND IS DRY TO AVOID RUTS AND COMPACTION) THE SEDIMENT FOREBAY SHALL BE CHECKED AND ACCUMULATED SEDIMENT REMOVED AT LEAST ANNUALLY. SEDIMENT SHALL BE REMOVED FROM THE POND AS NECESSARY, AND AT LEAST ONCE EVERY TEN YEARS.

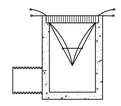
RECORD KEEPING & ANNUAL REPORTING:

RECORDS SHALL BE MAINTAINED BY THE TOWN OF STURBRIDGE AT THEIR OFFICES AND SHALL DOCUMENT ALL ROUTINE AND EMERGENCY MAINTENANCE WORK PERFORMED TO THE STORMWATER MANAGEMENT SYSTEM AND SHALL BEAR THE SIGNATURE OF THE INDIVIDUAL SUPERVISING THE WORK.

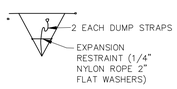
MAINTENANCE LOG

LOCATION	DESCRIPTION	DATE	INITIALS

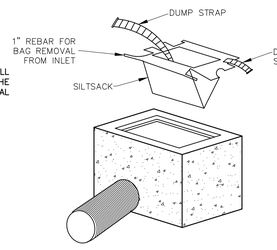




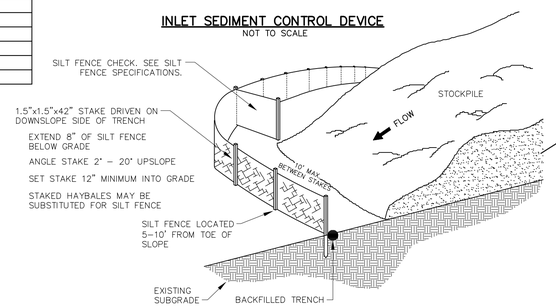
INSTALLATION DETAIL



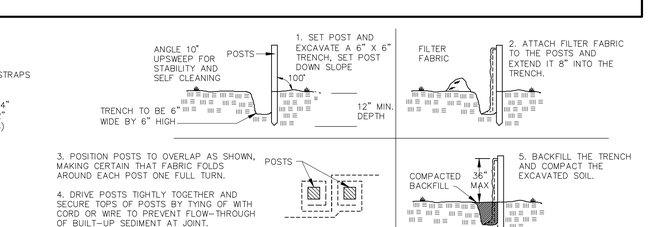
BAG DETAIL



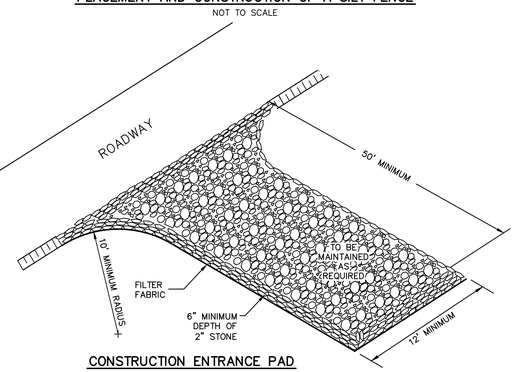
INLET SEDIMENT CONTROL DEVICE
NOT TO SCALE



SILT FENCE AT TOE OF SLOPE APPLICATION
NOT TO SCALE



PLACEMENT AND CONSTRUCTION OF A SILT FENCE
NOT TO SCALE



CONSTRUCTION ENTRANCE PAD
NTS

SUGGESTED SEEDING MIXTURES AND PRACTICES

AREAS WHERE SEED MIX APPLIES	SEEDING MIXTURES BY WEIGHT		RATE PER 1,000 SQ. FT.	SEEDING DATES
ALL LAWN AREAS	RED FESCUES KENTUCKY BLUEGRASS PERENNIAL RYEGRASS	45% 45% 10%	1 LBS.	APRIL 1 – JUNE 15 OR AUG. 15 – OCT. 1 PROJECT DATES
ROAD CUTS, FILLS, DIVERSION DITCHES, & STORMWATER BASINS	KENTUCKY TALL FESCUE REDTOP CREEPING RED FESCUE	47% 6% 47%	0.95 LBS.	APRIL 1 – JUNE 15 OR AUG. 15 – OCT. 1

WHERE TREES ARE TO BE RETAINED, THE SEED MIXTURE SHOULD BE ADAPTED FOR SHADY CONDITIONS.

