Sullivan, Connors & Associates

Land Surveying and Civil Engineering

Wayland Conservation Commission
41 Cochituate Road
Wayland, MA 01778

June 17, 2021

Attention: **Ms. Linda Hansen, Conservation Administrator**

Subject: **Chapter 193 Application**
27 Sherman's Bridge Road, Wayland, MA

Dear Ms. Hansen:

On behalf of the applicant (Keystone Custom Builders, LLC), Sullivan Connors & Associates, Inc., is pleased to submit the enclosed Chapter 193 Application related to the above referenced project. Please find the enclosed.

1. Copies of the application forms and documentation package:
   - Completed Chapter 193 Application & Checklist;
   - Stormwater Management Report:
     - Project narrative
     - Documentation of MassDEP Stormwater Standards
     - Drainage Pipe Sizing Calculations
     - Stormwater Operations and Maintenance Plan
     - Construction Period Stormwater Pollution Prevention Plan
2. Copies of the plans "Conservation Cluster and Definitive Subdivision Plans, 27 Sherman's Bridge Road, Wayland, MA," prepared by Sullivan Connors & Associates, Inc., dated June 1, 2021.
3. Copies of the "Concept Build-out Plan," prepared by Sullivan Connors & Associates, Inc., dated June 1, 2021.
4. A check in the amount of $100 to cover the application fee.

The proposed project includes a Conservation Cluster Subdivision at 27 Sherman's Bridge Road, Wayland. The project would create five (5) residential lots. The work would also include a 338-foot long cul-de-sac roadway, utility infrastructure, stormwater management, lot development, and miscellaneous site work as shown on the attached plans. The proposed development would preserve roughly half of the lot area through Open Space Land. See the attached reports and plans for additional details.

We look forward to discussing the proposed project at the next available meeting date, and should you have any questions please contact our office.

Sincerely,
Sullivan Connors & Associates, Inc.

Vito Colonna, PE

121 Boston Post Road • Sudbury, Massachusetts 01776
TEL (978) 443-9566 • FAX (978) 443-8915

HOLD TO LIGHT TO VIEW TRUE WATERMARK IN PAPER — HEAT SENSITIVE RED LOCK DISAPPEARS WHEN HEATED

44338

Keystone Development Corp
910 BOSTON POST ROAD E, SUITE 310
Marlborough, MA 01752
508-229-7827

Dedham Savings
Dedham, MA 02026
53-7172/2113

6/1/2021

PAY TO THE ORDER OF Town of Wayland $ **100.00

One Hundred and 00/100********** DOLLARS

Security features. Details on back.

Town of Wayland
41 Cochituate Road
Wayland, MA 01778

MEMO sherman bridge

AUTHORIZED SIGNATURE

⑈044338⑈ ⑆211371722⑆ 5470368714⑈

Keystone Development Corp

Town of Wayland			44338
	Permits	6/1/2021	100.00

Dedham Checking	sherman bridge	100.00

TOWN OF WAYLAND

41 COCHITUATE ROAD
WAYLAND, MASSACHUSETTS 01778

CHAPTER 193 APPLICATION
Stormwater Management and Land Disturbance Bylaw

A. General Information

1. Project Location

27 Sherman's Bridge Road — a. Street Address
Wayland — b. City/Town
01778 — c. Zip code
Map 7 Lot 23F — d. Parcel/ Lot Number

2. Applicant:

Keystone Custom Builders, LLC — a. First Name
b. Last Name
910 Boston Post Road, Suite 310 — c. Street Address
Marlborough, MA 01752 — e. State, f. Zip Code
d. City
g. Work/ Cell Phone #
mikestaiti@keystonedev.net — h. Email Address

3. Property Owner (required if different from applicant):

27 Sherman's Bridge Road Realty Trust — a. First Name
b. Last Name
c. Street Address
e. State
f. Zip Code
d.City
g. Work/ Cell Phone #
h. Email Address

4. Representative (if any):

Vito — a. First Name
Colonna — b. Last Name

CHAPTER 193 APPLICATION
Stormwater Management and Land Disturbance Bylaw

Sullivan Connors & Associates, Inc.
c. Company

121 Boston Post Road
c. Street Address

Sudbury, MA 01776 508-393-9727
e. State f. Zip Code d.City g. Work/ Cell Phone #

vc@csei.net
h. Email Address

5a. Project Type Checklist (check all that applies):

1. [X] Creation of new or increasing existing impervious surface of 500 sq. ft. or more.

   Impervious Surface: Is any material or structure on or above the ground that prevents water infiltration to the underlying soils. Impervious surface includes without limitation roads, paved parking lots, sidewalks, stone patios, decking, and rooftops.

2. [X] Alteration and/or land disturbance of at least 5,000 sq. ft. or 10% of the parcel; whichever is less.

   Alteration and/or land disturbance as defined in Chapter 193 Bylaw.

5b. General Project Description:

Proposed Conservation Cluster Subdivision to create five (5) lots.
The work would also include a 338 foot long road, utility infrastructure, stormwater management, septic systems, and miscellaneous site work as shown on the attached plans.
The proposed development would preserve roughly half of the lot area through either Open Space Land. See the attached reports and plans for additional details.

B. Additional Information

By submitting an application for coverage under the Stormwater Management and Land Disturbance Permit, the Applicant agrees to the following:

1. At a minimum, the proposed project complies with the performance standards of the most recent version of the Massachusetts Stormwater Management Handbook including but not limited to:
   a. Employing environmentally sensitive site design
   b. Evaluation of Low Impact Development practices
   c. Incorporation of source controls of contaminants and employing BMPs to minimize stormwater pollution
   d. Sizing of water quality volume of BMPs are based on 1-inch of runoff
   e. Methodology for hydrologic analyses (if necessary) is based on TR-55/TR-20 methodology
   f. Designing redevelopment of existing sites must provide a net improvement to stormwater conditions at the site.
2. The activity shall not increase either the rate or volume of stormwater runoff leaving the site, nor shall it alter stormwater flow to any adjoining properties, public ways, or any wetland resource areas, unless otherwise permitted based on improvements over existing conditions.

Please check all that apply to this project:

☒ Roof drains emptying into dry wells/recharge basins

☐ Grassed swales constructed

☐ Porous pavement installed; _____ sq. ft.

☐ Water quality swale

☐ Rain barrels/cisterns for irrigation

☒ Other methods (please list/describe): Rain Garden & Infiltration Basin

3. The Applicant shall provide and maintain Erosion and Sedimentation controls as necessary until the site is permanently stabilized. BMP's selected for erosion controls shall be chosen to minimize site disturbance from erosion control installation. As soon as the site is stabilized, such measures shall be removed.

   Please check all that apply to this project:

   ☒ Sediment filter fence with either hay bales or straw wattles

   ☐ Mulch filled fabric sock

   ☒ Construction entrance

   ☒ Temporary vegetative cover – mulch, netting

   ☒ Permanent vegetative cover – hydro seeding, seeding, sodding

   ☐ Slope stabilization

   ☐ Retaining Walls

   ☐ Slope drains

   ☐ Other methods (please list/describe): _____

4. The Applicant shall ensure that the site and stormwater management systems are perpetually inspected and maintained to function as designed.

   Please check all that apply to this project:

   ☒ Visual inspections by contractor

   ☒ Visual inspections by homeowner's Association

   ☒ Operation and Maintenance Plan

   ☐ Maintenance contract for stormwater components

   ☐ Other methods (please list/describe): _____

5. Other Jurisdiction

   ☐ Massachusetts Wetlands Protection Act (310 CMR 10.00) and it's implementing Regulations

   ☐ Wayland's Wetlands and Water Resource Protection Bylaw – Chapter 194

CHAPTER 193 APPLICATION
Stormwater Management and Land Disturbance Bylaw

- [X] Subdivision Approval
- [X] Board of Health Permit
- [X] Special Permit or Site Plan Review
- [X] Building Permit

C. Fees

Applicants must submit a $100 application fee.

D. Signatures and Submittal Requirements

I certify that I have reviewed the design standards above and the information contained herein, including all attachments, is true, accurate, and complete to the best of my knowledge. Further, I grant the Wayland Conservation Commission and its authorized Agents permission to enter the property to review this application and make inspections before, during and after construction. I have included a check for the application fee of $100.

Signature of Applicant — Date: 6/1/21

Signature of Property Owner (if different) — Date: 5/31/2021

Signature of Agent (if applicable) — Date: 31 May 2021

Kathleen E. Dunlay

For Conservation Commission:
Two copies of the completed Stormwater Management and Land Disturbance Bylaw (Chapter 193) including plans and documents and the bylaw fee payment to the Conservation Commission by mail or hand delivery.

TOWN OF WAYLAND
41 COCHITUATE ROAD

WAYLAND, MASSACHUSETTS 01778

CHAPTER 193 APPLICATION
Stormwater Management and Land Disturbance Bylaw Checklist

Submittal Requirements:

The applicant shall file eight copies of the completed application package to the Conservation Commission for a Stormwater Management and Land Disturbance Permit. The application package shall include:

[X] Application form with original signatures of all owners and representatives.

Two copies of the completed application form

Two copies of 11x17 size site plans

One copy of a full size site plan.

All documents emailed t rbrown@wayland.ma.us

[X] Number and size (dbh) of proposed trees to be removed. Replanting will be based on Replacement Tree and Shrub Schedule.

[X] Locus map showing location of the property.

[X] Any and all applications fees ($100 transmittal fee)

[X] Stormwater Management and Land Disturbance Plan (per the Massachusetts Stormwater Management Regulations and Massachusetts Stormwater Management handbook as applicable for the scope of the project.)

