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Sudbury Conservation Commission
Sudbury Planning Board
Sudbury, MA 01776

April 23, 2024

Subject: Lot 2 Brimstone Lane, Sudbury, MA

Dear Members of the Board and Commission;

On behalf of the applicant, Carrie Maciel, please find the enclosed site plans and supporting documentation for the proposed project at Lot 2 Brimstone Lane.

The enclosed plans have been revised based upon input from the previous hearings before the Conservation Commission and as a result of the modified wetland delineation along the northerly property line. The overall limit of work has been significantly reduced to minimize alteration within regulatory buffer zones and Riverfront Area. This has been accomplished through a reduction in the house footprint (garage area) and replacement of the surface stormwater basin with a subsurface drywell located under the driveway areas.

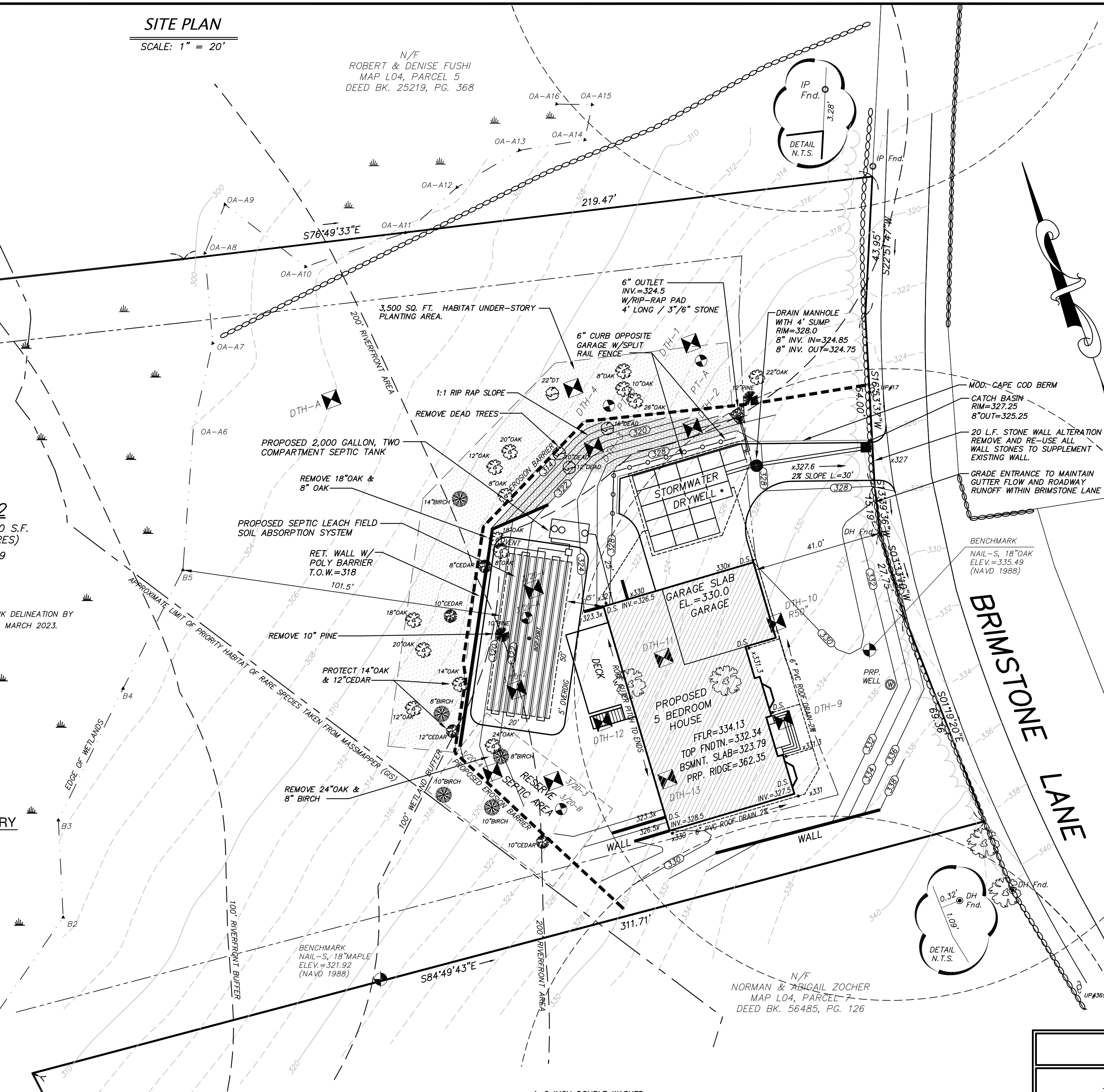
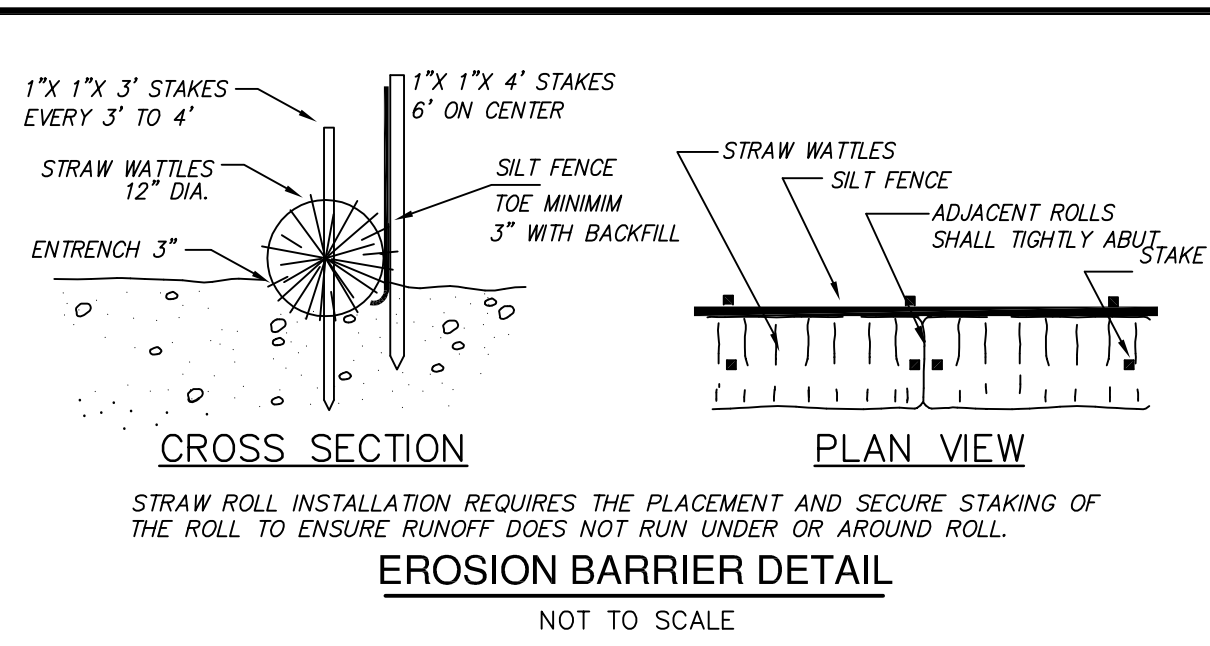
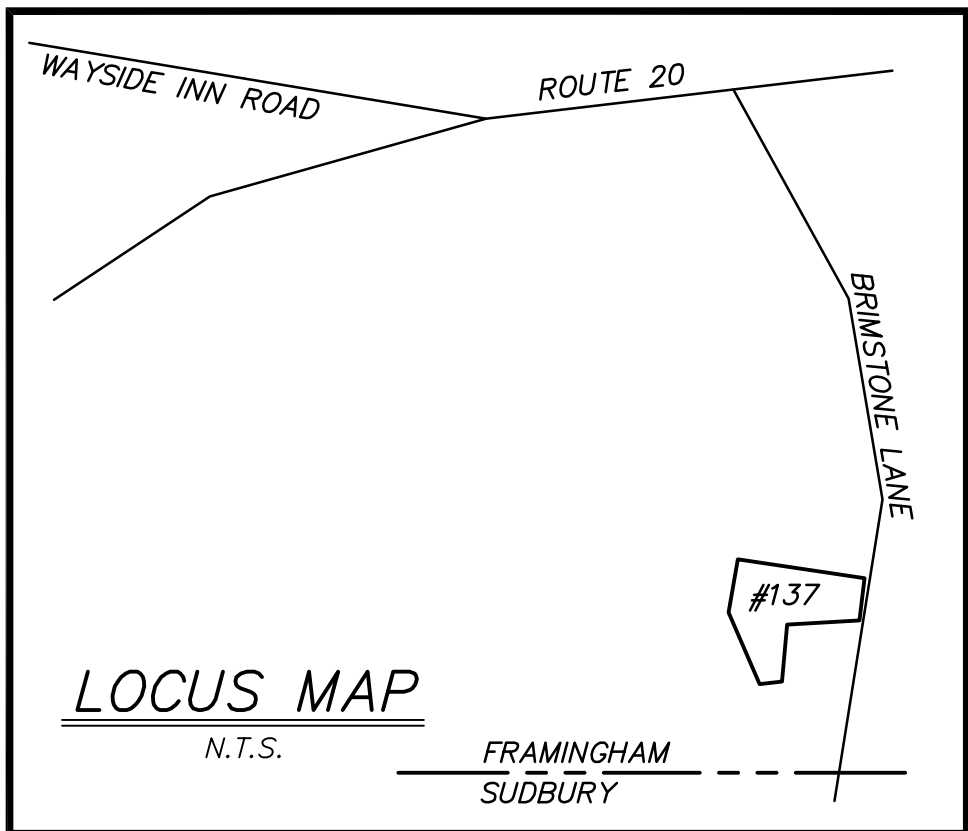
Mitigation planting have been proposed within the buffer zone at a 1.5:1 ratio to supplements the wooded areas with habitat understory plantings. the existing understory is relatively sparse, and plantings would supplement ad infill these areas.

Our office would like to thank the Board and Commission for their patience in providing the revised materials, and we look forward to discussing the project at the upcoming public hearings.

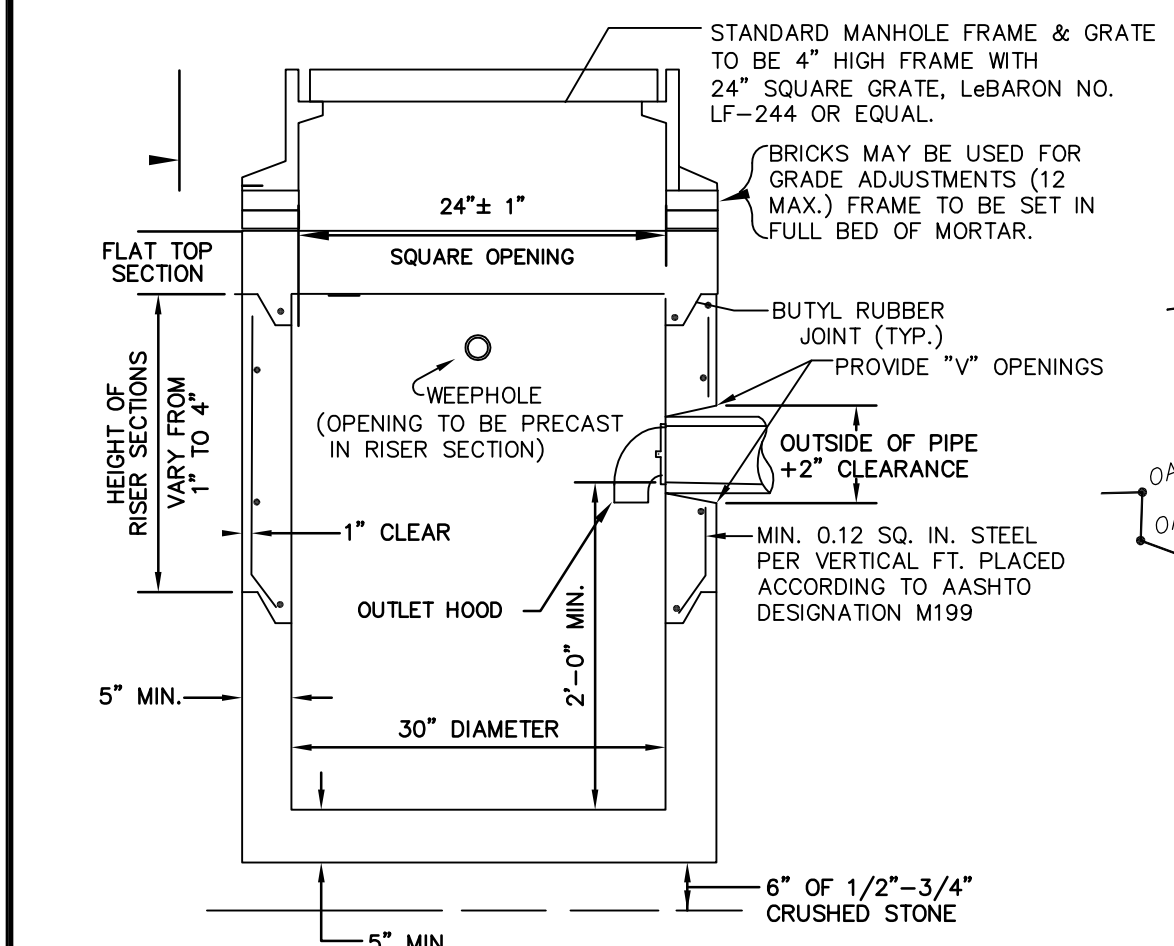
If you have any questions or require any additional information please contact this office at (508) 393-9727.

Sincerely,
Connorstone Engineering, Inc.

Vito Colonna, P.E.