TEMPORARY SEEDING	ANNUAL RYEGRASS OR PERENNIAL RYEGRASS	1–1/2 LBS.	WITHIN 7 DAYS AFTER SUSPENSION OF GRADING WORK

CHA
33 Wilbur Cross Way, Mansfield, CT 06268
101 East River Drive, 1st Floor
East Hartford, CT 06108
860-885-1055 | www.chacompanies.com

SITE DEVELOPMENT PLAN PREPARED FOR:

TOWN OF STURBRIDGE

501 MAIN STREET
STURBRIDGE, MA

No.	Submittal / Revision	App'd.	By	Date

EROSION & SEDIMENT CONTROL PLAN

Designed By:	Drawn By:	Checked By:
PMP	ZBC/PMP	
Issue Date:	Project No:	Scale:
10/29/2020	065470	AS NOTED

Drawing No.:

SHEET 5 OF 5

SOILS MAPPING

Map Scale: 1:1,180 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

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

MAP LEGEND

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

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

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

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

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

Soil Survey Area: Worcester County, Massachusetts, Southern Part
Survey Area Data: Version 13, Jun 11, 2020

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

Date(s) aerial images were photographed: May 18, 2019—Jul 9, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Water	0.8	18.8%
2A	Pootatuck fine sandy loam, 0 to 3 percent slopes	1.5	37.5%
420B	Canton fine sandy loam, 3 to 8 percent slopes	1.8	43.7%
Totals for Area of Interest		**4.1**	**100.0%**

Map Scale: 1:1,180 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

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Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		0.8	18.8%
2A	Pootatuck fine sandy loam, 0 to 3 percent slopes	B	1.5	37.5%
420B	Canton fine sandy loam, 3 to 8 percent slopes	B	1.8	43.7%
Totals for Area of Interest			**4.1**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