[X] Supporting Stormwater Management Report and engineering calculations (per the Massachusetts Stormwater Management Regulations and Massachusetts Stormwater Management handbook as applicable for the scope of the project.) The report must contain a narrative describing the project and how the project will comply with the Wayland Stormwater Management and Land Disturbance Bylaw. List any requested waivers and the reasons the standards cannot be met.

[X] Stormwater Pollution Preventative Plan (SWPPP) if coverage is required under the U.S. EPA Construction General Permit, Multi-Sector Permit or an individual permit under the NPDES Phase II requirements.

[X] Long-term Pollution Prevention Plan

[X] Erosion and Sediment Control Plan

[X] Stormwater System Operation and Maintenance Plan

The property owner, as well as the applicant and/or representative (if different from owner) must sign this checklist and all other applicable applications. The property owner, by signing this checklist and the applications, acknowledges that the Commission and Staff may enter the property to inspect the premises as part of the assessment of the application.

Signature of Property Owner

Kathleen C. Dunlay

Date 5/31/2021

31 May 2021

I certify under penalty of law that this document and all its attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete

Signature of Applicant

Date 6/1/21

Stormwater Management Report

27 Sherman's Bridge Road
Wayland, Massachusetts

June 16, 2021

Prepared by:
Sullivan, Connors & Associates, 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 requirements of the Town of Wayland Subdivision Rules and Regulations and the Stormwater Bylaw, Chapter 193.

Existing Conditions:

The site consists of a 8.3 acre parcel located at 27 Sherman's Bridge Road. The lot is currently developed as a single family house including several outbuildings, and has an existing impervious area of 3,000 square feet plus 11,850 square feet of gravel driveways. The perimeter site around the house area is currently wooded sloping to the four property lines. There is an isolated wetland located in the rear northeast corner of the site. This area is a 25 foot depression with a bottom elevation of 124, while the developable area is up at elevation 150 to 170.

The Natural Resource Conservation Service has mapped the soils within the proposed project area as Hinckley Loamy Sand, which is a well-drained highly permeable Group A soil. Soil testing for the septic systems was performed by this office in April 2021. The results were consistent with the soil mapping and showed well-drained sand with no evidence of groundwater or development restrictions.

Proposed Conditions:

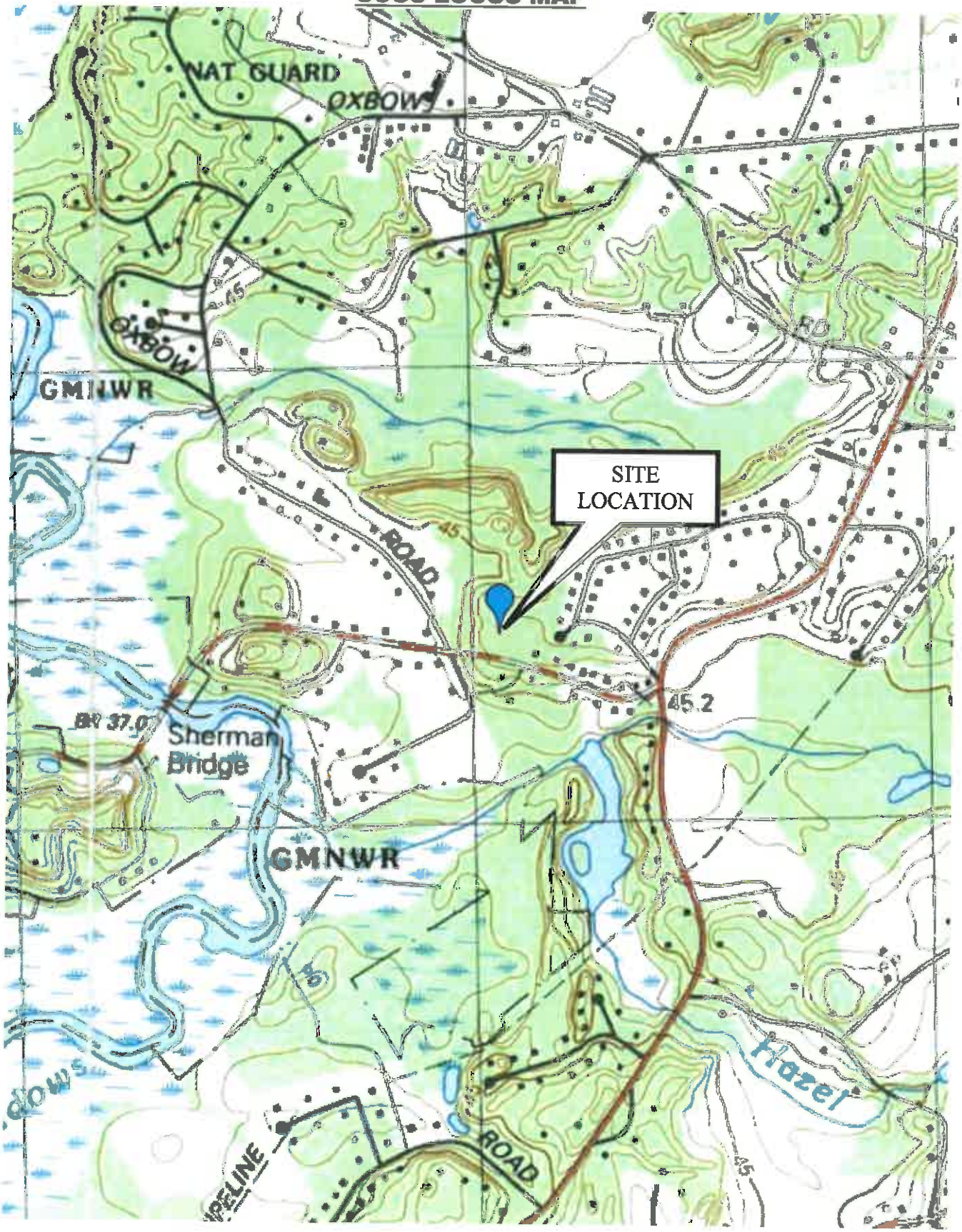
The proposed project consists of a cluster development subdivision consisting of five (5) lots. The project would provide access through a proposed 338 foot long cul-de-sac. The site would be serviced by private on-site septic systems on each lot and municipal water extended from Sherman's Bridge Road.

The total post development impervious area used in the calculations is 43,430 square feet. This includes the proposed roadway, roofs, driveways, and miscellaneous impervious areas (assumed allowance for the driveways plus an additional 7,500 square feet of miscellaneous impervious areas such as patios and walkways).

In order to mitigate the increase in runoff due to the impervious area, a stormwater management system has been proposed, which will collect runoff from the roadway and driveways through the roadway drainage system. This system will then discharge to a infiltration basin to the rear of the development. The collection and pretreatment system will consist of either deep sump catch basins in the roadway or the rain garden proposed within the cul-de-sac island. Roof water from each of the houses will be collected and infiltrated through drywells (cultec chambers).

Both the infiltration basin and the drywells have been designed to fully infiltrate the 100 year storm event.

USGS LOCUS MAP



27 Sherman's Bridge Road

Wayland, MA

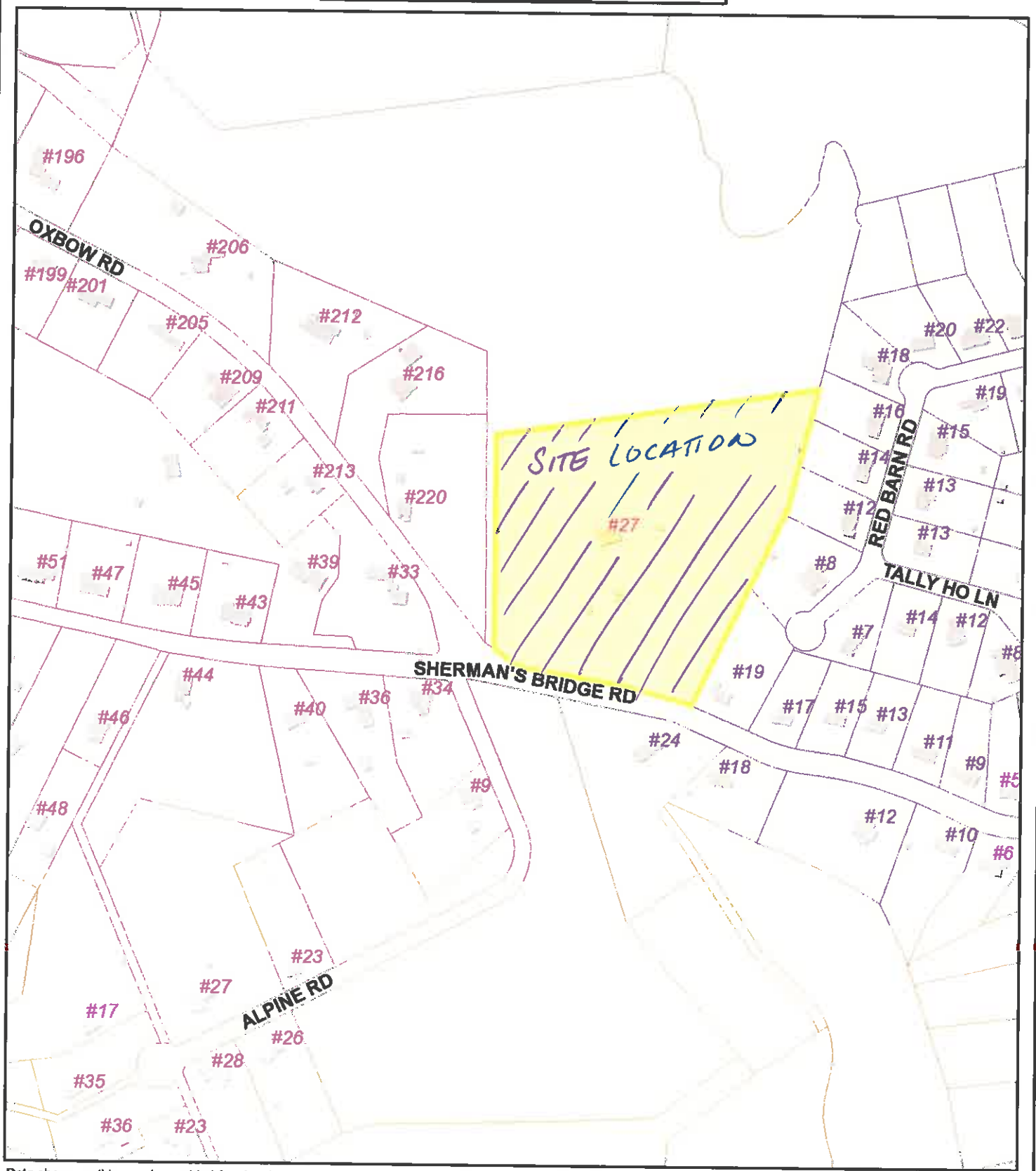
June 17, 2021

1 inch = 300 Feet

0 300 600 900

CAI Technologies

www.cai-tech.com



Data shown on this map is provided for planning and informational purposes only. The municipality and CAI Technologies are not responsible for any use for other purposes or misuse or misrepresentation of this map.