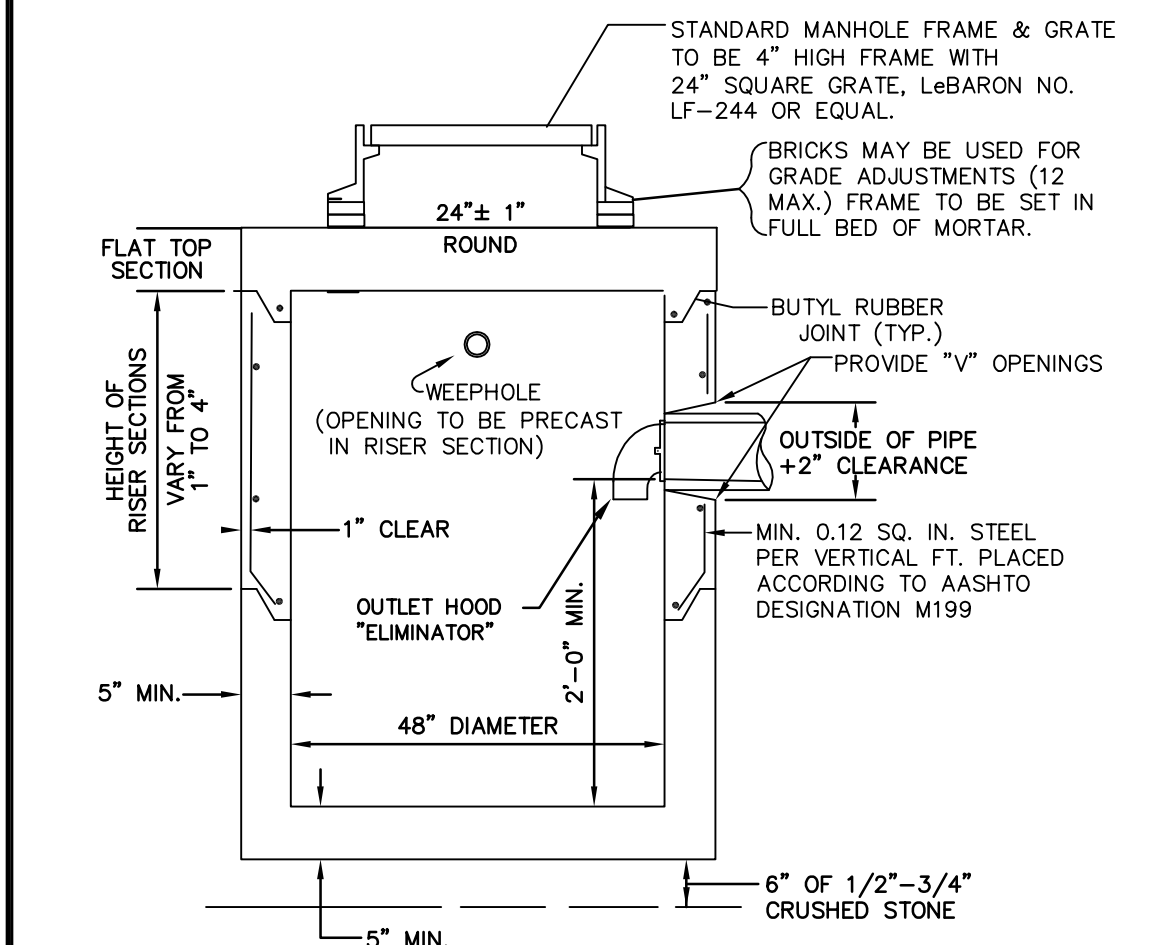


- ### SEDIMENTATION AND EROSION CONTROL NOTES:
1. ALL WORK SHALL BE IN ACCORDANCE WITH THE TOWN OF SUDBURY STORMWATER MANAGEMENT BYLAW AND IMPLEMENTING REGULATIONS.
 2. PRIOR TO INITIATING CONSTRUCTION, ALL SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE INSTALLED AS SHOWN ON THE PLANS AND DETAIL DRAWINGS. THIS PLAN DEPICTS THE MINIMUM REQUIRED SEDIMENTATION AND EROSION CONTROLS. THE CONTRACTOR SHALL EMPLOY ADDITIONAL MEASURES AS NECESSITATED BY SITE CONDITIONS, OR AS DIRECTED BY THE OWNER, THE OWNER'S REPRESENTATIVE, OR THE CONSERVATION COMMISSION TO ENSURE PROTECTION OF ALL WETLAND RESOURCES AND CONTROL SEDIMENT TRANSPORT. IF SEDIMENTATION OCCURS, THE CONTRACTOR SHALL STOP WORK AND INSTALL ADDITIONAL SEDIMENTATION CONTROL DEVICES IMMEDIATELY.
 3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL TEMPORARY AND PERMANENT SEDIMENTATION AND EROSION CONTROLS UNTIL WORK IS COMPLETE AND ALL AREAS HAVE BEEN PERMANENTLY STABILIZED. AT SUCH TIME THE CONTRACTOR IS RESPONSIBLE FOR REMOVING ALL SEDIMENTATION AND EROSION CONTROL MEASURES.
 4. THE CONTRACTOR SHALL INSPECT SEDIMENTATION AND EROSION CONTROLS ON A DAILY BASIS AND IMMEDIATELY AFTER EACH RAINFALL. REPAIRS SHALL BE MADE BY THE END OF THE WORKING DAY. ACCUMULATED SEDIMENT SHALL BE REMOVED AND DISPOSED OF BY THE CONTRACTOR, AS REQUIRED BY THE CONSERVATION COMMISSION OR AS DIRECTED BY THE ENGINEER.
 5. THE CONTRACTOR SHALL BE PREPARED TO ALLOW WORK TO WAIT A DAY OR TWO AFTER RAIN EVENTS TO ALLOW SURFACE SOILS TO DRY.
 6. SOIL STOCKPILES SHALL BE STABILIZED TO PREVENT EROSION. A SEDIMENT BARRIER SHALL BE PLACED AROUND THE BASE OF THE PERIMETER. NO MATERIALS SUBJECT TO EROSION SHALL BE STOCKPILED OVERNIGHT WITHIN 100 FEET OF A WETLAND UNLESS COVERED. EQUIPMENT SHALL NOT BE PARKED WITHIN WETLANDS OR BUFFER AREAS.
 7. DISTURBED AREAS SHALL BE STABILIZED BY LOAMING AND SEEDING, OR BY ANOTHER APPROVED METHOD, AS SOON AS POSSIBLE AFTER THE FINISHED GRADE HAS BEEN MET. DISTURBED AREAS WITH SLOPES 2:1 (H:V) OR GREATER SHALL BE STABILIZED WITH HYDROSEED AND SOIL TACKIFIER. IF FINAL GRADING DOES NOT OCCUR DURING THE GROWING SEASON, THESE AREAS SHALL BE MULCHED WITH HAY AND SECURED.
 8. DEWATERING OPERATIONS, IF REQUIRED, SHALL DISCHARGE ONTO STABILIZED AREAS AND ALL DISCHARGE WATER IS TO PASS THROUGH SEDIMENTATION CONTROL DEVICES TO PREVENT IMPACTS UPON WATER BODIES, BORDERING VEGETATED WETLANDS, DRAINAGE SYSTEMS AND ADJUTING PROPERTIES. NO DISCHARGES FROM DEWATERING OPERATIONS SHALL BE DISCHARGED DIRECTLY TO THE DRAINAGE SYSTEM.
 9. STREET SWEEPING IN THE VICINITY OF THE PROJECT AREA SHALL BE PERFORMED AS NEEDED UNTIL THE PROJECT LIMITS HAVE BEEN STABILIZED. ALL SEDIMENT TRACKED ONTO PUBLIC RIGHT-OF-WAYS SHALL BE SWEEPED AT THE END OF EACH WORKING DAY.



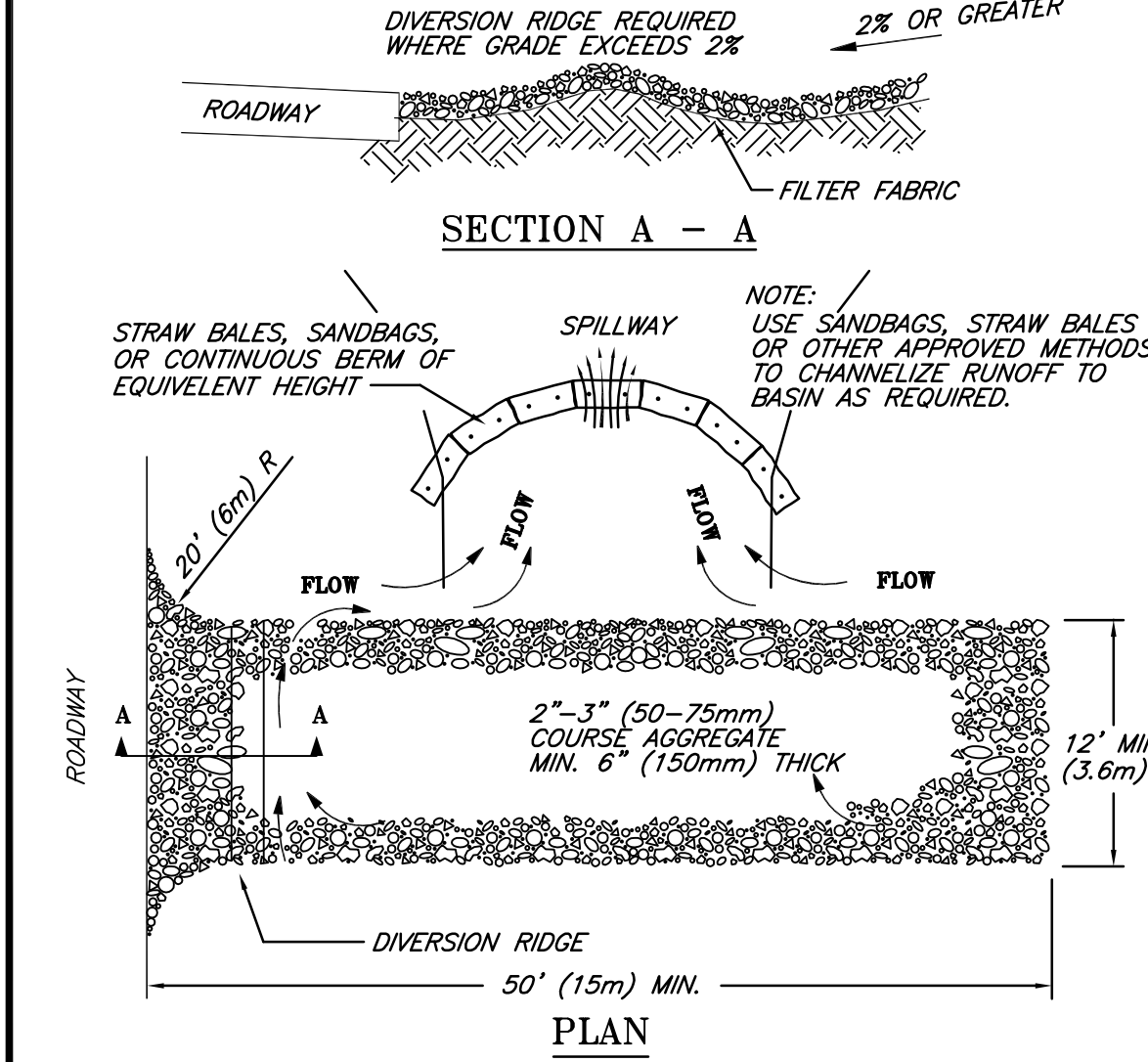
NOTE: NO BELL ENDS IN CATCH BASIN. CONNECTIONS TO BE TIGHTLY SEALED WITH MORTAR.

PRECAST CONCRETE 30" CATCH BASIN DETAIL
NOT TO SCALE



NOTE: NO BELL ENDS IN CATCH BASIN. CONNECTIONS TO BE TIGHTLY SEALED WITH MORTAR.

PRECAST CONCRETE DEEP SUMP MANHOLE DETAIL
NOT TO SCALE



BUFFER ZONE ALTERATION & MITIGATION SUMMARY

BUFFER ZONE ALTERATION AREA = 1,385 SQ. FT.

RIVERFRONT AREA (RFA) SUMMARY:
TOTAL RFA ON-SITE = 134,106
PROPOSED RFA DISTURBANCE = 1,100 SQ.FT. (0.8%)

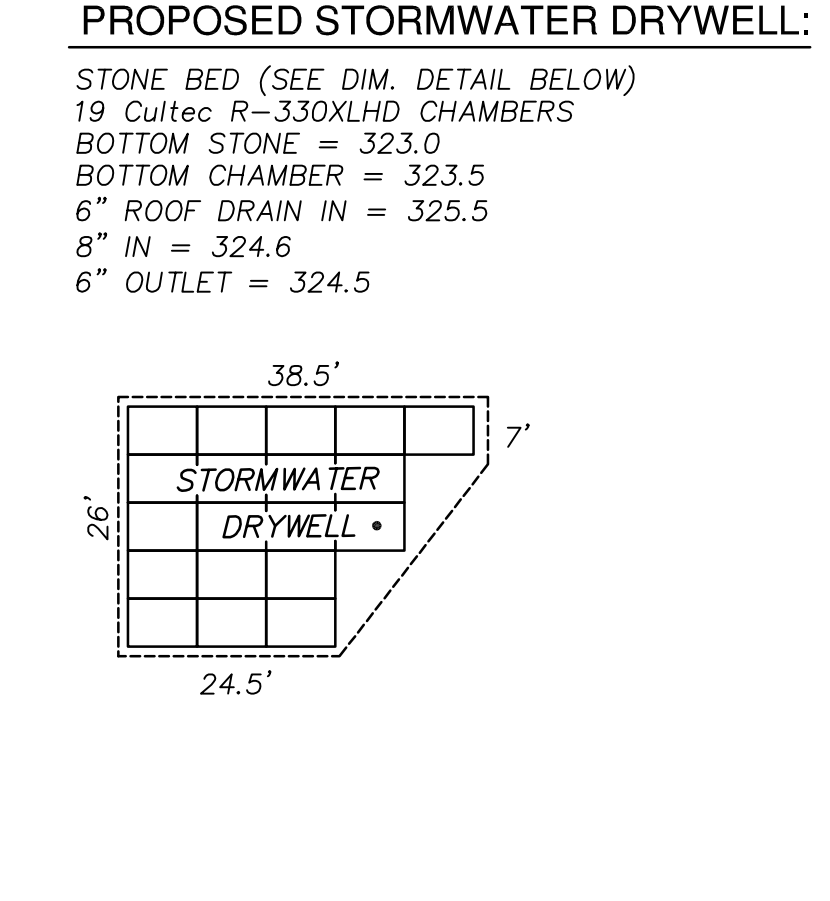
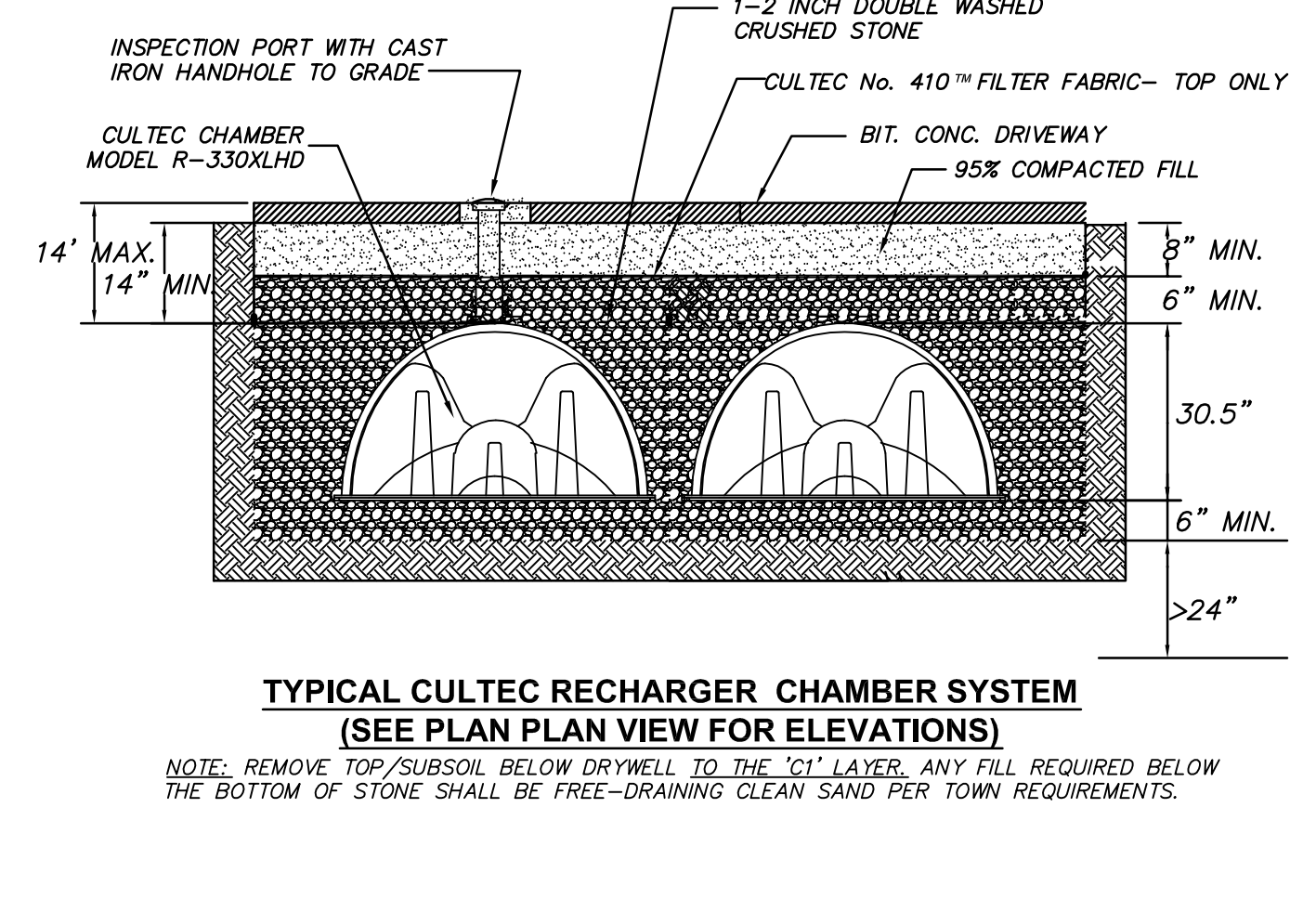
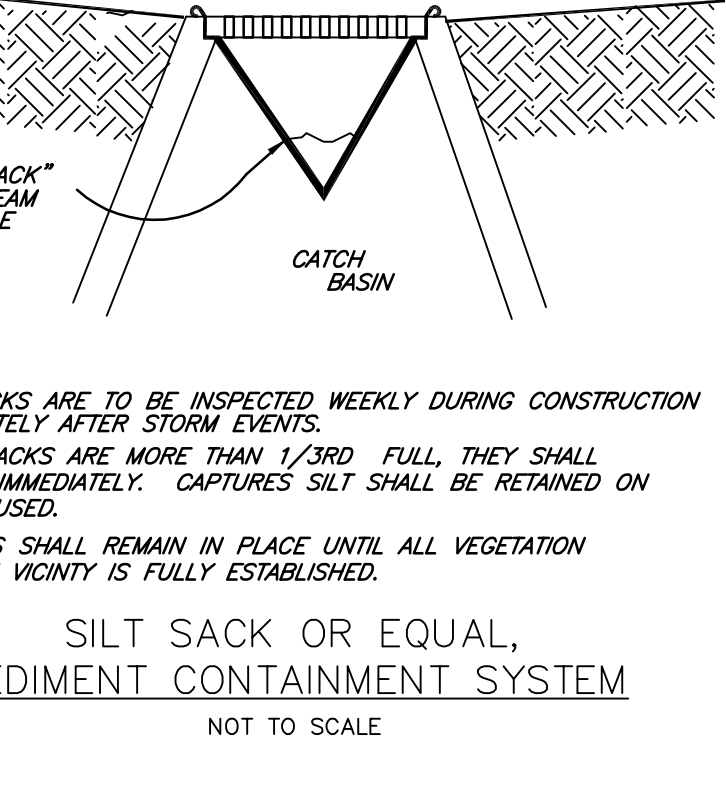
TOTAL ALTERATION AREA = 2,285 SQ.FT.
BUFFER ZONE PLUS RFA (INCLUDES OVERLAPPING AREAS)

PROPOSED TREE REMOVAL WITHIN BUFFER & RFA
24" OAK
18" OAK
8" OAK
8" BIRCH
12" PINE
(3) DEAD TREES

PROPOSED MITIGATION
REMOVE INVASIVE SPECIES WITHIN BUFFER ZONE (JAPANESE BARBERRY)
PROPOSED UNDERSTORY HABITAT PLANTING AREA WITHIN WOODED AREAS = 3,500 SQ. FT. (1.5:1 RATIO)
PLANTINGS SHALL BE NATIVE SPECIES TO INCLUDE:
• WINTERBERRY
• INK BERRY
• SPICE BUSH
OR EQUAL AS APPROVED BY THE COMMISSION
TOTAL 36 SHRUBS PLANTED ROUGHLY 1 PER 100 SQUARE FEET, TO INFILL BARE AREAS.