HYDROLOGIC DATA

NOAA Atlas 14, Volume 10, Version 3
Location name: Fiskdale, Massachusetts, USA*
Latitude: 42.1147°, Longitude: -72.1083°
Elevation: 585.28 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	**0.338** (0.261-0.433)	**0.399** (0.307-0.511)	**0.498** (0.383-0.641)	**0.581** (0.444-0.752)	**0.694** (0.514-0.939)	**0.780** (0.566-1.08)	**0.869** (0.612-1.25)	**0.964** (0.648-1.43)	**1.10** (0.710-1.68)	**1.20** (0.759-1.89)
10-min	**0.479** (0.369-0.613)	**0.565** (0.435-0.725)	**0.706** (0.542-0.909)	**0.823** (0.629-1.07)	**0.984** (0.728-1.33)	**1.11** (0.802-1.53)	**1.23** (0.867-1.77)	**1.37** (0.919-2.02)	**1.55** (1.01-2.38)	**1.70** (1.08-2.67)
15-min	**0.564** (0.435-0.722)	**0.665** (0.512-0.852)	**0.830** (0.638-1.07)	**0.968** (0.740-1.25)	**1.16** (0.856-1.57)	**1.30** (0.944-1.80)	**1.45** (1.02-2.08)	**1.61** (1.08-2.38)	**1.83** (1.18-2.81)	**2.00** (1.27-3.14)
30-min	**0.759** (0.586-0.973)	**0.896** (0.691-1.15)	**1.12** (0.860-1.44)	**1.31** (0.997-1.69)	**1.56** (1.16-2.11)	**1.76** (1.27-2.43)	**1.96** (1.38-2.80)	**2.17** (1.46-3.21)	**2.47** (1.60-3.79)	**2.70** (1.71-4.24)
60-min	**0.955** (0.737-1.22)	**1.13** (0.869-1.45)	**1.41** (1.08-1.82)	**1.64** (1.25-2.13)	**1.97** (1.45-2.66)	**2.21** (1.60-3.06)	**2.46** (1.73-3.53)	**2.73** (1.84-4.04)	**3.10** (2.01-4.77)	**3.40** (2.15-5.34)
2-hr	**1.22** (0.950-1.56)	**1.44** (1.11-1.83)	**1.78** (1.38-2.28)	**2.07** (1.59-2.67)	**2.47** (1.84-3.34)	**2.77** (2.03-3.83)	**3.08** (2.20-4.44)	**3.45** (2.33-5.08)	**3.99** (2.59-6.10)	**4.43** (2.82-6.94)
3-hr	**1.40** (1.09-1.78)	**1.65** (1.29-2.10)	**2.06** (1.59-2.62)	**2.39** (1.85-3.07)	**2.85** (2.14-3.85)	**3.20** (2.35-4.42)	**3.57** (2.56-5.15)	**4.01** (2.71-5.90)	**4.68** (3.05-7.15)	**5.26** (3.34-8.21)
6-hr	**1.75** (1.38-2.21)	**2.09** (1.64-2.64)	**2.64** (2.06-3.34)	**3.10** (2.40-3.94)	**3.73** (2.82-5.01)	**4.19** (3.11-5.78)	**4.70** (3.41-6.80)	**5.33** (3.61-7.80)	**6.32** (4.12-9.61)	**7.18** (4.58-11.2)
12-hr	**2.15** (1.70-2.69)	**2.62** (2.07-3.28)	**3.39** (2.66-4.25)	**4.02** (3.14-5.09)	**4.89** (3.72-6.55)	**5.53** (4.14-7.62)	**6.24** (4.56-9.01)	**7.13** (4.85-10.4)	**8.53** (5.58-12.9)	**9.75** (6.24-15.1)
24-hr	**2.57** (2.04-3.19)	**3.17** (2.52-3.95)	**4.16** (3.29-5.20)	**4.98** (3.92-6.26)	**6.11** (4.67-8.14)	**6.94** (5.21-9.50)	**7.85** (5.77-11.3)	**9.00** (6.14-13.1)	**10.8** (7.09-16.3)	**12.4** (7.94-19.1)
2-day	**2.99** (2.39-3.69)	**3.70** (2.96-4.57)	**4.87** (3.88-6.04)	**5.84** (4.62-7.29)	**7.17** (5.52-9.49)	**8.15** (6.16-11.1)	**9.23** (6.81-13.2)	**10.6** (7.25-15.3)	**12.7** (8.38-19.1)	**14.6** (9.39-22.4)
3-day	**3.26** (2.62-4.00)	**4.04** (3.24-4.96)	**5.30** (4.24-6.55)	**6.36** (5.05-7.90)	**7.80** (6.03-10.3)	**8.87** (6.72-12.0)	**10.0** (7.43-14.3)	**11.5** (7.91-16.6)	**13.8** (9.14-20.7)	**15.9** (10.2-24.3)
4-day	**3.49** (2.81-4.28)	**4.32** (3.47-5.29)	**5.66** (4.54-6.97)	**6.78** (5.40-8.40)	**8.32** (6.44-10.9)	**9.44** (7.18-12.8)	**10.7** (7.93-15.2)	**12.3** (8.44-17.6)	**14.7** (9.75-22.0)	**16.9** (10.9-25.8)
7-day	**4.14** (3.36-5.05)	**5.07** (4.10-6.19)	**6.58** (5.31-8.07)	**7.84** (6.28-9.67)	**9.57** (7.44-12.5)	**10.8** (8.27-14.6)	**12.2** (9.11-17.3)	**14.0** (9.67-20.0)	**16.8** (11.1-25.0)	**19.2** (12.4-29.3)
10-day	**4.81** (3.91-5.84)	**5.80** (4.71-7.05)	**7.40** (5.99-9.04)	**8.73** (7.02-10.7)	**10.6** (8.24-13.8)	**11.9** (9.11-16.0)	**13.4** (9.97-18.8)	**15.2** (10.6-21.7)	**18.1** (12.0-26.9)	**20.6** (13.3-31.3)
20-day	**6.95** (5.69-8.38)	**7.99** (6.54-9.65)	**9.70** (7.90-11.8)	**11.1** (9.00-13.6)	**13.1** (10.2-16.8)	**14.5** (11.1-19.2)	**16.1** (11.9-22.1)	**17.9** (12.4-25.3)	**20.4** (13.6-30.2)	**22.6** (14.7-34.1)
30-day	**8.74** (7.19-10.5)	**9.81** (8.05-11.8)	**11.6** (9.45-14.0)	**13.0** (10.6-15.8)	**15.0** (11.8-19.1)	**16.5** (12.6-21.6)	**18.1** (13.3-24.6)	**19.7** (13.8-27.8)	**22.0** (14.7-32.3)	**23.8** (15.5-35.9)
45-day	**11.0** (9.04-13.1)	**12.1** (9.93-14.4)	**13.9** (11.4-16.7)	**15.4** (12.5-18.6)	**17.4** (13.7-22.0)	**19.0** (14.5-24.6)	**20.6** (15.1-27.6)	**22.1** (15.5-31.0)	**24.0** (16.2-35.2)	**25.4** (16.6-38.2)
60-day	**12.8** (10.6-15.2)	**13.9** (11.5-16.6)	**15.8** (13.0-18.9)	**17.3** (14.2-20.9)	**19.4** (15.3-24.4)	**21.1** (16.2-27.1)	**22.7** (16.7-30.2)	**24.2** (17.0-33.8)	**25.9** (17.4-37.8)	**27.0** (17.7-40.6)