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.

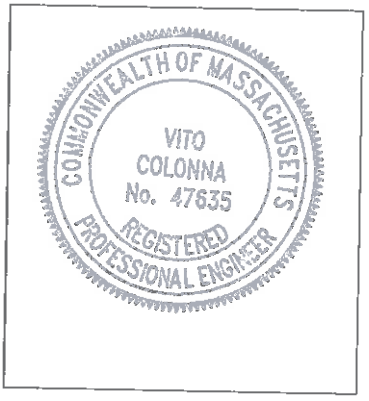
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



6-1-21
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:

- ☐ 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): Drywells

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 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.

☐ 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.

☑ 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 REQUIRED DOCUMENTATION

Low Impact Design (LID) Techniques

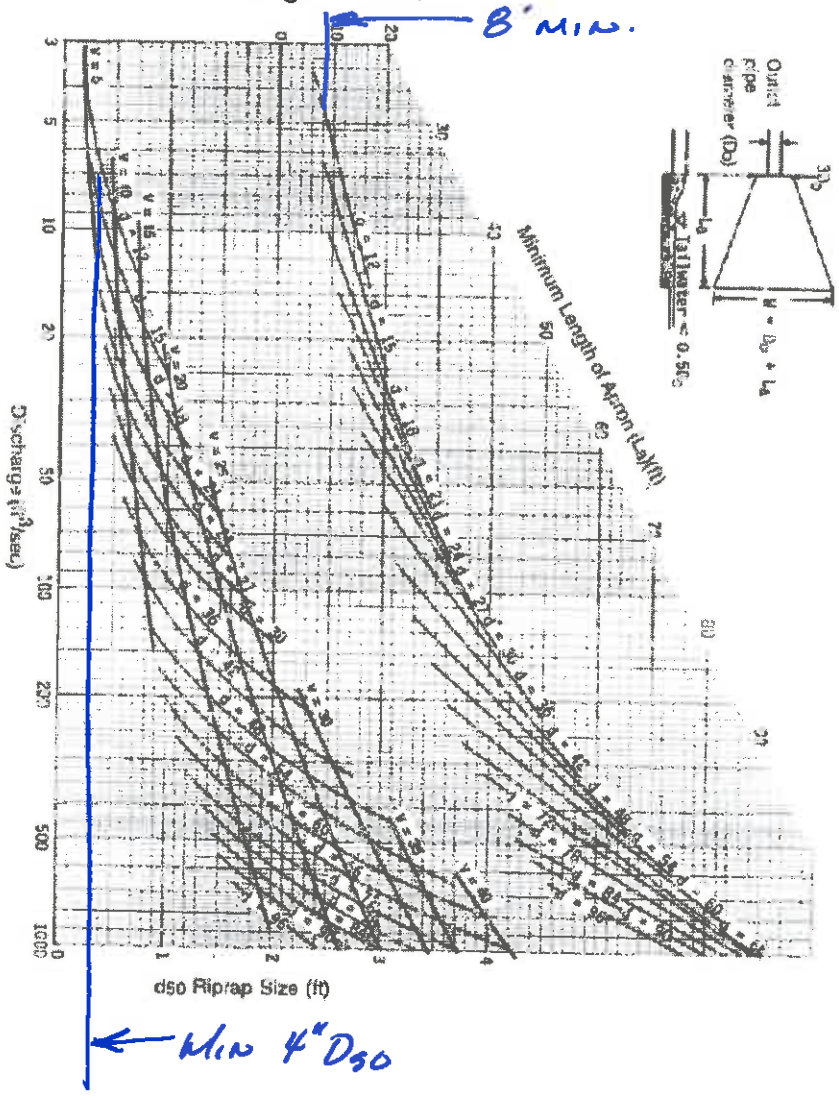
The design includes one of the main LID concepts through preservation of open space, vegetated buffers, and wetland resource areas. The plans also implement a rain garden within the cul-de-sac and a vegetated infiltration basin.

Standard 1: No New Untreated Discharges

There are no new untreated discharges to any wetland resource area.
A stone outlet splash pad has been placed at the drainage system overflow.

Stormwater Discharge Velocity:
15" FE: Q_{FULL}= 7.0 cfs / V_{FULL}= 5.7 fps

Riprap sizing: Use: Riprap Size = 4" Minimum (D50)
Length= 8 feet



Standard 2: Peak Rate Attenuation

The analysis indicates the proposed project will not result in an increase in peak rate or volume of runoff for the 2-yr 10-yr, and 100-yr storm events. The calculations were performed with HydroCAD 9.10 Stormwater modeling Software, which utilizes Soil Conservation Service (SCS) Technical Release No. 20 (TR-20) and SCS Technical Release 55 (TR-55), Urban Hydrology for Small Watersheds. Rainfall intensities are based upon the most current NRCC data. Stormwater was analyzed along the downgradient property lines below the limit of work.

The following tables summarized the peak rate and volume of runoff leaving the property to verify there would be no increases under the post-development condition.

Table 1: Peak Rate of Runoff

Storm Event	**1-inch**	**2-year**	**10-year**	**25-year**	**100-year**
Intensity		**3.2 inches**	**4.7 inches**	**5.9 inches**	**8.42 inches**
	Existing (Proposed)	**Existing (Proposed)**	**Existing (Proposed)**	**Existing (Proposed)**	**Existing (Proposed)**
1 Rear Depression	0.0 cfs (0.0 cfs)	0.0 cfs (0.0 cfs)	0.0 cfs (0.0 cfs)	0.0 cfs (0.0 cfs)	0.6 cfs (0.5 cfs)
2 East Property Line	0.0 cfs (0.0 cfs)	0.0 cfs (0.0 cfs)	0.0 cfs (0.0 cfs)	0.1 cfs (0.1 cfs)	0.9 cfs (0.8 cfs)
3 Sherman's Bridge Rd	0.0 cfs (0.0 cfs)	0.0 cfs (0.0 cfs)	0.0 cfs (0.0 cfs)	0.0 cfs (0.0 cfs)	0.1 cfs (0.1 cfs)
4 Rear Property Line	0.0 cfs (0.0 cfs)	0.0 cfs (0.0 cfs)	0.0 cfs (0.0 cfs)	0.0 cfs (0.0 cfs)	0.4 cfs (0.1 cfs)
5 West Property Line	0.0 cfs (0.0 cfs)	0.0 cfs (0.0 cfs)	0.0 cfs (0.0 cfs)	0.1 cfs (0.1 cfs)	1.4 cfs (1.0 cfs)

Table 2: Volume of Runoff

Storm Event	**1-inch**	**2-year**	**10-year**	**25-year**	**100-year**
Intensity		**3.2 inches**	**4.7 inches**	**5.9 inches**	**8.42 inches**
	Existing (Proposed)	**Existing (Proposed)**	**Existing (Proposed)**	**Existing (Proposed)**	**Existing (Proposed)**
1 Rear Depression	0.0 ac-ft (0.0 ac-ft)	0.0 ac-ft (0.0 ac-ft)	0.0 ac-ft (0.0 ac-ft)	0.02 ac-ft (0.02 ac-ft)	0.12 ac-ft (0.11 ac-ft)
2 East Property Line	0.0 ac-ft (0.0 ac-ft)	0.0 ac-ft (0.0 ac-ft)	0.01 ac-ft (0.01 ac-ft)	0.03 ac-ft (0.03 ac-ft)	0.15 ac-ft (0.10 ac-ft)
3 Sherman's Bridge Rd	0.0 ac-ft (0.0 ac-ft)	0.0 ac-ft (0.0 ac-ft)	0.0 ac-ft (0.0 ac-ft)	0.00 ac-ft (0.00 ac-ft)	0.03 ac-ft (0.03 ac-ft)
4 Rear Property Line	0.0 ac-ft (0.0 ac-ft)	0.0 ac-ft (0.0 ac-ft)	0.0 ac-ft (0.0 ac-ft)	0.02 ac-ft (0.00 ac-ft)	0.06 ac-ft (0.03 ac-ft)
5 West Property Line	0.0 ac-ft (0.0 ac-ft)	0.0 ac-ft (0.0 ac-ft)	0.01 ac-ft (0.01 ac-ft)	0.06 ac-ft (0.04 ac-ft)	0.21 ac-ft (0.16 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 two drywells.