NOTES:
1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT
© 1994 JOHN MCCULLAH



PROPOSED STORMWATER PLAN			
APPLICANT		LOCATION	
CARRIE MACIEL		LOT 2 BRIMSTONE LANE SUDBURY, MA ASSESSORS MAP L04 & PARCEL 08	
NO.	DATE:	REVISION:	BY:
2	4/12/24	RE-DESIGN SEPTIC SYSTEM, REPOSITION HOUSE, GRADING	REM
1	1/25/24	ADDITIONAL WETLANDS, REVISE SITE LAYOUT AND GRADING	REM
CONNORSTONE ENGINEERING			
CONSULTING CIVIL ENGINEERS AND LAND SURVEYORS 10 SOUTHWEST CUTOFF, SUITE 7 NORTHBOROUGH, MASSACHUSETTS 01532 PHONE: 508-393-9727 WWW.CSEI.NET			
121 BOSTON POST RD. SUDBURY, MA. 01776 PHONE: 978-443-9566 WWW.SULLIVANCONNORS.COM			
DATE: 11/06/23		SHEET 1 OF 2	

Stormwater Management Permit Documentation

Brimstone Lane (map L04 parcel 8)
Sudbury, Massachusetts

November 6, 2023
Revised April 23, 2024

Prepared by:
Connorstone Engineering, Inc.
121 Boston Post Road
Sudbury, MA

The purpose of this analysis is to summarize the design calculations, and design a stormwater management system in accordance with the Sudbury Stormwater Management Permit.

Site Description

The subject site consists of a 164,100 SF +/- parcel located at Lot 2 Brimstone Lane, formerly part of the lot located at 137 Brimstone Lane (between #109 and #125 Brimstone Lane). The parcel is currently undeveloped and in a wooded condition. Site topography slopes from southeast to northwest (away from Brimstone Lane) with an average grade of 15% to 25%. The project site is abutted on all three sides (side lines and rear line) by existing residential homes and reservation land.

The available soil mapping classifies the on-site soils mostly as Hollis-Rock outcrop-Charlton Complex which is a hydrologic soil group D soil due to shallow depth to ledge. Soil testing and site observations agree with this mapping. Areas of shallow rock and rock outcroppings are visible at the surface. Soil testing was performed in the area of the septic system, stormwater system, and development area. The testing showed the soil substratum consists of a mix of sandy loam or loamy sand, areas of shallow rock, and evidence of groundwater (mottling) 42 to 68 inches below grade. Percolation rates within the septic area ranged from 6 to 13 minutes per inch.

The existing site is currently undeveloped with wooded uplands along the easterly half of the site abutting Brimstone Lane, and then transitioning to regulated wetlands along the westerly half of the site in the areas of lower elevation. The site topography slopes down away from Brimstone Lane toward the wetland areas at moderately steep slopes of approximately 20%. Under the existing conditions stormwater flows overland from the high point along Brimstone Lane toward the wetlands in the rear. No stormwater controls or collection currently exist on-site.

Wetland resource areas onsite have been delineated on site by Oxbow Associates in March of 2023, and December 2023. Those resource areas include an perennial stream flowing through the rear of the site, along with associated bordering vegetated wetlands to the rear and side of the site. The stream is an unnamed stream flowing from Carding Mill Pond through the project site and the crossing the town line into Framingham, and does not have any associated flood hazard areas. The buffer zone and riverfront areas on-site currently consist of undeveloped woodlands.

Proposed Project:

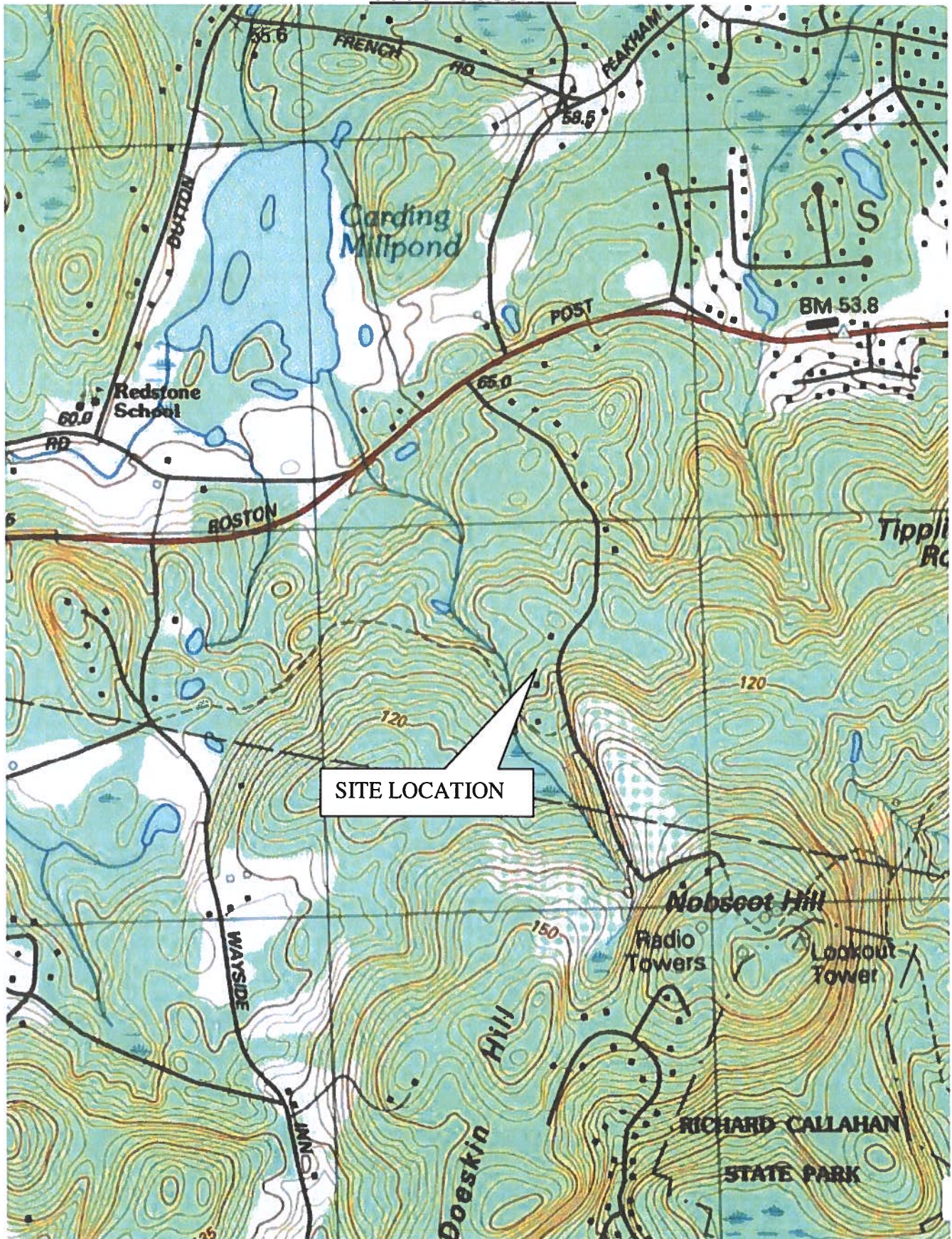
The proposed project includes construction of a five bedroom single-family residential dwelling including driveway access, septic system, utility connections, drainage, landscaping, and associated site work. The proposed project will result in a total impervious area of approximately 7,150 sq. ft., and the total disturbed area on-site is 19,620 square feet. The existing slopes on-site are generally greater than 10%, and this disturbance on slopes has triggered the need for a Major Stormwater Permit. The site has been designed to match the existing conditions for recharge, peak rate of runoff, and volume of runoff that may discharge from the property. Mitigation has been provided through a large drywell system located under the proposed driveway.

The proposed drywell is a typical subsurface structure consisting of plastic chambers within a crushed stone bed located under the driveway. The location was selected to be downgradient of the roof areas and to be located in an area of fill to allow the elevation of the system to be sufficiently above the seasonal high groundwater elevation.

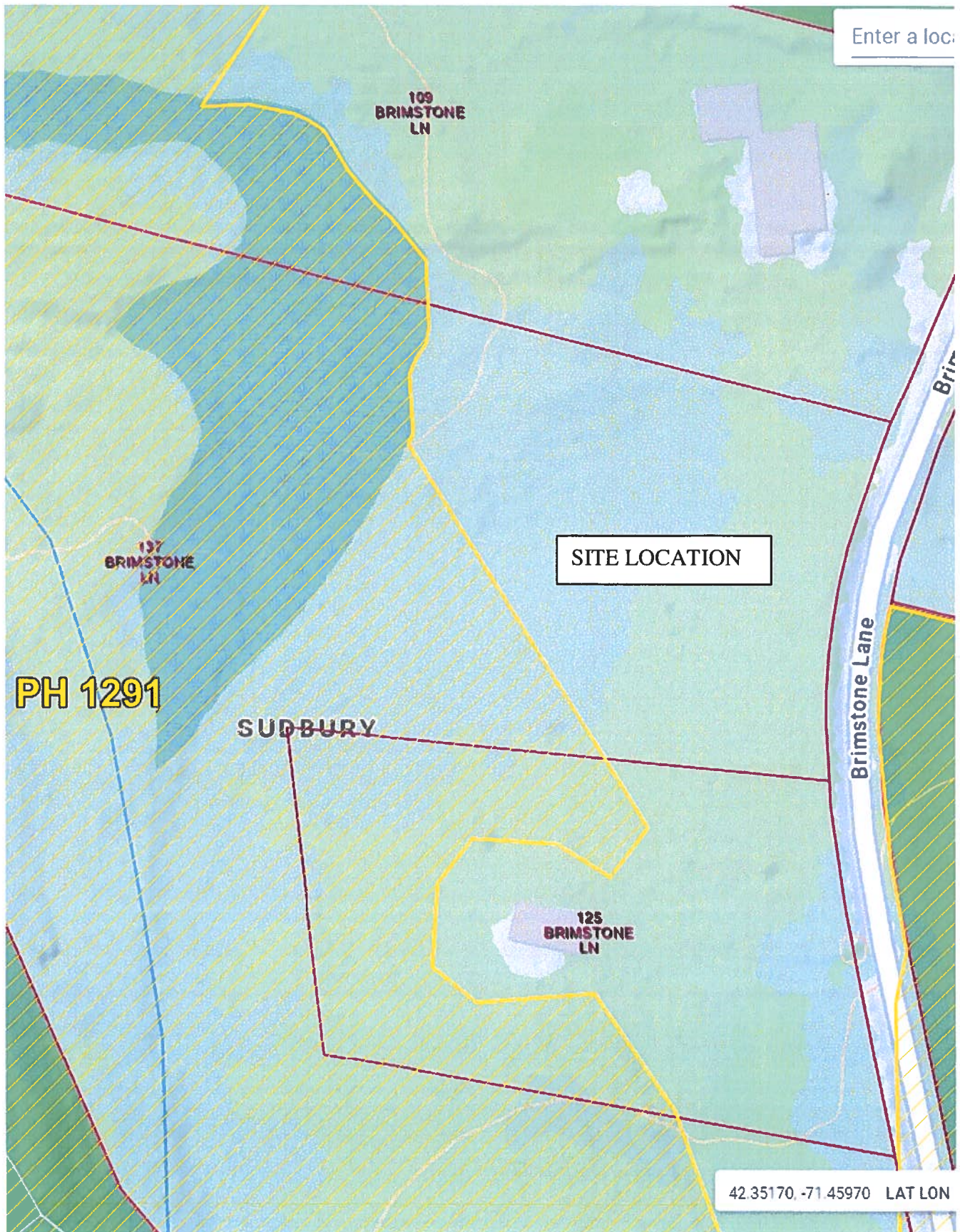
Per the Stormwater bylaw, low impact techniques had been investigated with the potential use of a rain garden. However this option was not preferred due to additional disruption/disturbances within the buffer zone. The proposed design would minimize land disturbances, which is also considered Low Impact Development measure.

As required under the Permit Standards and Requirements, the proposed project has been designed in compliance with MassDEP Stormwater Standards and the additional criteria under the regulations. A detailed summary of each standard is provided with this report.

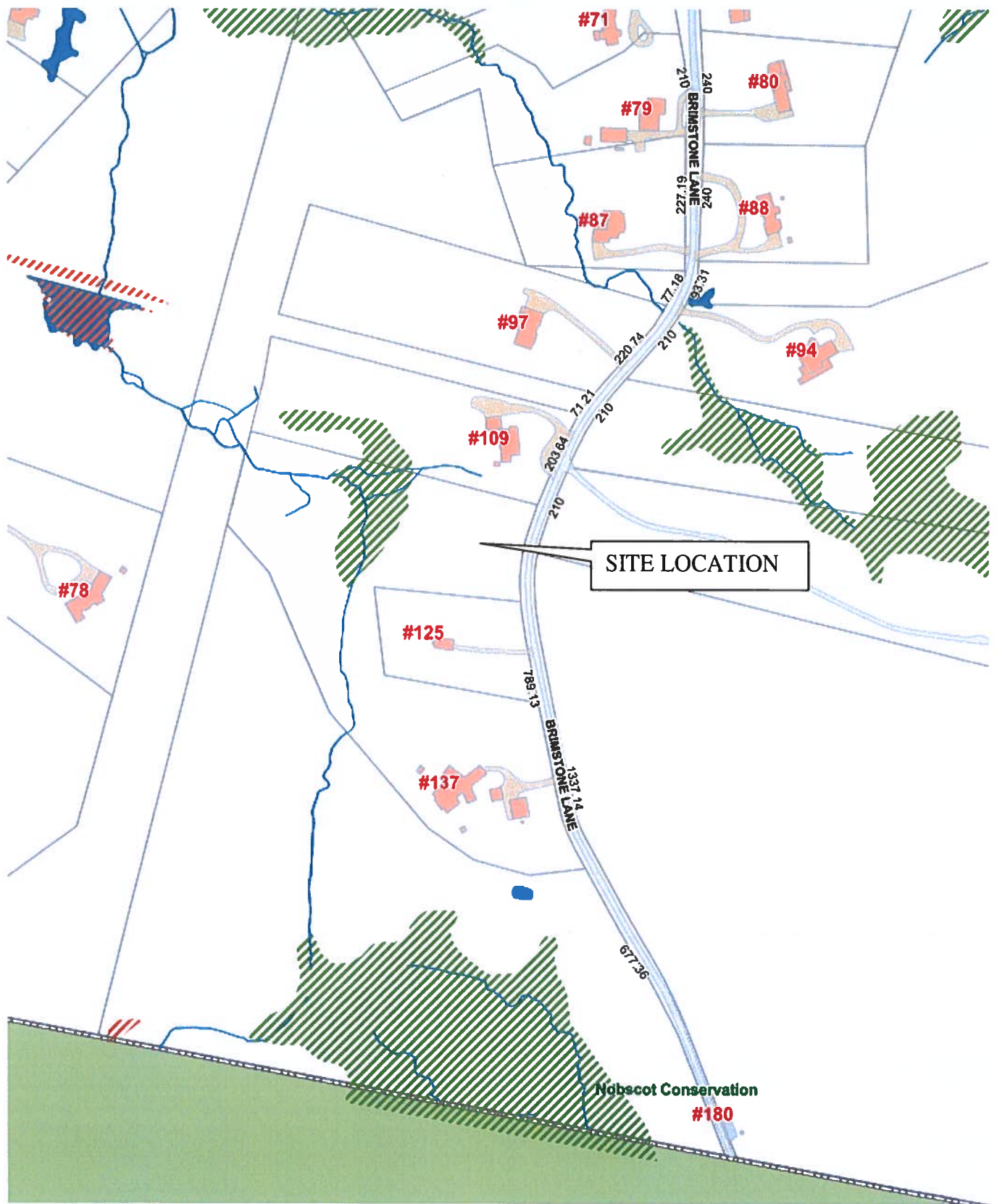
USGS LOCUS MAP



NHESP MAPPING



SUDBURY GIS MAPPING





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



Signature and Date

Vito Colonna 4/23/24

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:

- ☐ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ 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

Bioretention Cells (includes Rain Gardens)

- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter

Water Quality Swale

- ☐ Grass Channel
- ☐ Green Roof

- ☒ Other (describe): Roof Drain Drywell

Standard 1: No New Untreated Discharges

- ☐ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☒ 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 Field¹
- ☒ 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 1/2" 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 proprietary 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.
 - ☐ 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 - *N/A*

- ☐ 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)

N/A

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.