[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.

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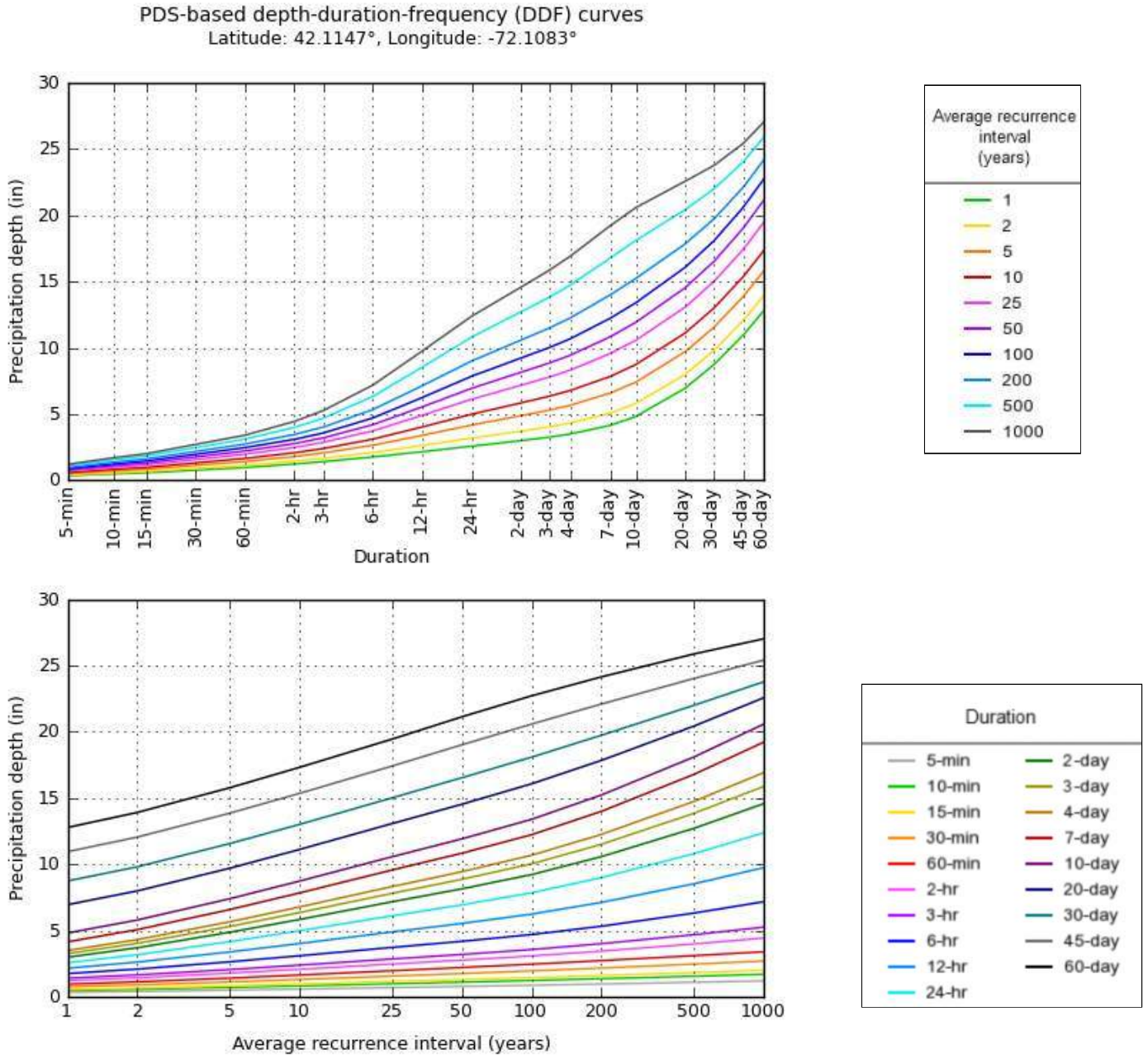
PF graphical