Required Recharge Volume:

Total Post-development impervious area = 43,430 S.F.
On-site Hydrologic Soil Group = A (0.60"/impervious area)
Recharge Volume = 43,430 S.F. x 0.6 / 12 = 2,172 cubic feet
Area Adjustment = (total impervious / collected area) = 43,430 / 37080 s.f. = 1.17
Total Recharge Required = 2,172 c.f. x 1.17 = 2,542 Cubic Feet

Proposed Recharge Volume

Infiltration Basin = 8,335 c.f.
Proposed Drywells = 450 c.f. x 5 lots = 2,250 c.f.
Total Proposed Recharge Volume = 10,585 Cubic Feet

Pretreatment: 44% TSS removal

1. Deep sump catch basins or rain garden
2. Sediment Forbay

Draw Down Calculations – 72 hours maximum allowed

= Volume / (Saturated Hydraulic Conductivity x Bottom Area)

Infiltration Basin
= 8,335 cubic feet / (8.27 in/hr x 1,900 sq. ft. / 12 in/ft) = 6 hours

Drywells
= 450 cubic feet / (8.27 in/hr x 216 sq. ft. / 12 in/ft) = 3 hours

Groundwater Separation

The bottom of drywells have been set a minimum of 4 feet above estimated groundwater and/or ledge elevation based upon on-site soil testing. A mounding analysis would not be required.

Standard 4: Water Quality

The proposed project has been designed to remove greater than 80% of the total suspended solids (TSS) through the use of a rain garden and subsurface infiltration system.

Area 1 (to Infiltration System)

1 **BMP**	2 **TSS removal**	3 **Starting TSS** (5 from previous BMP)	4 **TSS Removal** **(2 * 3)**	5 **Remaining TSS** **(3 - 4)**
Infiltration basin	80%	100%	80%	20%
		Total TSS Removal =	80%	

Infiltration Basin

Required Water Quality Volume (WQV): 1.0 inches

Tributary Impervious Area = 24,200 s.f.

1.0" x 24,200 s.f. /12 = 2,017 Cubic Feet

Proposed Storage Volume (WQV) = 8,335 Cubic Feet

Sediment Forebay Sizing (for pretreatment)

Required Water Quality Volume (WQV): 1.0 inches

Tributary Impervious Area = 24,200 s.f.

0.1" x 24,200 s.f. /12 = 202 Cubic Feet

Proposed Storage Volume (WQV) = 300 Cubic Feet

Rain Garden Sizing (sized as sediment forebay for pretreatment only)

Required Water Quality Volume (WQV): 0.1 inches

Tributary Impervious Area = 17,300 s.f.

0.1" x 17,300 s.f. /12 = 145 Cubic Feet

Proposed Storage Volume (WQV) = 335 Cubic Feet

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

The site is located within a DEP Zone 2, and the BMP's have been designed to treat the required 1-inhc of runoff and additional pretreatment has been provided.

Standard 7: Redevelopment

The proposed project is a partial redevelopment, however, all of the standards have been fully met.

Standard 8: Construction Period Controls

Construction period erosion and sedimentation controls have been provided on the design plans, and a Stormwater Pollution Prevention Plan has been prepared.

Standard 9: Operation and Maintenance Plan

An Operation and Maintenance Plan has been attached with this report.

Standard 10: Illicit Discharges

Based upon site observations made by Sullivan Connors and Associates, no illicit discharges have been observed on the site. All proposed sewerage flow shall be discharged to the proposed subsurface sewerage disposal system.

DRAIN PIPE SIZING CALCULATIONS

The street drainage system has been designed from calculations based upon the 50-year design storm. The system was also evaluated during the 100-year design storm to ensure capacity to convey stormwater to the detention system.

Storm intensities were determined from exhibit 8-14 "*Intensity – Duration – Frequency Curve for Worcester, MA*" from the MassHighway Design Manual. The resulting analysis was performed using the Rational Method of determining peak storm flows. All storm sewer pipe sizes were determined using Manning's Equation for pipes flowing full.

The following table presents the hydraulic calculations performed for sizing the site drainage system. The structure references refer to those as shown on the site plan submitted with this report.

DRAIN PIPE SIZING CALCULATIONS

PROJECT 105 Plain Road
Cluster Subdivision

LOCATION Wayland, MA
SHEET 1 OF 1

BY: VC
DATE: 1/12/2021

n= 0.012
RETURN PERIOD 25 YEAR

Line		Area	Percent Impervious	C	CA	Ci	Tc	rain	Inlet flow Q	Pipe flow Qd	Pipe Size	Pipe Length	Slope	flowing full		Rim (feet)		Inv. El.	
FROM	TO	ac					min.	in/hr	cfs	cfs	in	ft	ft/ft	Qf	Vf	Upper	Lower	Upper	Lower
CB-0+18 L	DMH 0+24	0.24	50%	0.55	0.13	1.1	5.0	6.5	0.94	**0.94**	12	12	0.025	**6.11**	7.8	167.30	167.70	164.10	163.80
CB-0+18 R	DMH 0+24	0.15	75%	0.75	0.11	1.1	5.0	6.5	0.80	**0.80**	12	18	0.017	**4.99**	6.3	167.35	167.70	164.10	163.80
DMH 0+24	DMH 1+50									**1.75**	12	115	0.010	**3.86**	4.9	167.70	170.34	163.70	162.55
DMH 1+50	DMH 3+12									**1.75**	12	160	0.010	**3.86**	4.9	170.34	170.50	162.45	160.85
CB-2+90	DMH-3+12	0.77	50%	0.55	0.42	1.1	5.0	6.5	3.03	**3.03**	12	30	0.042	**7.88**	10.0	165.50	170.50	165.50	164.25
DMH 3+12	FE-15"									**4.78**	15	150	0.010	**7.00**	5.7	170.50	---	160.50	159.00

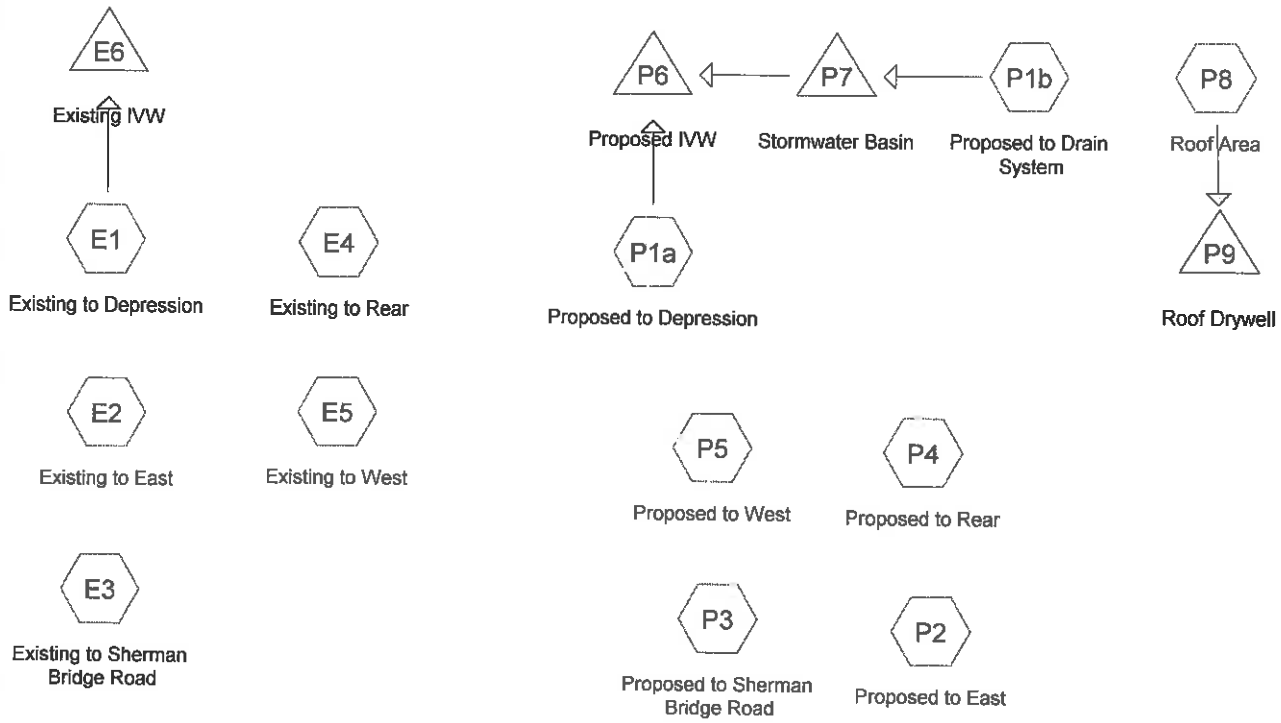
C (Lawn) 0.15
C (impervious) 0.95

HYDROLOGIC CALCULATIONS

EXISTING CONDITION
1-inch, 2 Year, 10 Year, 25 Year
& 100 Year Storm
Calculation Sheets

AND

PROPOSED CONDITION
1-inch, 2 Year, 10 Year, 25 Year
& 100 Year Storm
Calculation Sheets