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

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.
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.

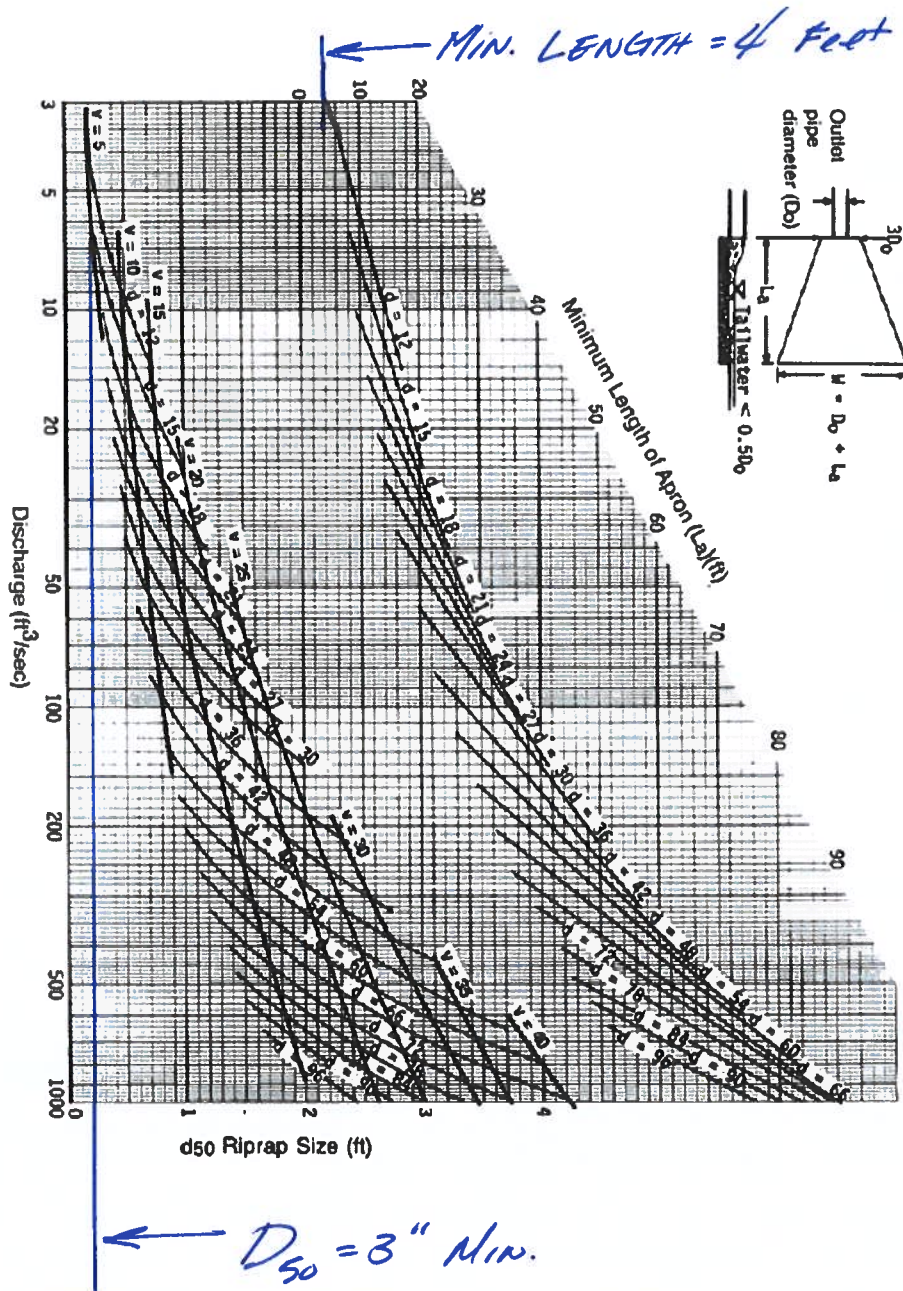
Standard 10: Prohibition of Illicit Discharges

- ☒ 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.

MA D.E.P. STORMWATER STANDARDS

Standard 1: No New Untreated Discharges

1. There are no new untreated discharges to any wetland resource areas. The discharge locations are to upland areas with stabilized outlets.
2. The overflow discharge outlets from the trench drain, roof drain, and rain garden have been protected with stone aprons to prevent scour. 2'(W)x4'(L) stone pad of 3-6" stone.
3. Riprap sizing: Use: Maximum pipe diameter = 6" (100 yr = 1.1 cfs / 5.7 fps)
Required Riprap Size = 3" to 6"
Required Length= 4 feet (min.)



Standard 2: Peak Rate Attenuation

The project has been designed to mitigate the increase in impervious surfaces through the use of a large rain garden. The pre- and post-development stormwater runoff has been analyzed using HydroCAD 10, which is a stormwater modeling computer program utilizing a collection of techniques for the generation and routing of hydrographs, including Soil Conservation Service (SCS) Technical Release No. 20 (TR-20) and SCS Technical Release 55 (TR-55), *Urban Hydrology for Small Watersheds*.

Runoff from the development area flows westerly toward the wetlands delineated on-site. This point was used as the analysis point in the analysis. The results are as follows:

Analysis Point 1 – Flow to Wetland on-site

Storm Event	Peak Rate of Runoff Existing (Proposed)	Volume of Runoff Existing (Proposed)
1-inch	0.0 cfs (0.0 cfs)	0.00 ac-ft (0.00 ac-ft)
2-year (3.2 inches)	1.4 cfs (1.2 cfs)	0.11 ac-ft (0.09 ac-ft)
10-year (4.8 inches)	2.8 cfs (2.7 cfs)	0.22 ac-ft (0.20 ac-ft)
25-year (6.0 inches)	4.0 cfs (4.0 cfs)	0.31 ac-ft (0.29 ac-ft)
100-year (8.6 inches)	6.7 cfs (6.6 cfs)	0.52 ac-ft (0.50 ac-ft)

Standard 3: Stormwater Recharge

The proposed Stormwater management system has been designed to provide recharge of stormwater in excess of that required by Standard 3. Recharge has been provided through the rain garden, and roof drywell in full compliance with the standard.

Recharge Volume Summary:

Total Post development impervious area = 7,150 S.F.

Onsite hydrologic soil group = D (0.1 inches x impervious area)

Recharge volume required = $(7,150 \times 0.1 / 12) = 60 \text{ C.F.}$

Recharge volume proposed = 770 C.F. below outlet

Soil Conditions:

The soil testing showed the soil substratum consists of Loamy Sand, with percolation rates between 12 minutes per inch and 14 minutes per inch. Evidence of groundwater (mottling) was observed 42-65 inches below grade near the rain garden. The drywell has been set within the loamy sand layer and greater than 2 feet above seasonal high groundwater elevation.

Draw down Time (maximum 72 hours allowable):

Proposed Roof Drain (770 cubic feet) / $(2.42 \text{ in/hr} \times 1/12 \times 875 \text{ sq. ft.}) = 4 \text{ hours}$
(rawles rate for Loamy Sand = 2.42 in/hr)

Mounding Analysis

The proposed system will provide at least 2 feet of separation to groundwater and a mounding analysis has been attached to the report. The maximum mound under the drywell would reach 1.9 feet (below the bottom of drywell).

Standard 4: Water Quality

The proposed project has been designed to collect as much impervious surfaces as practical. The roof areas have been collected through the use of roof drains and will be directed to the rain garden for infiltration. The driveway area will be directed to the rain garden for infiltration as well. Also, a minimum 100 foot buffer has been provided between driveway areas and the resource areas.

The driveway would be collected by a drainage inlet placed along the driveway entrance. The would direct the runoff to the drywell and pass through a deep sump / hooded manhole for pretreatment.

TSS removal = 80% Standard removal provided by drywell.

Water Quality Volume:

5,650 S.F. (impervious) X 1 inch / 12 = 470 C.F.

Volume provided below outlet = 770 C.F.

Standard 5: Land Uses With Higher pollutant Loads

Not applicable - The proposed use is not classified as a land use with higher pollutant loads.

Standard 6: Critical Areas

Not applicable – The site does not contain any critical areas.

Standard 7: Redevelopment

Not applicable – The proposed project is new development

Standard 8: Construction Period Controls

Erosion controls have been provided in accordance with the latest edition of the MassDEP Stormwater Handbook and Mass Sedimentation and Erosion Control Guidelines. Silt fence has been provided down-gradient of all proposed work, and detailed sedimentation and erosion control notes are provided on the plans. The project disturbance is less than 1 acre of disturbance and would not fall under the NPDES General Construction Permit.

Standard 9: Operation and Maintenance Plan

The homeowner will be responsible for all future operation and maintenance of the proposed stormwater management system. A recommended Operation and Maintenance Plan has been provided with this report.

Standard 10: Illicit Discharges

To the best of my knowledge, the attached plans, computations and specifications meet the requirements of Standard 10 of the Massachusetts Stormwater Handbook regarding illicit discharges to the stormwater management system. Based upon site observations no detectable illicit discharges exist on the site, and future Illicit discharges are prohibited. The proposed facility is serviced by an on-site subsurface sewerage disposal system per Board of Health requirements. All current documents and attachments were prepared under my direction and qualified personnel properly gathered and evaluated the information submitted.

Name: Vito Colonna

Organization: Connorstone Engineering

Signature: VCL

Date: 4/23/21

OPERATION AND MAINTENANCE PLAN

STORMWATER OPERATION AND MAINTENANCE PLAN

**Lot 2 Brimstone Lane (L04-8)
Sudbury, MA**

**November 6, 2023
Revised April 23, 2024**

Stormwater Management System Owner:
and Responsible Party

Name: _____
Lot 2 Brimstone Lane
Sudbury, MA

Signature: _____

This Operation and Maintenance Plan has been prepared in accordance with the Sudbury stormwater standards and recommendations outlined in the DEP stormwater handbook. This plan outlines the minimum efforts necessary to ensure that the stormwater collection and treatment system and sedimentation and erosion control system for this site operates in accordance with the design. Efforts in addition to the minimum listed herein may be required to ensure adequate stormwater management.

This plan includes general site restrictions, routing/non-routine operation and maintenance; reporting and record keeping; and an estimated budget.

General Site Conditions

The following conditions are imposed as part of this Plan per the Sudbury Stormwater Management Bylaw.

- The Stormwater Permitting Authority or its designee shall be able to enter the property, with notice to the property owner, at reasonable times and in a reasonable manner for the purpose of inspection.
- Illicit discharges into stormwater management system are perpetually prohibited.
- Store lawn and deicing chemicals under cover
- Apply fertilizers and pesticides sparingly to prevent wash-off
- Use of slow release nitrogen and low phosphorus fertilizers is encouraged
- No fertilization or pesticide application in or near any wetland resource area
- Dispose of pet waste properly
- Store, use and dispose of household hazardous wastes properly
- Limit exterior washing of vehicles to locations that drain to pervious surfaces and away from storm drains
- Maintain vehicles and clean up fluid spills/drips from pavement areas
- Pump and maintain septic systems
- Use alternative deicers such as calcium chloride and magnesium chloride in lieu of sodium based deicers
- No coal tar-based pavement sealants are to be used on any site subject to the smp.

Operation and Maintenance:

Schedule: The entire stormwater management system should be inspected twice per year.

Specific inspection and maintenance practices are listed under each component below. Upon completion of inspection, the inspector should specify any necessary corrective actions to be taken by ownership of the facility. The items to be inspected and maintained are described in the following sections.

Based on the observed conditions, the Responsible Party shall immediately schedule the appropriate maintenance. Some minor maintenance, such as the removal of blockages, debris and saplings in the basins may be conducted at the time of the inspection. More difficult maintenance activities, requiring special equipment, will have to be scheduled, such as the removal of excessive sediment or the repair of eroded areas. All sediment must be removed at least once per year.

Vegetation

The initial vegetation inspection shall occur four (4) weeks after final stabilization of the site; vegetation shall be dense (and aesthetically acceptable on all portions of the project, including the side slopes, buffer strips and the embankments). The inspector shall determine and document: (1) whether fertilizing is required (2) the areas where grass shall be mowed, and (3) the areas which shall be protected against erosion. In addition, recently seeded areas shall be inspected for failures. Eroded areas shall be filled and compacted, if necessary, and reseeded as soon as possible. If an area erodes twice, then a geotextile fabric is to be installed to stabilize the area to allow vegetation to be established. These maintenance activities shall take place during the planting season. Areas affected by lack of rainfall shall be watered. If the stand is more than 60% damaged, it shall be reestablished, following the original preparation and seeding instructions. Areas of repeated erosion/scour problems shall be lined with riprap only after twice attempting to stabilize the area with geotextile fabric.

Driveway Surfaces

Paved driveway surfaces shall be inspected for settlement, cracking, potholes, and sediment/sand accumulation on the surface. Surfaces shall be swept a minimum of twice per year (spring and fall). Any structural deficiencies shall be reported to the Owner and repaired as required.

Driveway Drain Inlet

The drain inlet at the end of the driveway should be inspected for structural condition. Any noted damage to the grate or concrete should be noted. Debris or sediment within drain should be removed as necessary to maintain proper flow.

Deep Sump Manhole

A deep sump manhole is located within the driveway area with a cover accessible to grade. The actual removal of sediments and associated pollutants and trash occurs only when sumps are cleaned out; therefore, regular maintenance is required. The more frequent the cleaning, the less likely sediments will be resuspended and subsequently discharged. Frequent cleaning also results in more volume available for future storms and enhances the overall performance. At a minimum, the manhole should be inspected four times annually, and cleaned whenever sediment accumulation exceeds 12 inches. Disposal of the accumulated sediment and hydrocarbons must be in accordance with applicable local, state, and federal guidelines and regulations. At each inspection, inspect internal components and outlet pipe. Vacuum trucks shall be utilized for all cleanings.

Drainage Outlets / Outfalls:

The rain garden, roof drain, and trench drain have overflow pipes with riprap (crushed stone) pads to prevent erosion. The outlets should be inspected a minimum of twice per year. The outlets should be inspected for (1) sediment/debris accumulation (2) displacement of riprap pad (3) downgradient scour or erosion.

Any sediment or debris should be removed at the time of inspection. Stone displacement should be repaired. Areas of repeated displacement should be replaced with larger stone size. Guidance on sizing can be provided by the design engineer. If any evidence of downgradient scour is noted, a qualified engineer should be contacted for recommendations and/or guidance.

Drywell:

The roof drywell is located under the driveway approximately 20 feet from the rear of the house. The location is shown on the attached map.

Drywells shall be inspected after every major storm in the first few months after construction. After this initial period, the systems should be inspected at least twice annually (spring and fall) with one inspection performed after a major storm (1-inch or greater). The inspection port within the drywell and the overflow manhole should be opened at the inspection. The system should be checked for sediment and/or debris and to verify the system is fully draining after a storm event. If the infiltration system does not drain within 72 hours of the end of a storm, then remediation may be necessary including replacement of the system. A qualified engineer should be contacted to recommend mitigation measures.

The outlet shall be inspected for functionality, debris and scour. Roof drains at each building corner and area drains within the driveway shall be inspected to verify connection to the system, area drains cleaned of any debris, and checked for any evidence of overflow, which could indicate potential blockages. Roof gutters should be cleaned twice per year, or whenever debris is noted.

Drainage Easements:

No drainage easements are currently proposed or required.