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Small scale terrain

NOAA Atlas 14, Volume 10, Version 3
Location name: Fiskdale, Massachusetts, USA*
Latitude: 42.1147°, Longitude: -72.1083°
Elevation: 585.28 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	**4.06** (3.13-5.20)	**4.79** (3.68-6.13)	**5.98** (4.60-7.69)	**6.97** (5.33-9.02)	**8.33** (6.17-11.3)	**9.36** (6.79-12.9)	**10.4** (7.34-15.0)	**11.6** (7.78-17.1)	**13.2** (8.52-20.2)	**14.4** (9.11-22.6)
10-min	**2.87** (2.21-3.68)	**3.39** (2.61-4.35)	**4.24** (3.25-5.45)	**4.94** (3.77-6.39)	**5.90** (4.37-7.99)	**6.64** (4.81-9.18)	**7.39** (5.20-10.6)	**8.20** (5.51-12.1)	**9.32** (6.04-14.3)	**10.2** (6.46-16.0)
15-min	**2.26** (1.74-2.89)	**2.66** (2.05-3.41)	**3.32** (2.55-4.27)	**3.87** (2.96-5.01)	**4.63** (3.42-6.26)	**5.20** (3.78-7.20)	**5.80** (4.08-8.31)	**6.43** (4.32-9.52)	**7.31** (4.73-11.2)	**8.00** (5.06-12.6)
30-min	**1.52** (1.17-1.95)	**1.79** (1.38-2.30)	**2.24** (1.72-2.88)	**2.61** (1.99-3.38)	**3.12** (2.31-4.22)	**3.51** (2.55-4.85)	**3.91** (2.75-5.61)	**4.34** (2.91-6.42)	**4.93** (3.19-7.57)	**5.40** (3.42-8.48)
60-min	**0.955** (0.737-1.22)	**1.13** (0.869-1.45)	**1.41** (1.08-1.82)	**1.64** (1.25-2.13)	**1.97** (1.45-2.66)	**2.21** (1.60-3.06)	**2.46** (1.73-3.53)	**2.73** (1.84-4.04)	**3.10** (2.01-4.77)	**3.40** (2.15-5.34)
2-hr	**0.612** (0.475-0.778)	**0.718** (0.557-0.914)	**0.892** (0.690-1.14)	**1.04** (0.797-1.33)	**1.24** (0.922-1.67)	**1.38** (1.01-1.91)	**1.54** (1.10-2.22)	**1.72** (1.16-2.54)	**1.99** (1.29-3.05)	**2.22** (1.41-3.47)
3-hr	**0.468** (0.364-0.592)	**0.550** (0.428-0.698)	**0.684** (0.531-0.871)	**0.796** (0.614-1.02)	**0.950** (0.713-1.28)	**1.06** (0.784-1.47)	**1.19** (0.853-1.72)	**1.34** (0.902-1.96)	**1.56** (1.01-2.38)	**1.75** (1.11-2.73)
6-hr	**0.293** (0.230-0.369)	**0.349** (0.274-0.440)	**0.441** (0.344-0.558)	**0.517** (0.402-0.658)	**0.622** (0.470-0.837)	**0.699** (0.519-0.966)	**0.784** (0.569-1.14)	**0.890** (0.603-1.30)	**1.06** (0.688-1.61)	**1.20** (0.764-1.86)
12-hr	**0.179** (0.141-0.223)	**0.217** (0.172-0.272)	**0.281** (0.221-0.353)	**0.334** (0.261-0.422)	**0.406** (0.309-0.544)	**0.459** (0.343-0.632)	**0.518** (0.378-0.748)	**0.592** (0.402-0.863)	**0.708** (0.463-1.07)	**0.809** (0.518-1.25)