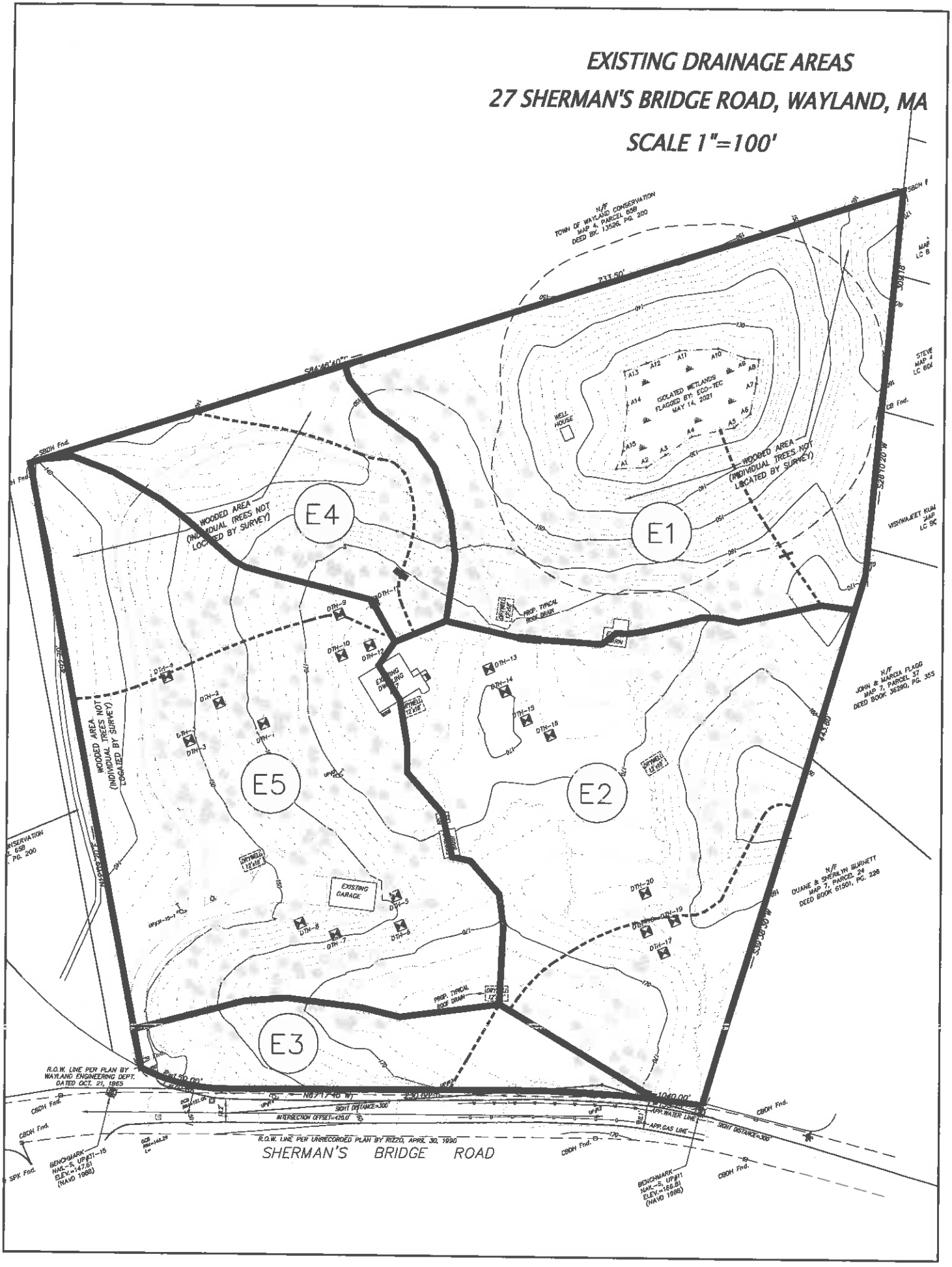
Subcat Reach Pond Link

Drainage Diagram for Sherman Bridge Cluster
Prepared by Microsoft, Printed 6/17/2021

EXISTING DRAINAGE AREAS

27 SHERMAN'S BRIDGE ROAD, WAYLAND, MA

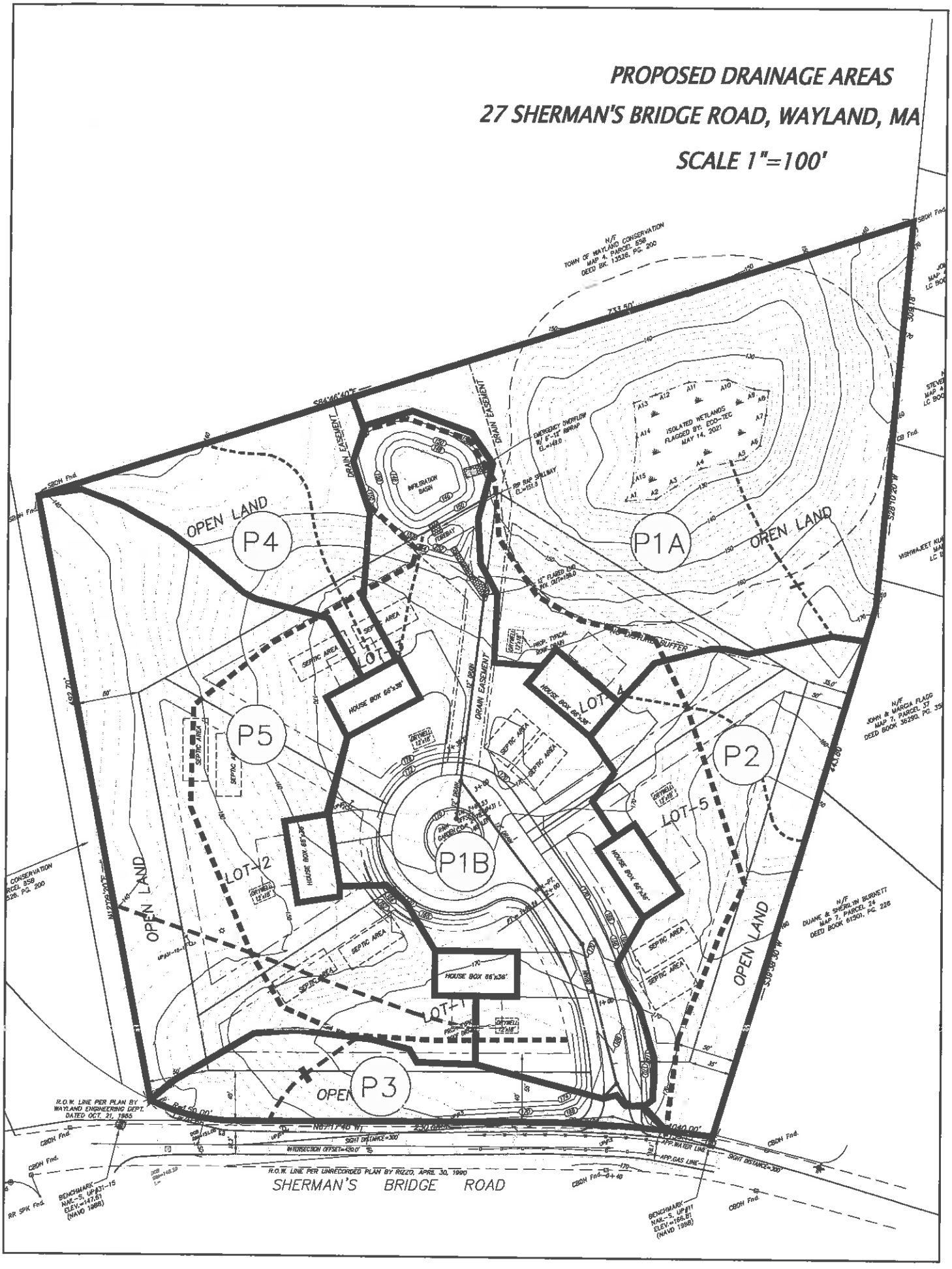
SCALE 1"=100'



PROPOSED DRAINAGE AREAS

27 SHERMAN'S BRIDGE ROAD, WAYLAND, MA

SCALE 1"=100'



Summary for Subcatchment E1: Existing to Depression

[45] Hint: Runoff=Zero

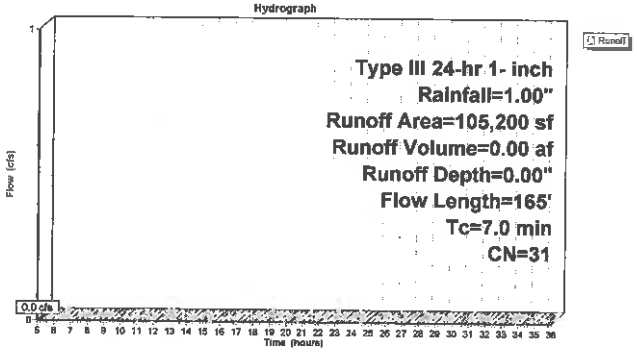
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 1- inch Rainfall=1.00"

	Area (sf)	CN	Description
	104,105	30	Woods, Good, HSG A
*	830	96	Gravel Road
	265	98	Unconnected roofs, HSG A
	105,200	31	Weighted Average
	104,935		99.75% Pervious Area
	265		0.25% Impervious Area
	265		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.6	115	0.3500	2.96		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.0	165	Total			

Subcatchment E1: Existing to Depression



Summary for Subcatchment E2: Existing to East

[45] Hint: Runoff=Zero

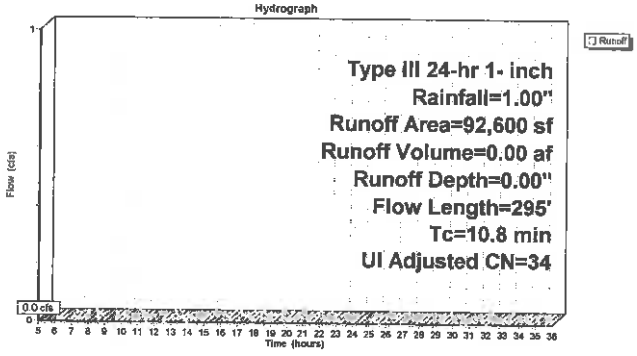
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 1- inch Rainfall=1.00"