Changes to Operation and Maintenance Plans

The owner(s) of the stormwater management system must notify the Stormwater Permitting Authority or its designated Reviewing Agent of changes in ownership or assignment of financial responsibility.

Reporting and Record Keeping

The responsible party will be responsible for maintaining accurate Maintenance Logs for all maintenance, inspections, repairs, replacements, and disposal (for disposal, the log shall indicate the type of material and the disposal location). The logs shall be kept on site be available for inspection by the Town municipal departments or other auditing authority. This will be a perpetual requirement of the Owners or their Designated Party.

The Site Maintenance Log will be completed as described above, and at a minimum will include:

- a. The date of inspection or activity;
- b. Name of inspector;
- c. The condition of each BMP, including components such as:
 - i. Pretreatment devices
 - ii. Vegetation
 - iii. Inlets and outlets
 - iv. Swales
 - v. Underground drainage
 - vi. Sediment and debris accumulation.
 - vii. Any nonstructural practices
 - viii. Pavement condition
 - ix. Roof drains and gutter conditions
 - ix. Any other item that could affect the proper function of the stormwater management system
- d. Description of the need for maintenance; and
- e. For disposal include type of material and the disposal location;

Emergency Response Plan / Spill Control Practices

On-site storage of hazardous materials shall not be allowed.

In the event of an accident in the roadway or on individual lots, where a significant (5-gallons or more) amount of gasoline or other petroleum product is released and/or if the release has reached (or could potentially impact) a wetland, drainage system, or waterbody, then following procedure should be followed:

1. Immediately contact the following agencies:

Sudbury Fire Department	(508)443-2239
MassDEP Emergency response	(888) 304-1133
2. Provide support to agencies listed above, which may include contacting an outside contractor to provide clean-up or contacting a Licensed Site Professional (LSP) to lead the clean-up.

Notes: The reportable limits on other chemicals can be found on the MassDEP website at <http://eeaonline.eea.state.ma.us/DEP/MOMHL/hazmat.aspx>

If the volume of spill has reached the roadway catch basins, wetlands, or other waterbodies, additional corrective actions must be taken extending to the receiving water or beyond.

MAINTENANCE INSPECTION LOG FORM
Lot 2 Brimstone Lane
Sudbury, MA

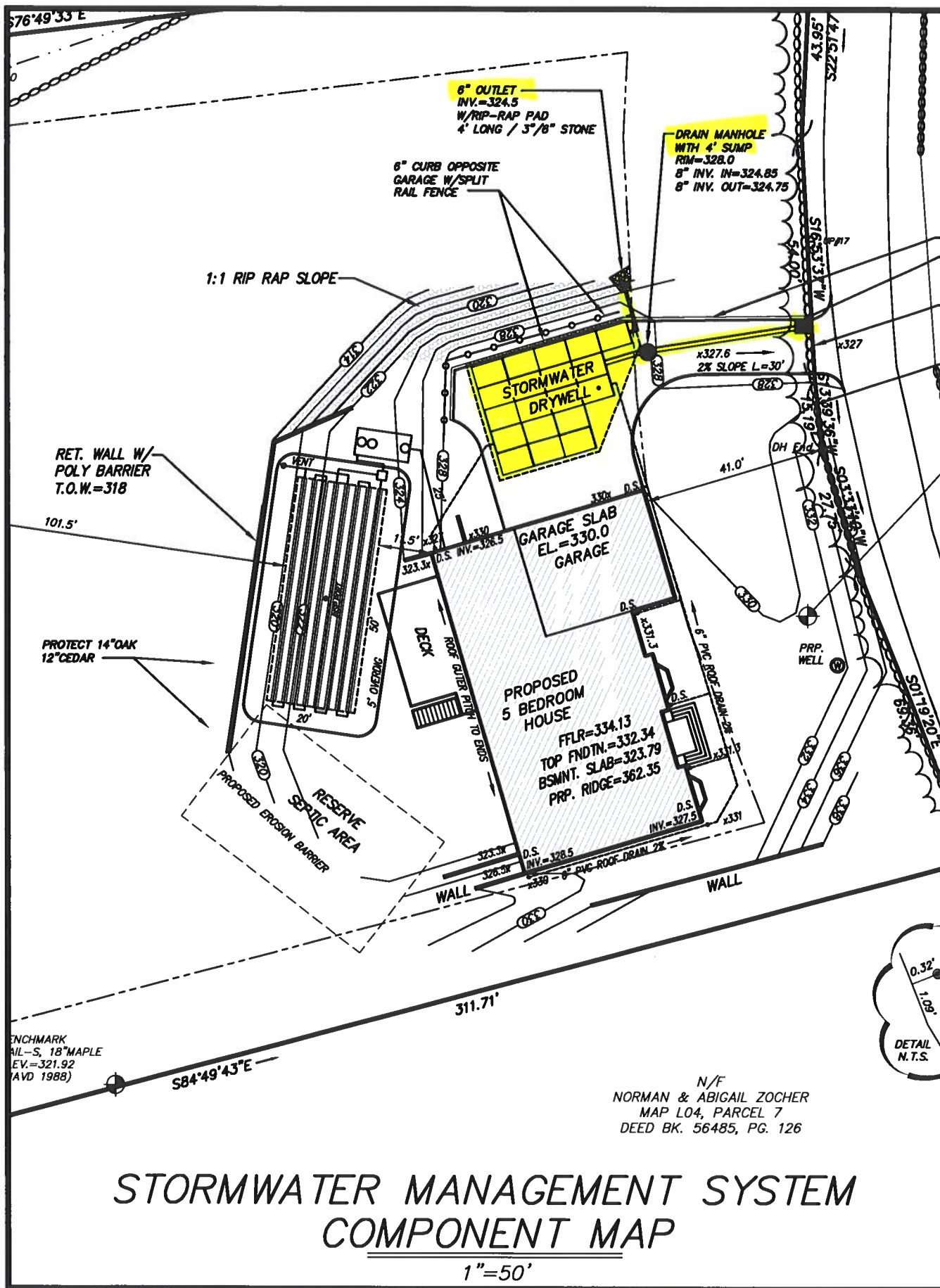
Inspector

Date _____

Precipitation: 24 hrs _____ 72 hrs _____

- | | |
|--|---|
| 1. Inspect Drain Inlet | Sediment Depth: _____
Cleaning required? _____ |
| 2. Inspect Deep Sump Manhole | Sediment Depth: _____
Cleaning required? _____ |
| 3. Inspect Dry Well | Water Observed: _____
Sediment Depth: _____ |
| 4. Inspect Drain Outlet:
(From drywell) | Sediment Depth: _____
Evidence of scour: _____ |
| 5. Inspect vegetation on site | Condition: _____ |

[illegible]



HYDROCAD CALCULATIONS

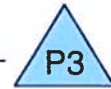
**1-inch, 2-, 10-, 25-, and 100-Year Storm
Calculation Sheets**



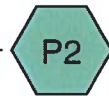
Existing Subcatchment
Area



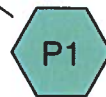
Wetland (Analysis Point)



Roof Drywell



Site Area to Drywell



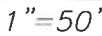
Uncollected Runoff



Routing Diagram for STORM rev 2024

Prepared by Microsoft, Printed 4/23/2024

HydroCAD® 10.10-7a s/n 01413 © 2021 HydroCAD Software Solutions LLC



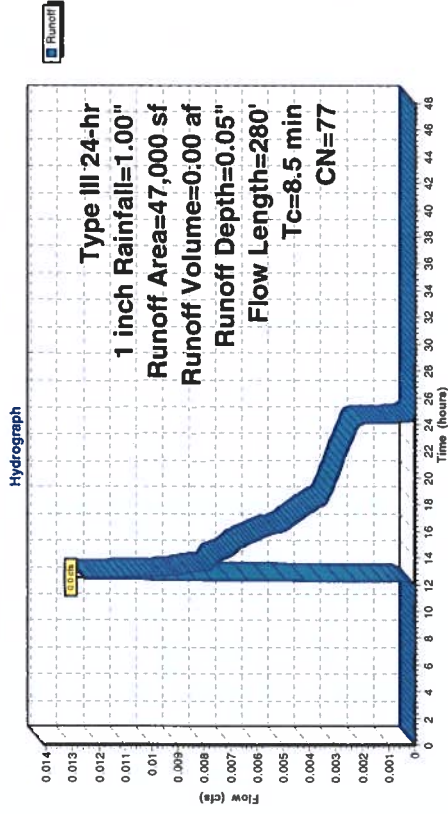
Summary for Subcatchment Ex1: Existing Subcatchment Area

Runoff = 0.0 cfs @ 12.48 hrs, Volume= 0.00 af, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 inch Rainfall=1.00"

Area (sf)	CN	Description			
47,000	77	Woods, Good, HSG D			
47,000		100.00% Pervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		Sheet Flow.
2.0	230	0.1500	1.94		Woods: Light underbrush n= 0.400 Shallow Concentrated Flow, P2= 3.20" Woodland KV= 5.0 fps
8.5	280	Total			

Subcatchment Ex1: Existing Subcatchment Area



Summary for Subcatchment P1: Uncollected Runoff

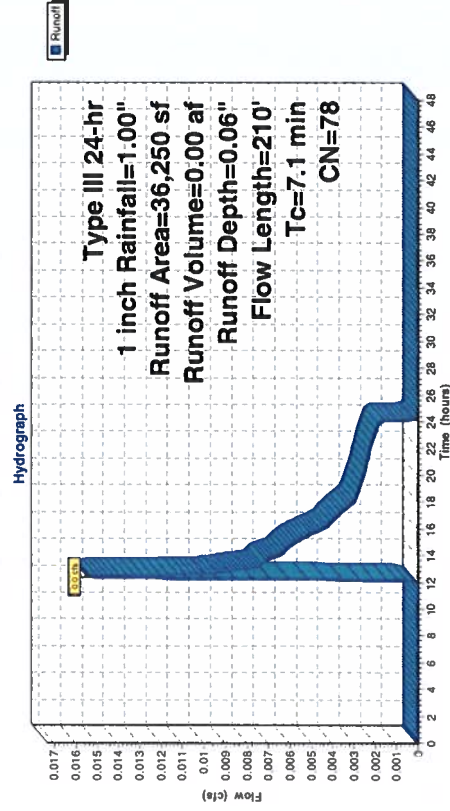
Runoff = 0.0 cfs @ 12.41 hrs, Volume= 0.00 af, Depth= 0.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 inch Rainfall=1.00"

Area (sf)	CN	Description
27,350	77	Woods, Good, HSG D
7,400	80	>75% Grass cover, Good, HSG D
1,500	98	Unconnected pavement, HSG D
36,250	78	Weighted Average
34,750		95.86% Pervious Area
1,500		4.14% Impervious Area
1,500		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0500	0.15		Sheet Flow,
1.4	160	0.1500	1.94		Grass: Dense n= 0.240 P2= 3.20" Shallow Concentrated Flow, Woodland KV= 5.0 fps
7.1	210	Total			

Subcatchment P1: Uncollected Runoff



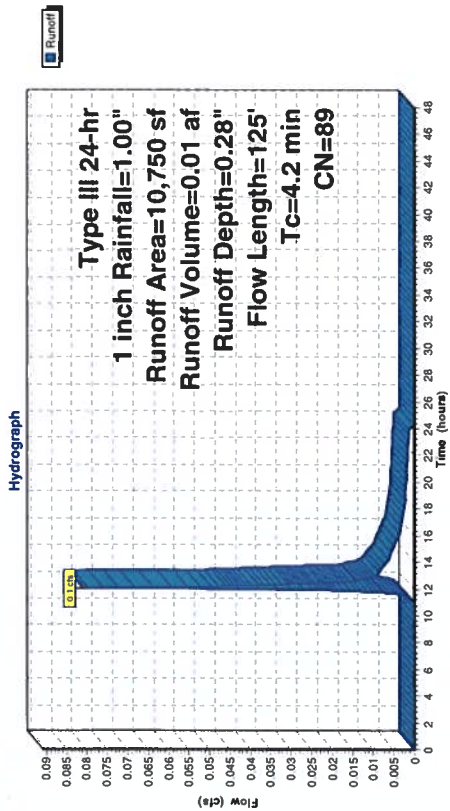
Summary for Subcatchment P2: Site Area to Drywell

Runoff = 0.1 cfs @ 12.07 hrs, Volume= 0.01 af, Depth= 0.28"
Routed to Pond P3 : Roof Drywell
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 inch Rainfall=1.00"

Area (sf)	CN	Description
1,900	98	Paved parking, HSG D
5,100	80	>75% Grass cover, Good, HSG D
500	98	Paved parking, HSG D
3,250	98	Roofs, HSG D
10,750	89	Weighted Average
5,100		47.44% Pervious Area
5,650		52.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.1800	0.24		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.7	60	0.0400	1.40		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	15	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
4.2	125	Total			

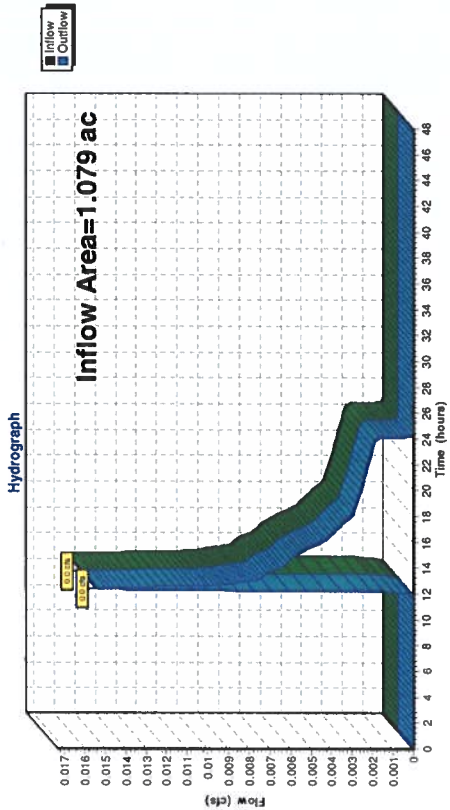
Subcatchment P2: Site Area to Drywell



Summary for Reach P4: Wetland (Analysis Point)

[40] Hint: Not Described (Outflow=Inflow)
Inflow Area = 1.079 ac, 15.21% Impervious, Inflow Depth = 0.05" for 1 inch event
Inflow = 0.0 cfs @ 12.41 hrs, Volume= 0.00 af
Outflow = 0.0 cfs @ 12.41 hrs, Volume= 0.00 af, Atten= 0%, Lag= 0.0 min
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach P4: Wetland (Analysis Point)



Summary for Pond P3: Roof Drywell

Inflow Area = 0.247 ac, 52.56% impervious, Inflow Depth = 0.28" for 1 inch event
Inflow = 0.1 cfs @ 12.07 hrs, Volume= 0.01 af
Outflow = 0.0 cfs @ 12.48 hrs, Volume= 0.01 af, Atten= 73%, Lag= 24.4 min
Discarded = 0.0 cfs @ 12.48 hrs, Volume= 0.01 af
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0.00 af
Routed to Reach P4 : Wetland (Analysis Point)

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 323.16' @ 12.48 hrs Surf.Area= 875 sf Storage= 54 cf
Plug-Flow detention time= 18.8 min calculated for 0.01 af (100% of inflow)
Center-of-Mass det. time= 18.8 min (887.0 - 868.3)

Volume	Invert	Avail.Storage	Storage Description
#1	323.00'	824 cf	Custom Stage Data (Conic) Listed below (Recalc) 3,063 cf Overall - 1,002 cf Embedded = 2,060 cf x 40.0% Voids
#2	323.70'	1,002 cf	Cuttec R-330XLHD x 19 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 1 rows
1,826 cf			Total Available Storage

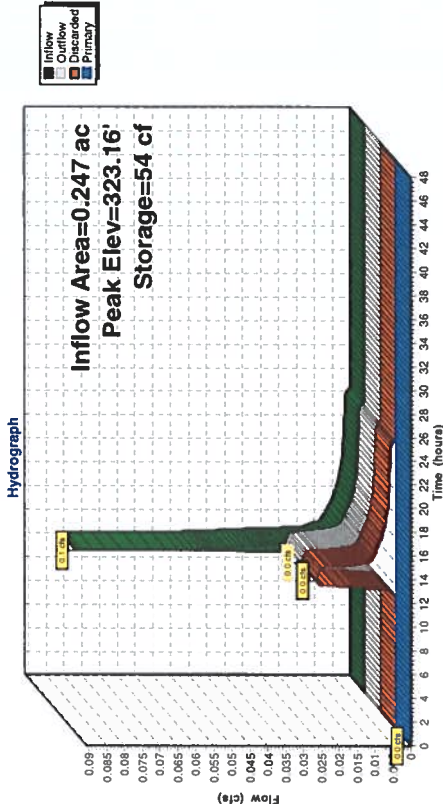
Elevation	Surf.Area	Inc.Store	Cum.Store	Wet.Area
(feet)	(sq-ft)	(cubic-feet)	(cubic-feet)	(sq-ft)
323.00	875	0	0	875
326.50	875	3,063	3,063	1,242