24-hr	**0.107** (0.085-0.133)	**0.132** (0.105-0.164)	**0.173** (0.137-0.217)	**0.208** (0.163-0.261)	**0.255** (0.195-0.339)	**0.289** (0.217-0.396)	**0.327** (0.240-0.470)	**0.375** (0.256-0.544)	**0.450** (0.295-0.679)	**0.516** (0.331-0.795)
2-day	**0.062** (0.050-0.077)	**0.077** (0.062-0.095)	**0.101** (0.081-0.126)	**0.122** (0.096-0.152)	**0.149** (0.115-0.198)	**0.170** (0.128-0.231)	**0.192** (0.142-0.275)	**0.220** (0.151-0.318)	**0.265** (0.174-0.398)	**0.304** (0.195-0.466)
3-day	**0.045** (0.036-0.056)	**0.056** (0.045-0.069)	**0.074** (0.059-0.091)	**0.088** (0.070-0.110)	**0.108** (0.084-0.143)	**0.123** (0.093-0.167)	**0.139** (0.103-0.199)	**0.160** (0.110-0.230)	**0.192** (0.127-0.288)	**0.221** (0.142-0.338)
4-day	**0.036** (0.029-0.045)	**0.045** (0.036-0.055)	**0.059** (0.047-0.073)	**0.071** (0.056-0.088)	**0.087** (0.067-0.114)	**0.098** (0.075-0.133)	**0.111** (0.083-0.159)	**0.128** (0.088-0.184)	**0.154** (0.102-0.230)	**0.176** (0.114-0.269)
7-day	**0.025** (0.020-0.030)	**0.030** (0.024-0.037)	**0.039** (0.032-0.048)	**0.047** (0.037-0.058)	**0.057** (0.044-0.075)	**0.064** (0.049-0.087)	**0.073** (0.054-0.103)	**0.083** (0.058-0.119)	**0.100** (0.066-0.149)	**0.114** (0.074-0.174)
10-day	**0.020** (0.016-0.024)	**0.024** (0.020-0.029)	**0.031** (0.025-0.038)	**0.036** (0.029-0.045)	**0.044** (0.034-0.057)	**0.050** (0.038-0.067)	**0.056** (0.042-0.079)	**0.063** (0.044-0.091)	**0.075** (0.050-0.112)	**0.086** (0.056-0.130)
20-day	**0.014** (0.012-0.017)	**0.017** (0.014-0.020)	**0.020** (0.016-0.025)	**0.023** (0.019-0.028)	**0.027** (0.021-0.035)	**0.030** (0.023-0.040)	**0.033** (0.025-0.046)	**0.037** (0.026-0.053)	**0.043** (0.028-0.063)	**0.047** (0.031-0.071)
30-day	**0.012** (0.010-0.015)	**0.014** (0.011-0.016)	**0.016** (0.013-0.019)	**0.018** (0.015-0.022)	**0.021** (0.016-0.027)	**0.023** (0.018-0.030)	**0.025** (0.018-0.034)	**0.027** (0.019-0.039)	**0.031** (0.020-0.045)	**0.033** (0.022-0.050)
45-day	**0.010** (0.008-0.012)	**0.011** (0.009-0.013)	**0.013** (0.011-0.015)	**0.014** (0.012-0.017)	**0.016** (0.013-0.020)	**0.018** (0.013-0.023)	**0.019** (0.014-0.026)	**0.020** (0.014-0.029)	**0.022** (0.015-0.033)	**0.024** (0.015-0.035)
60-day	**0.009** (0.007-0.011)	**0.010** (0.008-0.012)	**0.011** (0.009-0.013)	**0.012** (0.010-0.015)	**0.014** (0.011-0.017)	**0.015** (0.011-0.019)	**0.016** (0.012-0.021)	**0.017** (0.012-0.023)	**0.018** (0.012-0.026)	**0.019** (0.012-0.028)

[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.