Area (sf)	CN	Description
40,840	39	>75% Grass cover, Good, HSG A
50,655	30	Woods, Good, HSG A
1,105	98	Unconnected roofs, HSG A
92,600	35	Weighted Average, UI Adjusted CN = 34
91,495		98.81% Pervious Area
1,105		1.19% Impervious Area
1,105		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
1.3	120	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.5	90	0.1600	2.80		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.6	35	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.8	295	Total			

Subcatchment E2: Existing to East



Summary for Subcatchment E3: Existing to Sherman Bridge Road

[45] Hint: Runoff=Zero

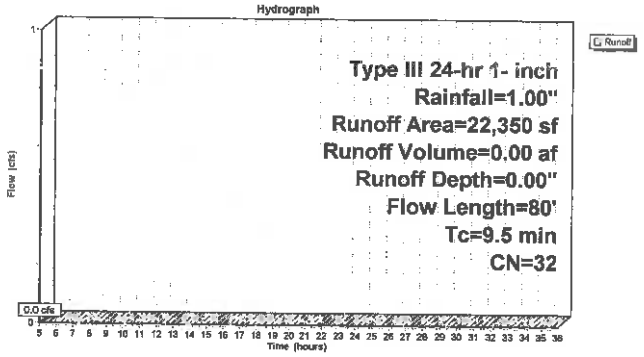
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 1- inch Rainfall=1.00"

	Area (sf)	CN	Description
	21,800	30	Woods, Good, HSG A
*	550	96	Gravel Driveway
	22,350	32	Weighted Average
	22,350		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.3	30	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.5	80	Total			

Subcatchment E3: Existing to Sherman Bridge Road



Summary for Subcatchment E4: Existing to Rear

[45] Hint: Runoff=Zero

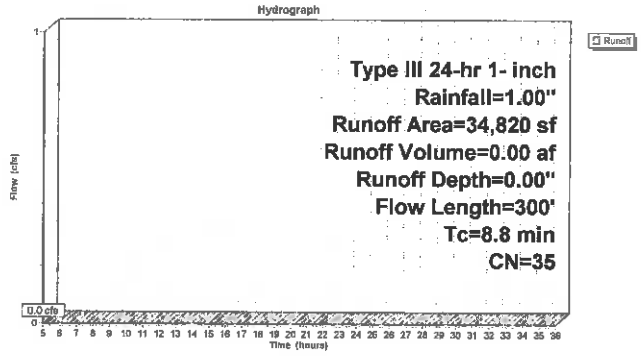
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 1- inch Rainfall=1.00"

	Area (sf)	CN	Description
	31,920	30	Woods, Good, HSG A
*	2,900	98	Gravel Driveway
	34,820	35	Weighted Average
	34,820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.30"
2.4	250	0.1200	1.73		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
8.8	300	Total			

Subcatchment E4: Existing to Rear



Summary for Subcatchment E5: Existing to West

[45] Hint: Runoff=Zero

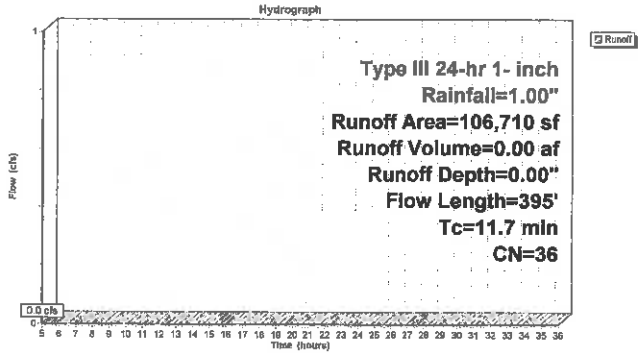
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 1- inch Rainfall=1.00"

	Area (sf)	CN	Description
	94,350	30	Woods, Good, HSG A
*	7,570	96	Gravel Drives
	1,630	98	Unconnected roofs, HSG A
	3,160	39	>75% Grass cover, Good, HSG A
	106,710	36	Weighted Average
	105,080		98.47% Pervious Area
	1,630		1.53% Impervious Area
	1,630		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.30"
3.3	345	0.1200	1.73		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.7	395	Total			

Subcatchment E5: Existing to West



Summary for Pond E6: Existing IVW

Inflow Area = 2.415 ac, 0.25% Impervious, Inflow Depth = 0.00" for 1- inch event
Inflow = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af
Outflow = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Atten= 0%, Lag= 0.0 min

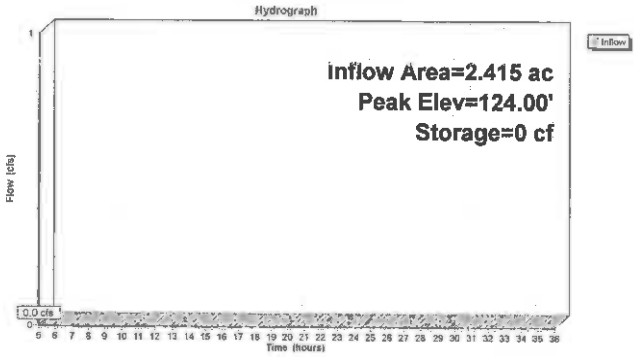
Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 124.00' @ 5.00 hrs Surf.Area= 6,740 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	520,260 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	6,740	0	0
126.00	8,950	15,690	15,690
128.00	11,590	20,540	36,230
130.00	14,500	26,090	62,320
140.00	31,230	228,650	290,970
146.00	45,200	229,290	520,260

Pond E6: Existing IVW



Summary for Subcatchment P1a: Proposed to Depression

[45] Hint: Runoff=Zero

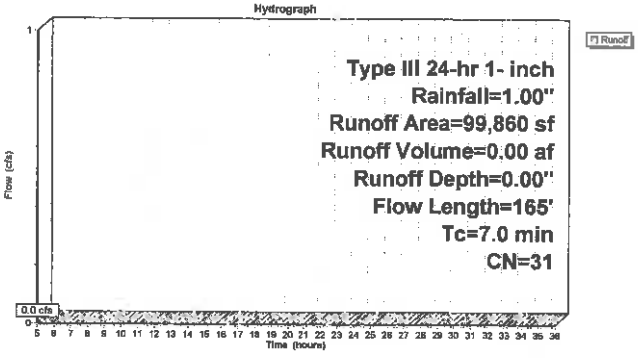
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 1- inch Rainfall=1.00"

	Area (sf)	CN	Description
	91,050	30	Woods, Good, HSG A
	7,810	39	>75% Grass cover, Good, HSG A
	1,000	98	Unconnected pavement, HSG A
	99,860	31	Weighted Average
	98,860		99.00% Pervious Area
	1,000		1.00% Impervious Area
	1,000		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.30"
0.6	115	0.3500	2.96		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
7.0	165	Total			

Subcatchment P1a: Proposed to Depression



Summary for Subcatchment P1b: Proposed to Drain System

[49] Hint: Tc<2dt may require smaller dt
[45] Hint: Runoff=Zero

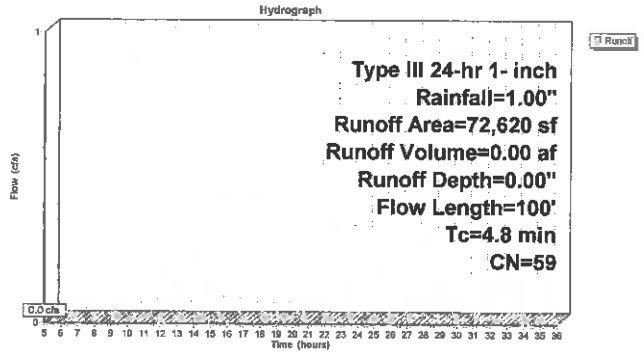
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 1- inch Rainfall=1.00"

Area (sf)	CN	Description
48,420	39	>75% Grass cover, Good, HSG A
11,400	98	Paved roads w/curbs & sewers, HSG A
12,800	98	Paved parking, HSG A
72,620	59	Weighted Average
48,420		66.68% Pervious Area
24,200		33.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0800	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
0.2	50	0.3000	3.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.8	100	Total			

Subcatchment P1b: Proposed to Drain System



Summary for Subcatchment P2: Proposed to East

[45] Hint: Runoff=Zero

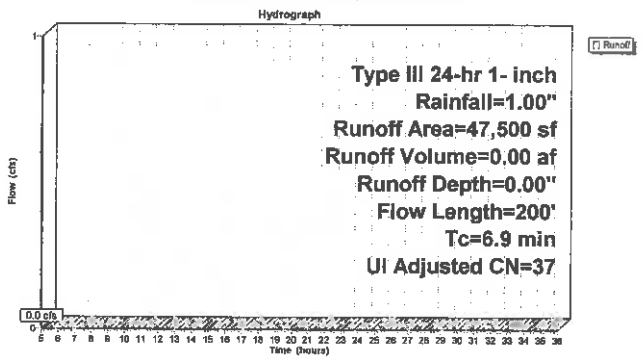
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 1- inch Rainfall=1.00"

Area (sf)	CN	Description
23,660	39	>75% Grass cover, Good, HSG A
20,540	30	Woods, Good, HSG A
3,300	98	Unconnected pavement, HSG A
47,500	39	Weighted Average, UI Adjusted CN = 37
44,200		93.05% Pervious Area
3,300		6.95% Impervious Area
3,300		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0500	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
1.2	150	0.1600	2.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.9	200	Total			