Device	Routing	Invert	Outlet Devices
#1	Primary	324.50'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	323.00'	1.020 in/hr Exfiltration over Wetted area Conductivity to Groundwater Elevation = 320.00'

Discarded OutFlow Max=0.0 cfs @ 12.48 hrs HW=323.16' (Free Discharge)
2=Exfiltration (Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=323.00' (Free Discharge)
1=Orifice/Grate (Controls 0.0 cfs)

Pond P3: Roof Drywell

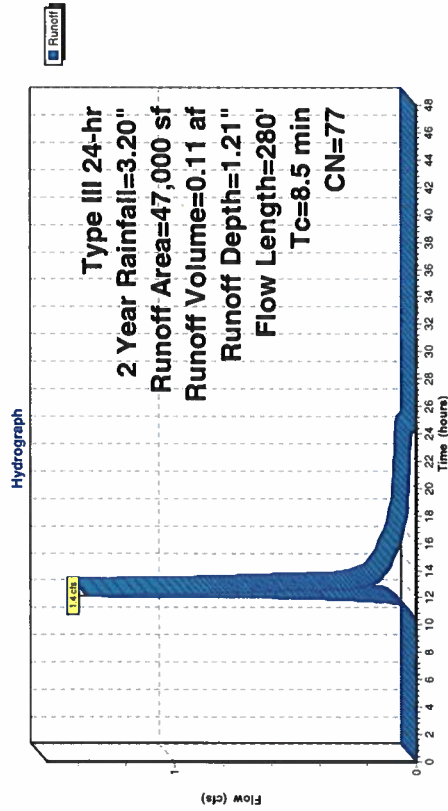


Summary for Subcatchment Ex1: Existing Subcatchment Area

Runoff = 1.4 cfs @ 12.13 hrs, Volume= 0.11 af, Depth= 1.21"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.20"

Area (sf)	CN	Description			
47,000	77	Woods, Good, HSG D			
47,000	100.00%	Pervious Area			
Tc	Length (min)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		Sheet Flow, Woods: Light underbrush, n= 0.400 P2= 3.20"
2.0	230	0.1500	1.94		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
8.5	280	Total			

Subcatchment Ex1: Existing Subcatchment Area

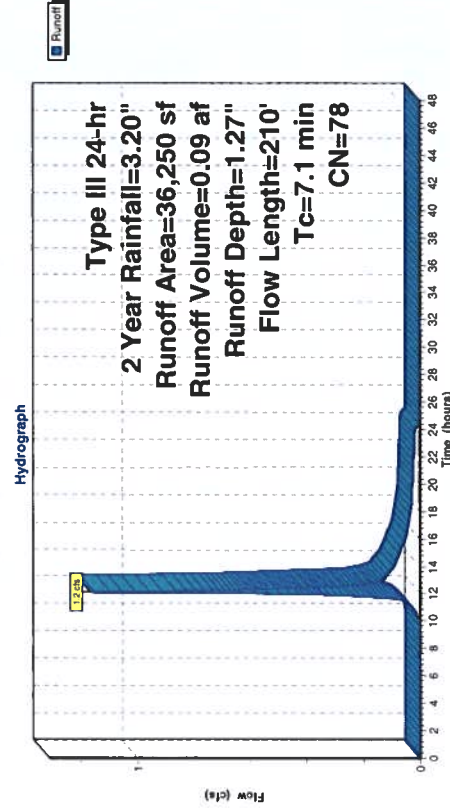


Summary for Subcatchment P1: Uncollected Runoff

Runoff = 1.2 cfs @ 12.11 hrs, Volume= 0.09 af, Depth= 1.27"
Routed to Reach P4 : Wetland (Analysis Point)
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.20"

Area (sf)	CN	Description			
27,350	77	Woods, Good, HSG D			
7,400	80	>75% Grass cover, Good, HSG D			
1,500	98	Unconnected pavement, HSG D			
36,250	78	Weighted Average			
34,750		95.86% Pervious Area			
1,500		4.14% Impervious Area			
1,500		100.00% Unconnected			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0500	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.4	160	0.1500	1.94		Shallow Concentrated Flow, Woodland KV= 5.0 fps
7.1	210	Total			

Subcatchment P1: Uncollected Runoff



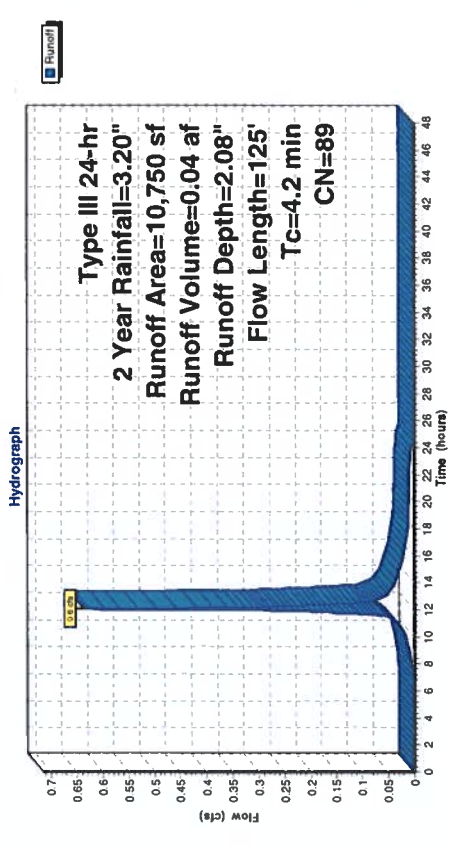
Summary for Subcatchment P2: Site Area to Drywell

Runoff = 0.6 cfs @ 12.06 hrs, Volume= 0.04 af, Depth= 2.08"
Routed to Pond P3 : Roof Drywell
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.20"

Area (sf)	CN	Description
1,900	98	Paved parking, HSG D
5,100	80	>75% Grass cover, Good, HSG D
500	98	Paved parking, HSG D
3,250	98	Roofs, HSG D
10,750	89	Weighted Average
5,100	47	44% Pervious Area
5,650	52	56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.1800	0.24		Sheet Flow, Grass: Dense, n= 0.240 P2= 3.20"
0.7	60	0.0400	1.40		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	15	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
4.2	125	Total			

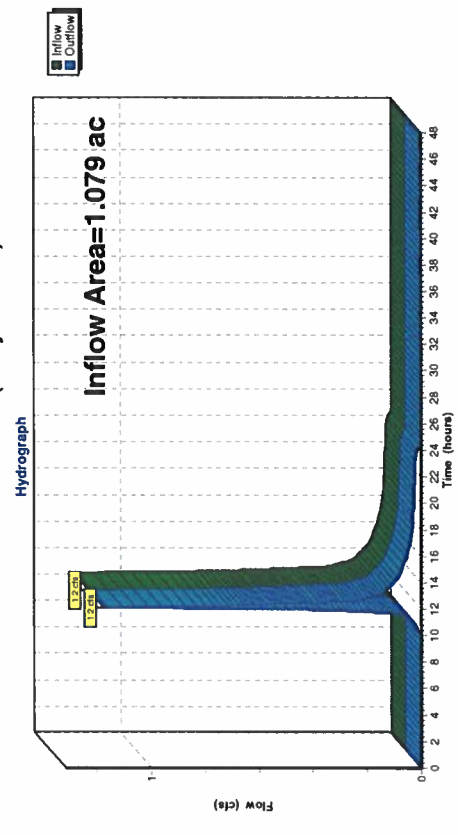
Subcatchment P2: Site Area to Drywell



Summary for Reach P4: Wetland (Analysis Point)

[40] Hint: Not Described (Outflow=Inflow)
Inflow Area = 1.079 ac, 15.21% Impervious, Inflow Depth = 1.01" for 2 Year event
Inflow = 1.2 cfs @ 12.11 hrs, Volume= 0.09 af
Outflow = 1.2 cfs @ 12.11 hrs, Volume= 0.09 af, Atten= 0%, Lag= 0.0 min
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach P4: Wetland (Analysis Point)



Summary for Pond P3: Roof Drywell

Inflow Area = 0.247 ac, 52.56% impervious, Inflow Depth = 2.08" for 2 Year event
Inflow = 0.6 cfs @ 12.06 hrs, Volume= 0.04 af
Outflow = 0.1 cfs @ 12.83 hrs, Volume= 0.04 af, Atten= 90%, Lag= 46.3 min
Discarded = 0.0 cfs @ 12.83 hrs, Volume= 0.04 af
Primary = 0.0 cfs @ 12.83 hrs, Volume= 0.00 af
Routed to Reach P4 : Wetland (Analysis Point)

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 324.60' @ 12.83 hrs Surf.Area= 875 sf Storage= 834 cf
Plug-Flow detention time= 222.9 min calculated for 0.04 af (100% of inflow)
Center-of-Mass det. time= 222.9 min (1,032.3 - 809.4)

Volume	Invert	Avail.Storage	Storage Description
#1	323.00'	824 cf	Custom Stage Data (Conic) Listed below (Recalc) 3,063 cf Overall - 1,002 cf Embedded = 2,060 cf x 40.0% Voids
#2	323.70'	1,002 cf	Cultec R-330XLHD x 19 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 1 rows
1,826 cf			Total Available Storage

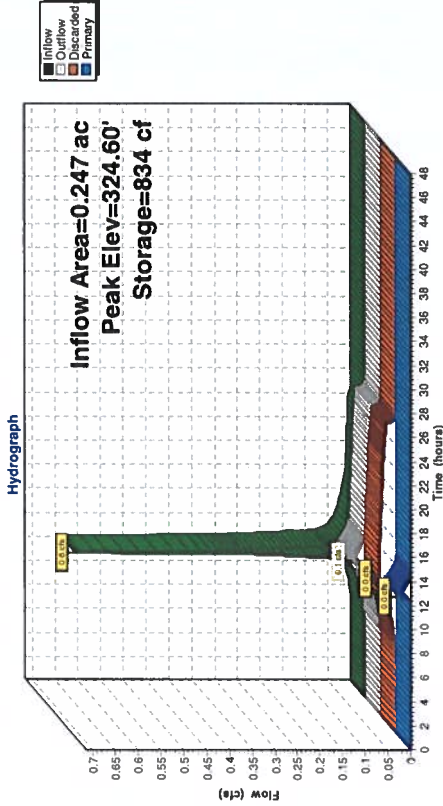
Elevation (feet)	Surf. Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
323.00	875	0	0	875
326.50	875	3,063	3,063	1,242

Device	Routing	Invert	Outlet Devices
#1	Primary	324.50'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	323.00'	1.020 in/hr Exfiltration over Wetted area Conductivity to Groundwater Elevation = 320.00'

Discarded OutFlow Max=0.0 cfs @ 12.83 hrs HW=324.60' (Free Discharge)
2=Exfiltration (Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 12.83 hrs HW=324.60' (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.0 cfs @ 1.05 fps)

Pond P3: Roof Drywell



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Type III 24-hr 10 Year Rainfall=4.80"

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Page 1

Summary for Subcatchment Ex1: Existing Subcatchment Area

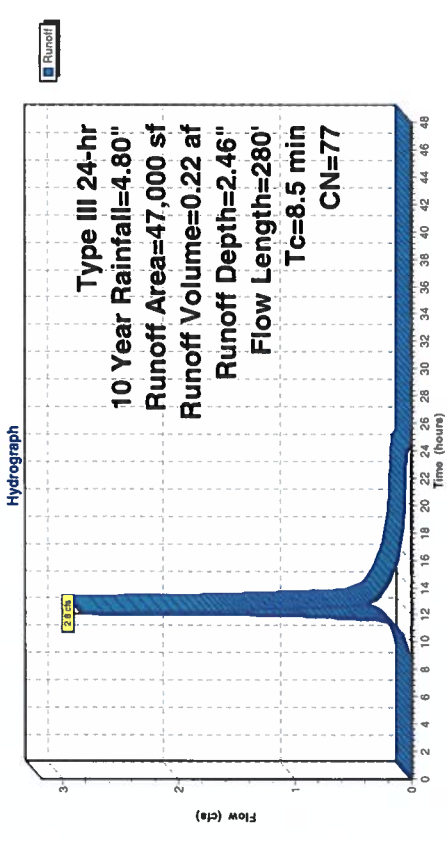
Runoff = 2.8 cfs @ 12.12 hrs, Volume= 0.22 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Type III 24-hr 10 Year Rainfall=4.80"

Area (sf)		CN	Description		
47,000		77	Woods, Good, HSG D		
47,000			100.00% Pervious Area		
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
2.0	230	0.1500	1.94		Shallow Concentrated Flow, Woodland Kv= 5.0 fps

Subcatchment Ex1: Existing Subcatchment Area



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Type III 24-hr 10 Year Rainfall=4.80"

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Summary for Subcatchment P1: Uncollected Runoff

Runoff = 2.4 cfs @ 12.10 hrs, Volume= 0.18 af, Depth= 2.54"

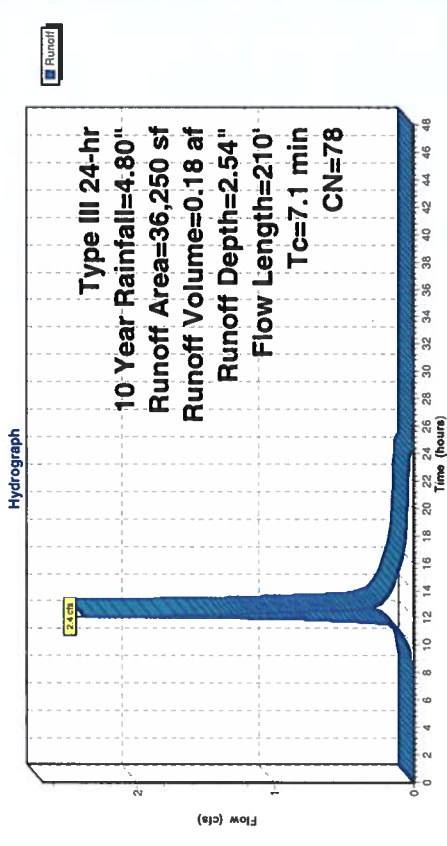
Routed to Reach P4 : Wetland (Analysis Point)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Type III 24-hr 10 Year Rainfall=4.80"

Area (sf)	CN	Description		
27,350	77	Woods, Good, HSG D		
7,400	80	>75% Grass cover, Good, HSG D		
1,500	98	Unconnected pavement, HSG D		
36,250	78	Weighted Average		
34,750		95.86% Pervious Area		
1,500		4.14% Impervious Area		
1,500		100.00% Unconnected		
Tc (min)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description

Subcatchment P1: Uncollected Runoff



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Type III 24-hr 10 Year Rainfall=4.80"

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Summary for Subcatchment P2: Site Area to Drywell

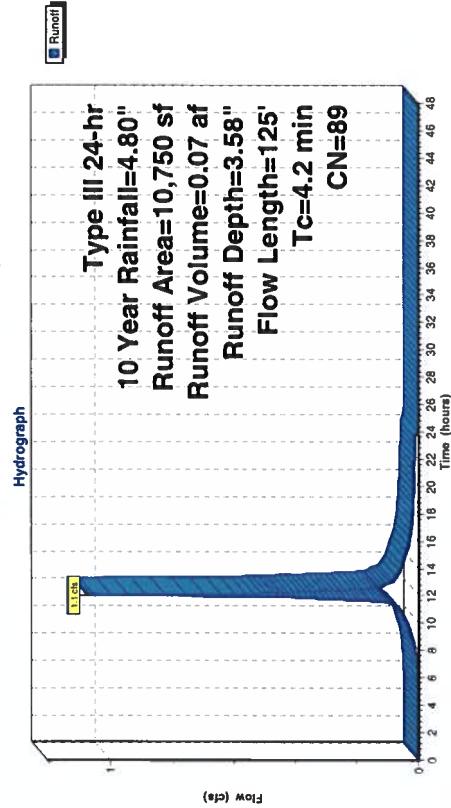
Runoff = 1.1 cfs @ 12.06 hrs, Volume= 0.07 af, Depth= 3.58"
Routed to Pond P3 : Roof Drywell
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.80"

Area (sf)	CN	Description
1,900	98	Paved parking, HSG D
5,100	80	>75% Grass cover, Good, HSG D
500	98	Paved parking, HSG D
3,250	98	Roofs, HSG D

10,750	89	Weighted Average
5,100		47.44% Pervious Area
5,650		52.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.1800	0.24		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.7	60	0.0400	1.40		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	15	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
4.2	125	Total			