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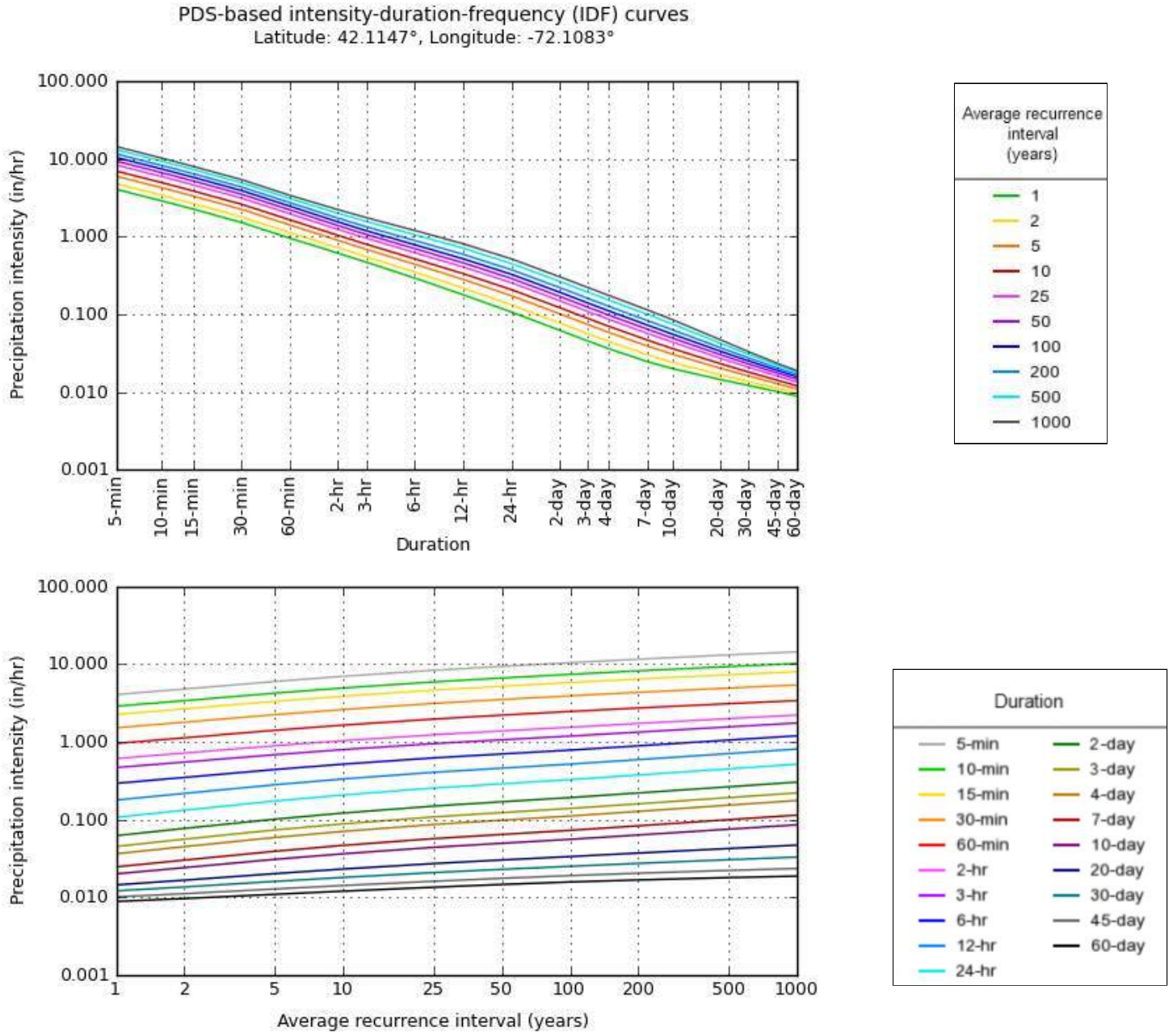
PF graphical