Subcatchment P2: Proposed to East



Summary for Subcatchment P3: Proposed to Sherman Bridge Road

[45] Hint: Runoff=Zero

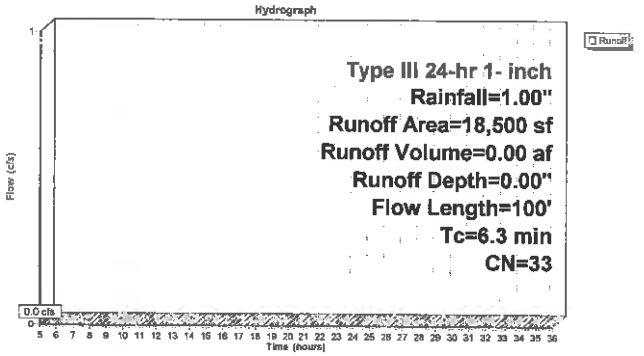
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 1- inch Rainfall=1.00"

Area (sf)	CN	Description
15,300	30	Woods, Good, HSG A
550	98	Paved roads w/curbs & sewers, HSG A
2,650	39	>75% Grass cover, Good, HSG A
18,500	33	Weighted Average
17,950		97.03% Pervious Area
550		2.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.1200	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.4	50	0.2000	2.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.3	100	Total			

Subcatchment P3: Proposed to Sherman Bridge Road



Summary for Subcatchment P4: Proposed to Rear

[45] Hint: Runoff=Zero

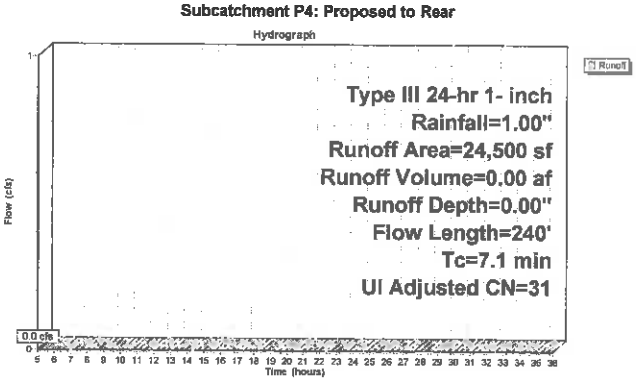
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 1- inch Rainfall=1.00"

Area (sf)	CN	Description
22,400	30	Woods, Good, HSG A
1,600	39	>75% Grass cover, Good, HSG A
500	98	Unconnected pavement, HSG A
24,500	32	Weighted Average, UI Adjusted CN = 31
24,000		97.96% Pervious Area
500		2.04% Impervious Area
500		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0500	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
1.5	190	0.1700	2.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.1	240	Total			

Subcatchment P4: Proposed to Rear



Summary for Subcatchment P5: Proposed to West

[45] Hint: Runoff=Zero

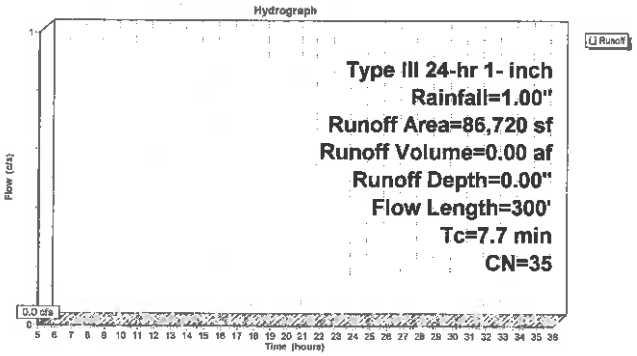
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 1- inch Rainfall=1.00"

Area (sf)	CN	Description
49,120	30	Woods, Good, HSG A
35,600	39	>75% Grass cover, Good, HSG A
2,000	98	Unconnected pavement, HSG A
86,720	35	Weighted Average
84,720		97.69% Pervious Area
2,000		2.31% Impervious Area
2,000		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0500	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30"
0.9	140	0.1500	2.71		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	110	0.0900	1.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
7.7	300	Total			

Subcatchment P5: Proposed to West



Summary for Pond P6: Proposed IVW

Inflow Area = 3.960 ac, 14.61% Impervious, Inflow Depth = 0.00" for 1- inch event
Inflow = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af
Outflow = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Atten= 0%, Lag= 0.0 min

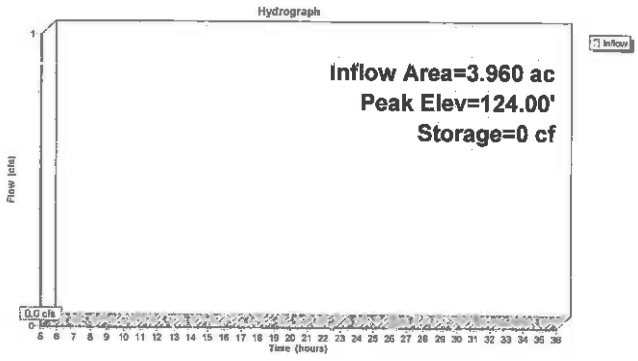
Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 124.00' @ 5.00 hrs Surf.Area= 6,740 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	520,260 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	6,740	0	0
126.00	8,950	15,690	15,690
128.00	11,590	20,540	36,230
130.00	14,500	26,090	62,320
140.00	31,230	228,650	290,970
146.00	45,200	229,290	520,260

Pond P6: Proposed IVW



Summary for Pond P7: Stormwater Basin

Inflow Area = 1.667 ac, 33.32% Impervious, Inflow Depth = 0.00" for 1- inch event
Inflow = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af
Outflow = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af
Primary = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af

Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 146.00' @ 5.00 hrs Surf.Area= 1,900 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	146.00'	12,319 cf	Custom Stage Data (Conic) Listed below (Recalc)

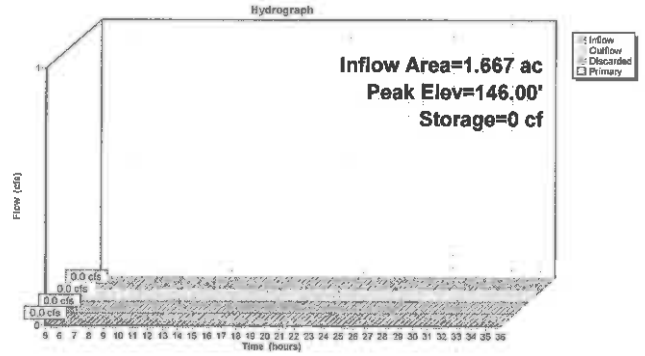
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
146.00	1,900	0	0	1,900
148.00	3,100	4,951	4,951	3,151
150.00	4,300	7,367	12,319	4,425

Device	Routing	Invert	Outlet Devices
#1	Discarded	146.00'	8.270 in/hr Exfiltration over Wetted area
#2	Primary	149.00'	10.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.0 cfs @ 5.00 hrs HW=146.00' (Free Discharge)
↳1=Exfiltration (Passes 0.0 cfs of 0.4 cfs potential flow)

Primary OutFlow Max=0.0 cfs @ 5.00 hrs HW=146.00' (Free Discharge)
↳2=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

Pond P7: Stormwater Basin



Summary for Subcatchment P8: Roof Area

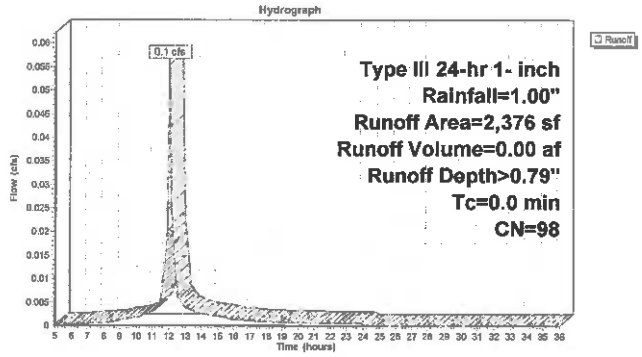
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.1 cfs @ 12.00 hrs, Volume= 0.00 af, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 1- inch Rainfall=1.00"

Area (sf)	CN	Description
2,376	98	Roofs, HSG A
2,376		100.00% Impervious Area

Subcatchment P8: Roof Area



Summary for Pond P9: Roof Drywell

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.055 ac,100.00% Impervious, Inflow Depth > 0.79" for 1- inch event
Inflow = 0.1 cfs @ 12.00 hrs, Volume= 0.00 af
Outflow = 0.0 cfs @ 12.05 hrs, Volume= 0.00 af, Atten= 24%, Lag= 2.8 min
Discarded = 0.0 cfs @ 12.05 hrs, Volume= 0.00 af

Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 0.07' @ 12.05 hrs Surf.Area= 216 sf Storage= 6 cf

Plug-Flow detention time= 1.4 min calculated for 0.00 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (784.4 - 783.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	244 cf	**12.00'W x 18.00'L x 3.79'H Field A** 819 cf Overall - 209 cf Embedded = 610 cf x 40.0% Voids
#2A	0.75'	209 cf	**Cultec R-330XL** x 4 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
		453 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.0 cfs @ 12.05 hrs HW=0.07' (Free Discharge)
└1=Exfiltration (Exfiltration Controls 0.0 cfs)

Pond P9: Roof Drywell - Chamber Wizard Field A

Chamber Model = Cultec R-330XL
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

52.0" Wide + 6.0" Spacing = 58.0" C-C

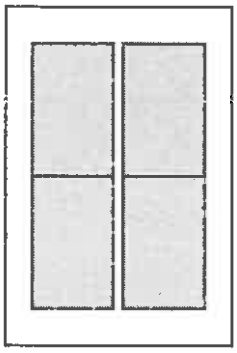
2 Chambers/Row x 7.00' Long = 14.00' + 24.0" End Stone x 2 = 18.00' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 17.0" Side Stone x 2 = 12.00' Base Width
9.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.79' Field Height

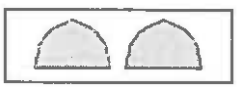
4 Chambers x 52.2 cf = 208.6 cf Chamber Storage