Subcatchment P2: Site Area to Drywell



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Type III 24-hr 10 Year Rainfall=4.80"

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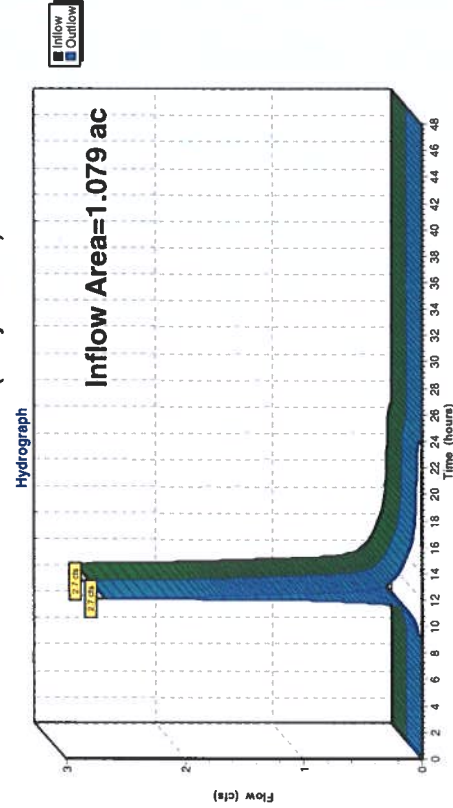
Page 4

Summary for Reach P4: Wetland (Analysis Point)

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

Inflow Area = 1.079 ac, 15.21% Impervious, Inflow Depth = 2.23" for 10 Year event
Inflow = 2.7 cfs @ 12.12 hrs, Volume= 0.20 af
Outflow = 2.7 cfs @ 12.12 hrs, Volume= 0.20 af, Atten= 0%, Lag= 0.0 min
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach P4: Wetland (Analysis Point)



Summary for Pond P3: Roof Drywell

Inflow Area = 0.247 ac, 52.56% impervious, Inflow Depth = 3.58" for 10 Year event
Inflow = 1.1 cfs @ 12.06 hrs, Volume= 0.07 af
Outflow = 0.5 cfs @ 12.21 hrs, Volume= 0.07 af, Atten= 56%, Lag= 9.0 min
Discarded = 0.0 cfs @ 12.21 hrs, Volume= 0.05 af
Primary = 0.4 cfs @ 12.21 hrs, Volume= 0.02 af
Routed to Reach P4 : Wetland (Analysis Point)

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 324.96' @ 12.21 hrs Surf.Area= 875 sf Storage= 1,067 cf
Plug-Flow detention time= 167.8 min calculated for 0.07 af (100% of inflow)
Center-of-Mass det. time= 167.8 min (962.0 - 794.2)

Volume	Invert	Avail.Storage	Storage Description
#1	323.00'	824 cf	Custom Stage Data (Conic) Listed below (Recalc)
#2	323.70'	1,002 cf	3,063 cf Overall - 1,002 cf Embedded = 2,060 cf x 40.0% Voids Cultec R-330XLHD x 19 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 1 rows
1,826 cf			Total Available Storage

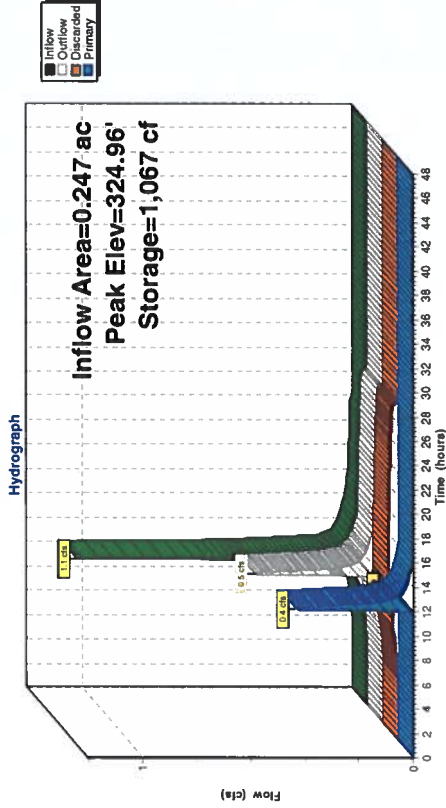
Elevation	Surf.Area	Inc.Store	Cum.Store	Wet.Area
(feet)	(sq-ft)	(cubic-feet)	(cubic-feet)	(sq-ft)
323.00	875	0	0	875
326.50	875	3,063	3,063	1,242

Device	Routing	Invert	Outlet Devices
#1	Primary	324.50'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	323.00'	1.020 in/hr Exfiltration over Wetted area Conductivity to Groundwater Elevation = 320.00'

Discarded OutFlow Max=0.0 cfs @ 12.21 hrs HW=324.96' (Free Discharge)
2=Exfiltration (Controls 0.0 cfs)

Primary OutFlow Max=0.4 cfs @ 12.21 hrs HW=324.96' (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.4 cfs @ 2.31 fps)

Pond P3: Roof Drywell

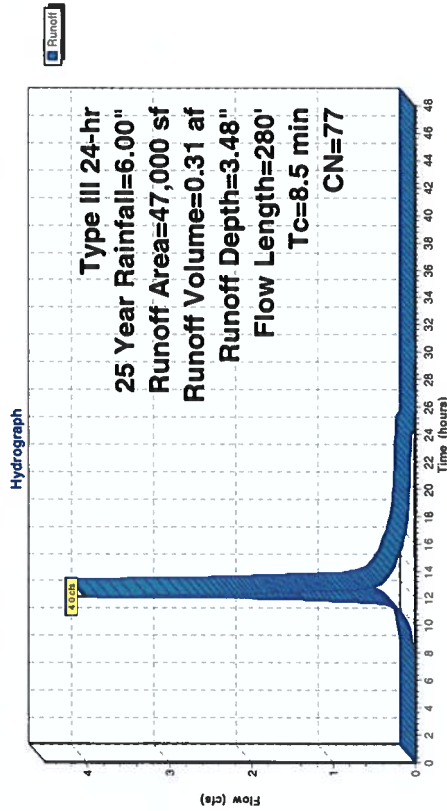


Summary for Subcatchment Ex1: Existing Subcatchment Area

Runoff = 4.0 cfs @ 12.12 hrs, Volume= 0.31 af, Depth= 3.48"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.00"

Area (sf)	CN	Description			
47,000	77	Woods, Good, HSG D			
47,000	100.00%	Pervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		Sheet Flow, Woods: Light underbrush, n= 0.400 P2= 3.20"
2.0	230	0.1500	1.94		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
8.5	280	Total			

Subcatchment Ex1: Existing Subcatchment Area

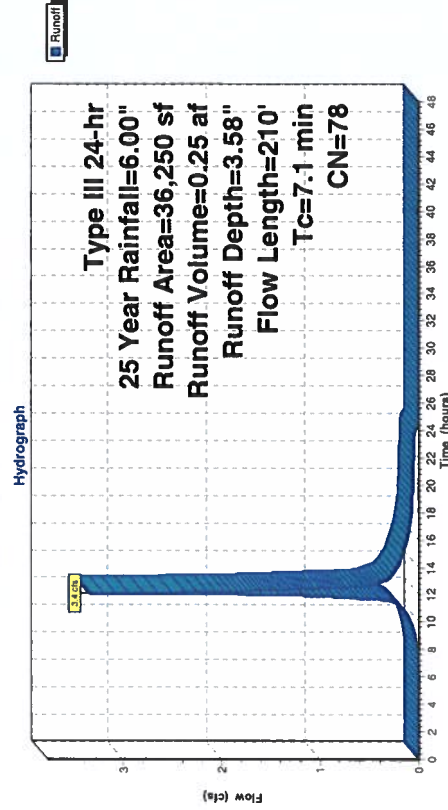


Summary for Subcatchment P1: Uncollected Runoff

Runoff = 3.4 cfs @ 12.10 hrs, Volume= 0.25 af, Depth= 3.58"
Routed to Reach P4 : Wetland (Analysis Point)
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.00"

Area (sf)	CN	Description			
27,350	77	Woods, Good, HSG D			
7,400	80	>75% Grass cover, Good, HSG D			
1,500	98	Unconnected pavement, HSG D			
36,250	78	Weighted Average			
34,750		95.86% Pervious Area			
1,500		4.14% Impervious Area			
1,500		100.00% Unconnected			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0500	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
1.4	160	0.1500	1.94		Shallow Concentrated Flow, Woodland KV= 5.0 fps
7.1	210	Total			

Subcatchment P1: Uncollected Runoff



Summary for Subcatchment P2: Site Area to Drywell

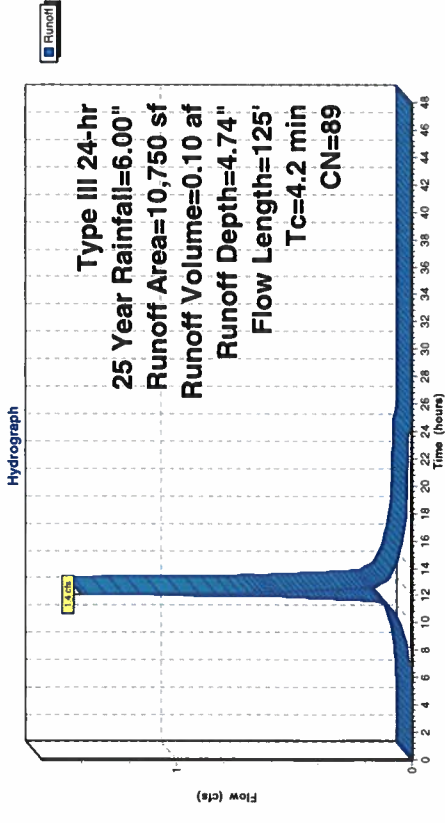
Runoff = 1.4 cfs @ 12.06 hrs, Volume= 0.10 af, Depth= 4.74"
Routed to Pond P3 : Roof Drywell
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.00"

Area (sf)	CN	Description
1,900	98	Paved parking, HSG D
5,100	80	>75% Grass cover, Good, HSG D
500	98	Paved parking, HSG D
3,250	98	Roofs, HSG D

10,750	89	Weighted Average
5,100		47.44% Pervious Area
5,650		52.56% Impervious Area

Tc (min)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.1800	0.24	Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.7	60	0.0400	1.40	Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	15	0.0200	2.87	Shallow Concentrated Flow, Paved Kv= 20.3 fps
4.2	125	Total		

Subcatchment P2: Site Area to Drywell

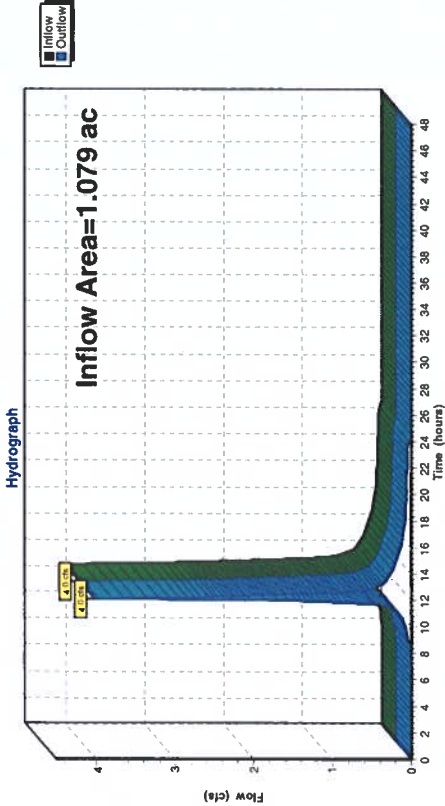


Summary for Reach P4: Wetland (Analysis Point)

[40] Hint: Not Described (Outflow=Inflow)
Inflow Area = 1.079 ac, 15.21% Impervious, Inflow Depth = 3.24" for 25 Year event
Inflow = 4.0 cfs @ 12.11 hrs, Volume= 0.29 af
Outflow = 4.0 cfs @ 12.11 hrs, Volume= 0.29 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind-Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach P4: Wetland (Analysis Point)



Summary for Pond P3: Roof Drywell

Inflow Area = 0.247 ac, 52.56% Impervious, Inflow Depth = 4.74" for 25 Year event
Inflow = 1.4 cfs @ 12.06 hrs, Volume= 0.10 af
Outflow = 0.8 cfs @ 12.16 hrs, Volume= 0.10 af, Atten= 46%, Lag= 6.2 min
Discarded = 0.0 cfs @ 12.16 hrs, Volume= 0.05 af
Primary = 0.7 cfs @ 12.16 hrs, Volume= 0.04 af
Routed to Reach P4 : Wetland (Analysis Point)

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 325.32' @ 12.16 hrs Surf.Area= 875 sf Storage= 1,288 cf
Plug-Flow detention time= 145.8 min calculated for 0.10 af (100% of inflow)
Center-of-Mass det. time= 145.9 min (932.4 - 786.5)

Volume	Invert	Avail.Storage	Storage Description
#1	323.00'	824 cf	Custom Stage Data (Conic) Listed below (Recalc)
#2	323.70'	1,002 cf	3,063 cf Overall - 1,002 cf Embedded = 2,060 cf x 40.0% Voids Cultec R-330XLHD x 19 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustments= +1.50' x 7.45 sf x 1 rows
		1,826 cf	Total Available Storage

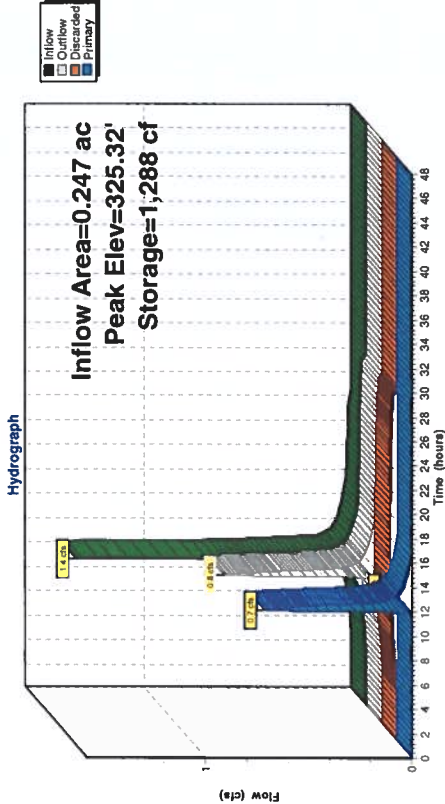
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
323.00	875	0	0	875
326.50	875	3,063	3,063	1,242

Device	Routing	Invert	Outlet Devices
#1	Primary	324.50'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	323.00'	1.020 in/hr Exfiltration over Wetted area Conductivity to Groundwater Elevation = 320.00'

Discarded OutFlow Max=0.0 cfs @ 12.16 hrs HW=325.32' (Free Discharge)
2=Exfiltration (Controls 0.0 cfs)

Primary OutFlow Max=0.7 cfs @ 12.16 hrs HW=325.32' (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.7 cfs @ 3.65 fps)

Pond P3: Roof Drywell

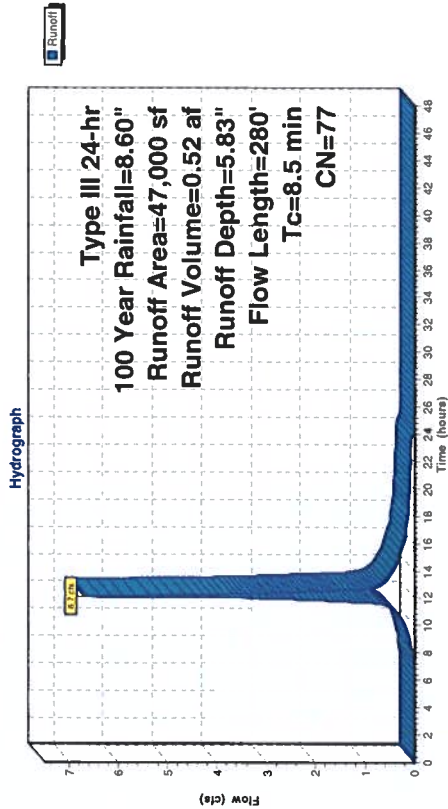


Summary for Subcatchment Ex1: Existing Subcatchment Area

Runoff = 6.7 cfs @ 12.12 hrs, Volume= 0.52 af, Depth= 5.83"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.60"

Area (sf)	CN	Description			
47,000	77	Woods, Good, HSG D			
47,000	100.00%	Pervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1000	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
2.0	230	0.1500	1.94		Shallow Concentrated Flow, Woodland Kv= 5.0 fps