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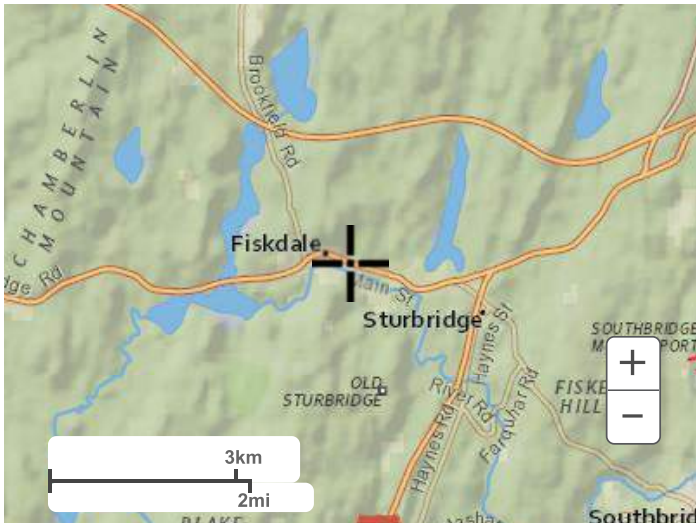
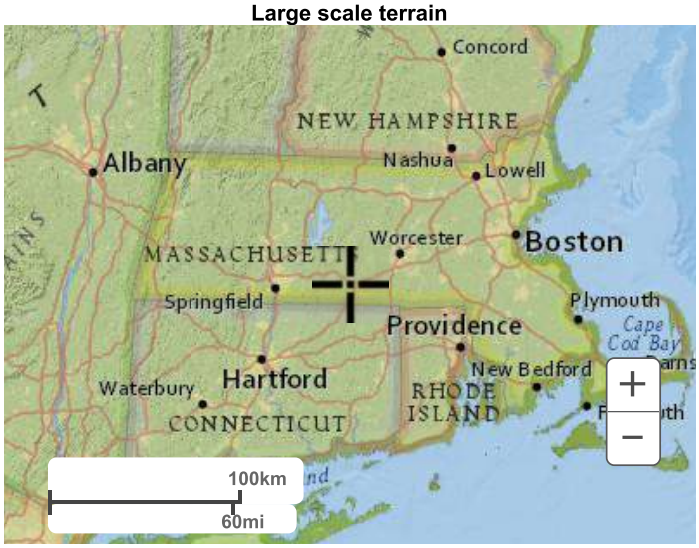
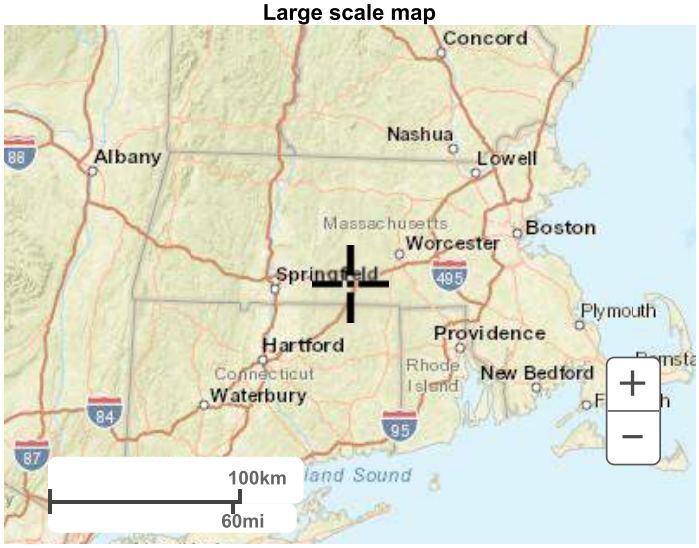


Large scale terrain



Large scale map



Large scale aerial

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