Subcatchment Ex1: Existing Subcatchment Area

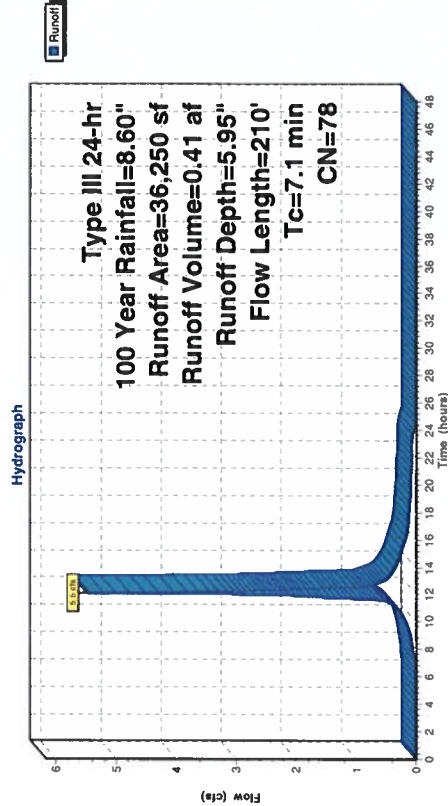


Summary for Subcatchment P1: Uncollected Runoff

Runoff = 5.5 cfs @ 12.10 hrs, Volume= 0.41 af, Depth= 5.95"
Routed to Reach P4 : Wetland (Analysis Point)
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.60"

Area (sf)	CN	Description			
27,350	77	Woods, Good, HSG D			
7,400	80	>75% Grass cover, Good, HSG D			
1,500	98	Unconnected pavement, HSG D			
36,250	78	Weighted Average			
34,750		95.86% Pervious Area			
1,500		4.14% Impervious Area			
1,500		100.00% Unconnected			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description

Subcatchment P1: Uncollected Runoff



Summary for Subcatchment P2: Site Area to Drywell

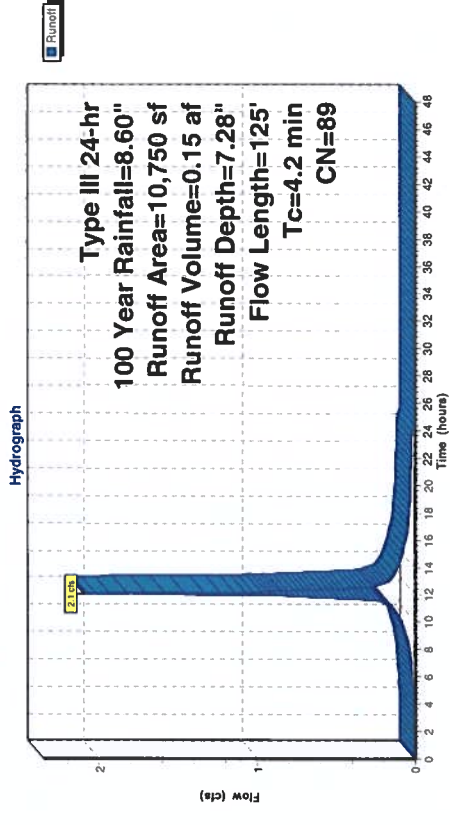
Runoff = 2.1 cfs @ 12.06 hrs, Volume= 0.15 af, Depth= 7.28"
Routed to Pond P3 : Roof Drywell
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.60"

Area (sf)	CN	Description
1,900	98	Paved parking, HSG D
5,100	80	>75% Grass cover, Good, HSG D
500	98	Paved parking, HSG D
3,250	98	Roofs, HSG D

10,750	89	Weighted Average
5,100		47.44% Pervious Area
5,650		52.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.1800	0.24		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.7	60	0.0400	1.40		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	15	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
4.2	125	Total			

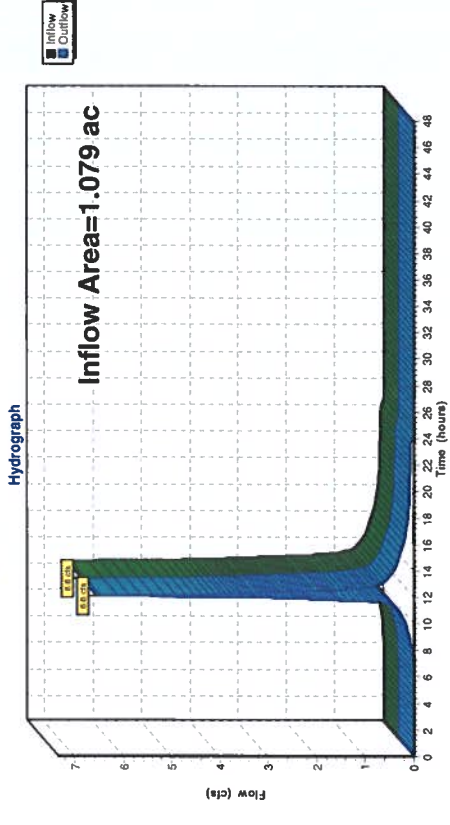
Subcatchment P2: Site Area to Drywell



Summary for Reach P4: Wetland (Analysis Point)

[40] Hint: Not Described (Outflow=Inflow)
Inflow Area = 1.079 ac, 15.21% Impervious, Inflow Depth = 5.54" for 100 Year event
Inflow = 6.6 cfs @ 12.10 hrs, Volume= 0.50 af
Outflow = 6.6 cfs @ 12.10 hrs, Volume= 0.50 af, Atten= 0%, Lag= 0.0 min
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Reach P4: Wetland (Analysis Point)



Summary for Pond P3: Roof Drywell

Inflow Area = 0.247 ac, 52.56% Impervious, Inflow Depth = 7.28" for 100 Year event
Inflow = 2.1 cfs @ 12.06 hrs, Volume= 0.15 af
Outflow = 1.2 cfs @ 12.16 hrs, Volume= 0.15 af, Atten= 45%, Lag= 5.9 min
Discarded = 0.1 cfs @ 12.16 hrs, Volume= 0.06 af
Primary = 1.1 cfs @ 12.16 hrs, Volume= 0.09 af
Routed to Reach P4 : Wetland (Analysis Point)

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 326.13' @ 12.16 hrs Surf.Area= 875 sf Storage= 1,696 cf
Plug-Flow detention time= 119.3 min calculated for 0.15 af (100% of inflow)
Center-of-Mass det. time= 119.3 min (894.5 - 775.2)

Volume	Invert	Avail. Storage	Storage Description
#1	323.00'	824 cf	Custom Stage Data (Conic) Listed below (Recalc)
#2	323.70'	1,002 cf	3,063 cf Overall - 1,002 cf Embedded = 2,060 cf x 40.0% Voids Cultec R-330XLHD x 19 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustments= +1.50' x 7.45 sf x 1 rows
		1,826 cf	Total Available Storage

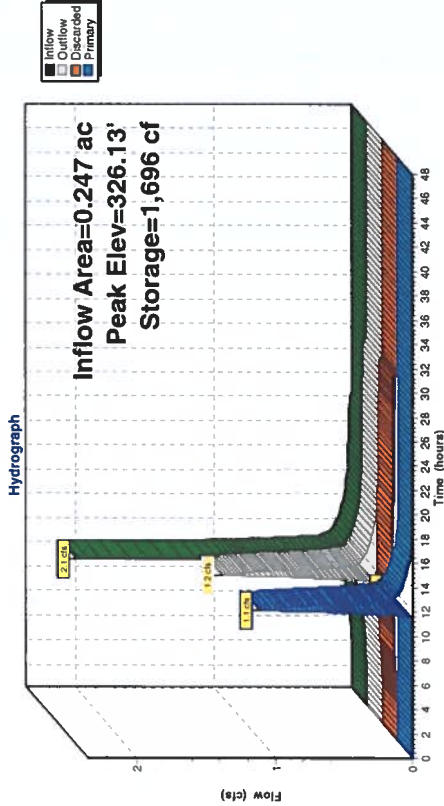
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
323.00	875	0	0	875
326.50	875	3,063	3,063	1,242

Device	Routing	Invert	Outlet Devices
#1	Primary	324.50'	6.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Discarded	323.00'	1.020 in/hr Exfiltration over Wetted area Conductivity to Groundwater Elevation = 320.00'

Discarded OutFlow Max=0.1 cfs @ 12.16 hrs HW=326.13' (Free Discharge)
2=Exfiltration (Controls 0.1 cfs)

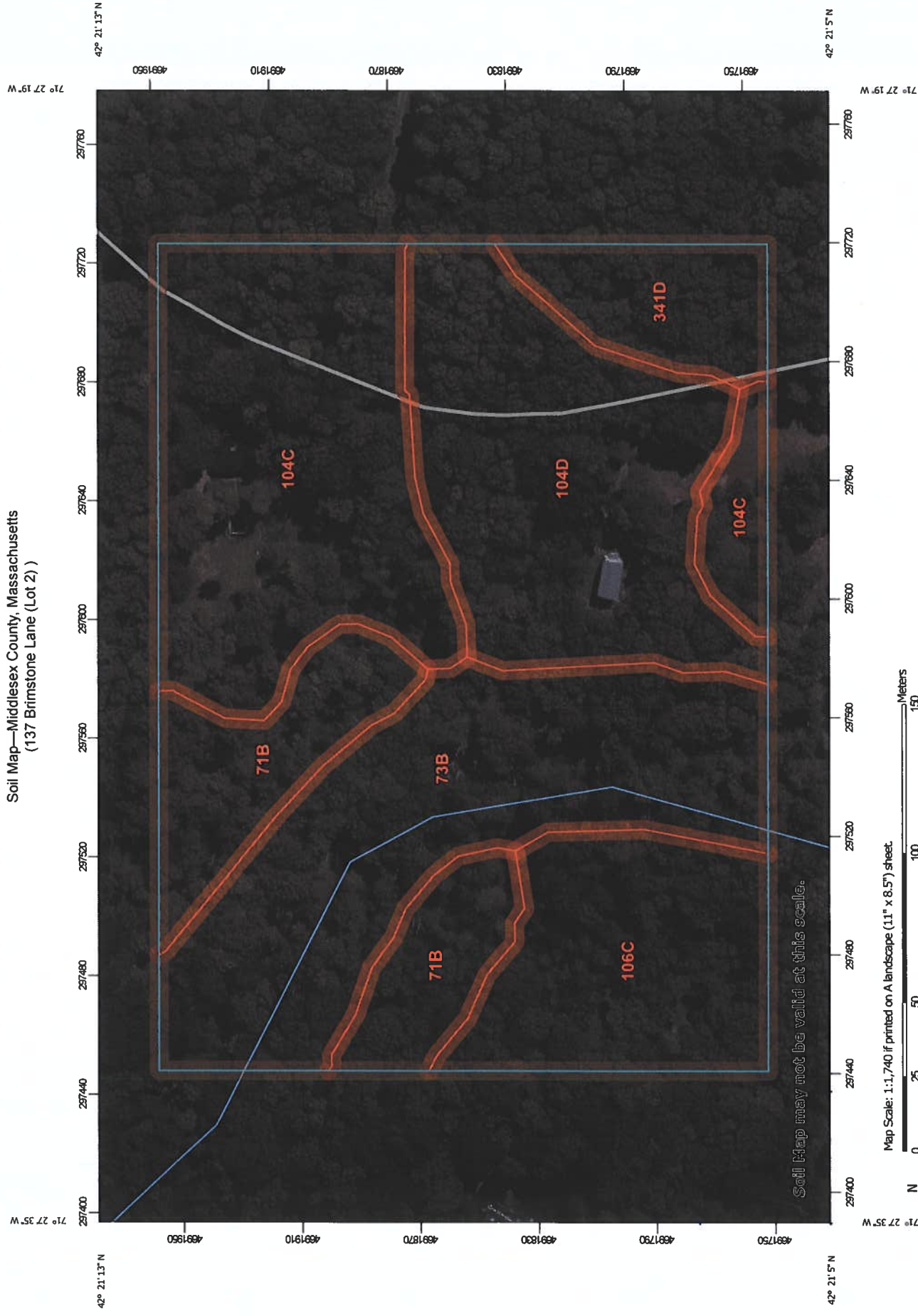
Primary OutFlow Max=1.1 cfs @ 12.16 hrs HW=326.13' (Free Discharge)
1=Orifice/Grate (Orifice Controls 1.1 cfs @ 5.66 fps)

Pond P3: Roof Drywell



SOIL MAPPING

Soil Map—Middlesex County, Massachusetts
(137 Brimstone Lane (Lot 2))



Soil Map may not be valid at this scale.

Map Scale: 1:1,740 if printed on A landscape (11" x 8.5") sheet.



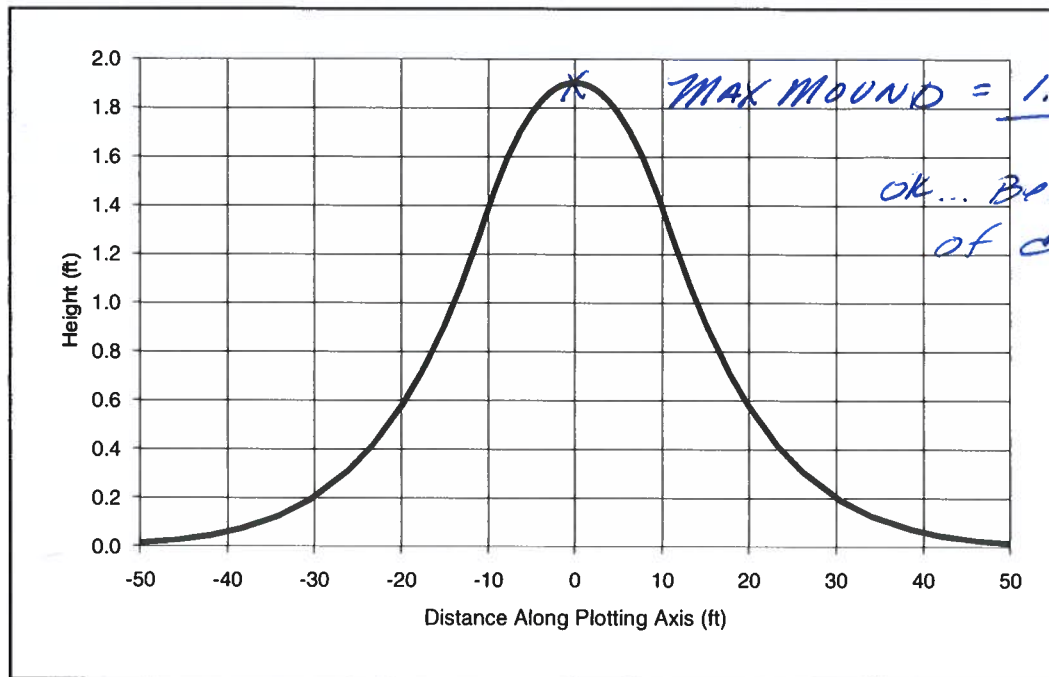
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	1.7	11.9%
73B	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	3.4	23.8%
104C	Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes	3.6	25.3%
104D	Hollis-Rock outcrop-Charlton complex, 15 to 25 percent slopes	3.0	20.9%
106C	Narragansett-Hollis-Rock outcrop complex, 3 to 15 percent slopes	1.8	12.8%
341D	Broadbrook very fine sandy loam, 15 to 25 percent slopes, very stony	0.8	5.4%
Totals for Area of Interest		14.2	100.0%

MOUNDING SUMMARY

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



MAX MOUND = 1.9 Feet *

ok... Below bottom of drywell.

COMPANY: csei

PROJECT: Brimstone

ANALYST: vc

DATE: 4/23/2024 TIME: 11:53:32 AM

INPUT PARAMETERS

Application rate: 0.881 c.ft/day/sq. ft

Duration of application: 1 days

Fillable porosity: 0.25

Hydraulic conductivity: 4.84 ft/day

Initial saturated thickness: 10 ft

Length of application area: 42 ft

Width of application area: 20.8 ft

No constant head boundary used

Plotting axis from Y-Axis: 90 degrees

Edge of recharge area:

positive X: 10.4 ft

positive Y: 0 ft

Total volume applied: 769.6416 c.ft

WRV = 770 c.f. ✓

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-50	0	-50	0.01
-42	0	-42	0.04
-34.1	0	-34	0.12
-26.1	0	-26	0.31
-19.9	0	-20	0.58
-15	0	-15	0.91
-11.1	0	-11	1.27
-7.7	0	-8	1.6
-4.8	0	-5	1.78
-2.9	0	-3	1.86
-1.6	0	-2	1.89
0	0	0	1.9
1.6	0	2	1.89
2.9	0	3	1.86
4.8	0	5	1.78
7.7	0	8	1.6
11.1	0	11	1.27
15	0	15	0.91
19.9	0	20	0.58
26.1	0	26	0.31
34.1	0	34	0.12
42	0	42	0.04
50	0	50	0.01