819.0 cf Field - 208.6 cf Chambers = 610.4 cf Stone x 40.0% Voids = 244.1 cf Stone Storage

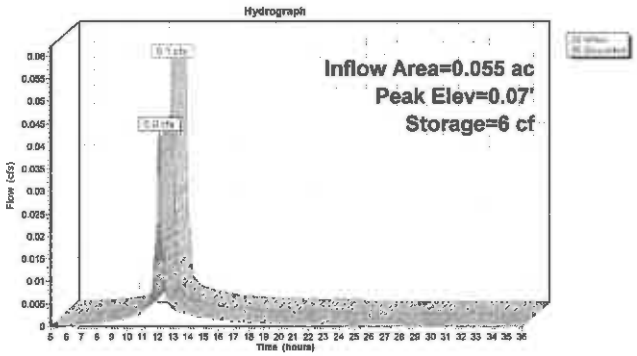
Stone + Chamber Storage = 452.8 cf = 0.01 af

4 Chambers
30.3 cy Field
22.6 cy Stone





Pond P9: Roof Drywell



Summary for Subcatchment E1: Existing to Depression

[45] Hint: Runoff=Zero

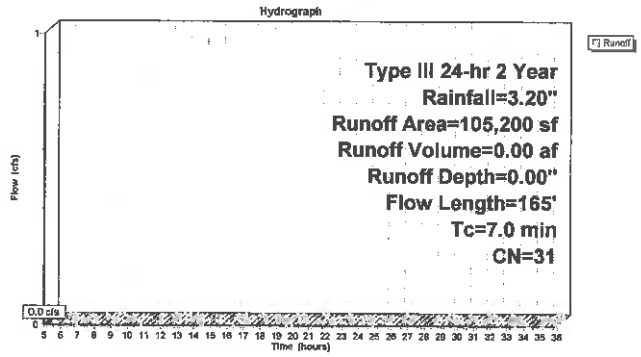
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.20"

Area (sf)	CN	Description
104,105	30	Woods, Good, HSG A
* 830	96	Gravel Road
265	98	Unconnected roofs, HSG A
105,200	31	Weighted Average
104,935		99.75% Pervious Area
265		0.25% Impervious Area
265		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.6	115	0.3500	2.96		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.0	165	Total			

Subcatchment E1: Existing to Depression



Summary for Subcatchment E2: Existing to East

[45] Hint: Runoff=Zero

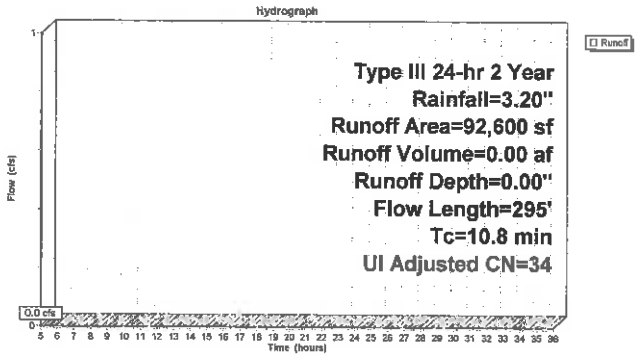
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.20"

Area (sf)	CN	Description
40,840	39	>75% Grass cover, Good, HSG A
50,655	30	Woods, Good, HSG A
1,105	98	Unconnected roofs, HSG A
92,600	35	Weighted Average, UI Adjusted CN = 34
91,495		98.81% Pervious Area
1,105		1.19% Impervious Area
1,105		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
1.3	120	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.5	90	0.1600	2.80		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.6	35	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.8	295	Total			

Subcatchment E2: Existing to East



Summary for Subcatchment E3: Existing to Sherman Bridge Road

[45] Hint: Runoff=Zero

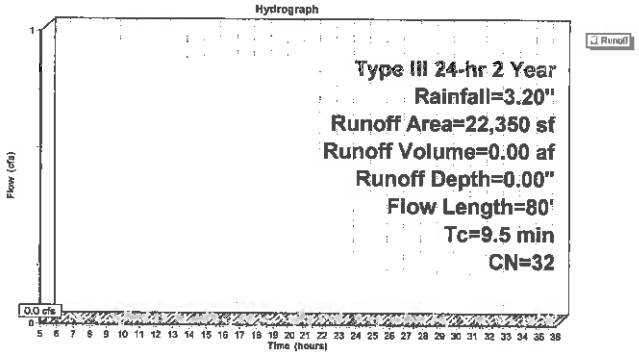
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.20"

Area (sf)	CN	Description
21,800	30	Woods, Good, HSG A
* 550	96	Gravel Driveway
22,350	32	Weighted Average
22,350		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.3	30	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.5	80	Total			

Subcatchment E3: Existing to Sherman Bridge Road



Summary for Subcatchment E4: Existing to Rear

[45] Hint: Runoff=Zero

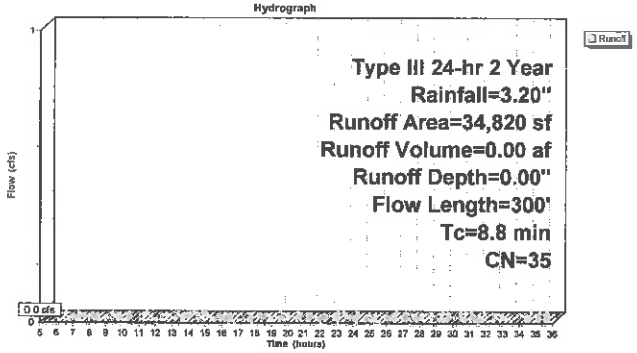
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.20"

	Area (sf)	CN	Description
	31,920	30	Woods, Good, HSG A
*	2,900	96	Gravel Driveway
	34,820	35	Weighted Average
	34,820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
2.4	250	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.8	300	Total			

Subcatchment E4: Existing to Rear



Summary for Subcatchment E5: Existing to West

[45] Hint: Runoff=Zero

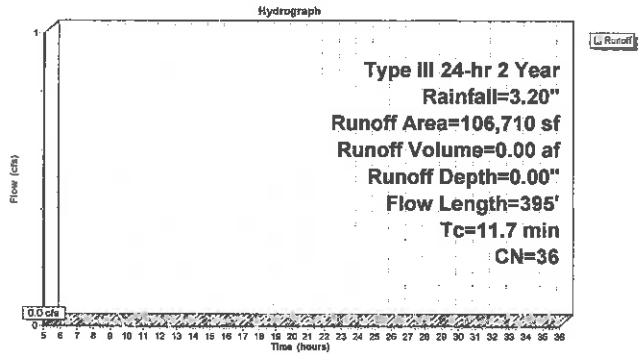
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.20"

	Area (sf)	CN	Description
	94,350	30	Woods, Good, HSG A
*	7,570	96	Gravel Drives
	1,630	98	Unconnected roofs, HSG A
	3,160	39	>75% Grass cover, Good, HSG A
	106,710	36	Weighted Average
	105,080		98.47% Pervious Area
	1,630		1.53% Impervious Area
	1,630		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
3.3	345	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.7	395	Total			

Subcatchment E5: Existing to West



Summary for Pond E6: Existing IVW

Inflow Area = 2.415 ac, 0.25% Impervious, Inflow Depth = 0.00" for 2 Year event
Inflow = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af
Outflow = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Atten= 0%, Lag= 0.0 min

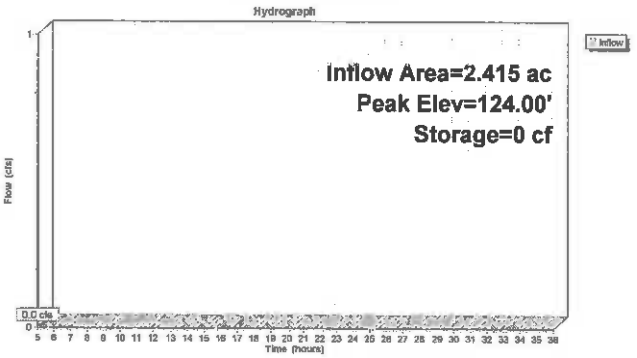
Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 124.00' @ 5.00 hrs Surf.Area= 6,740 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	520,260 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	6,740	0	0
126.00	8,950	15,690	15,690
128.00	11,590	20,540	36,230
130.00	14,500	26,090	62,320
140.00	31,230	228,650	290,970
146.00	45,200	229,290	520,260

Pond E6: Existing IVW



Summary for Subcatchment P1a: Proposed to Depression

[45] Hint: Runoff=Zero

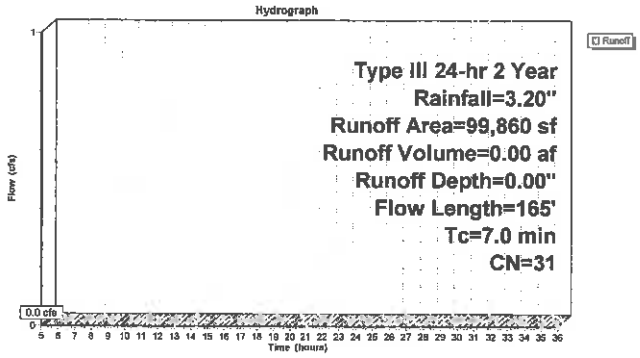
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.20"

	Area (sf)	CN	Description
	91,050	30	Woods, Good, HSG A
	7,810	39	>75% Grass cover, Good, HSG A
	1,000	98	Unconnected pavement, HSG A
	99,860	31	Weighted Average
	98,860		99.00% Pervious Area
	1,000		1.00% Impervious Area
	1,000		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.6	115	0.3500	2.96		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.0	165	Total			

Subcatchment P1a: Proposed to Depression



Summary for Subcatchment P1b: Proposed to Drain System

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

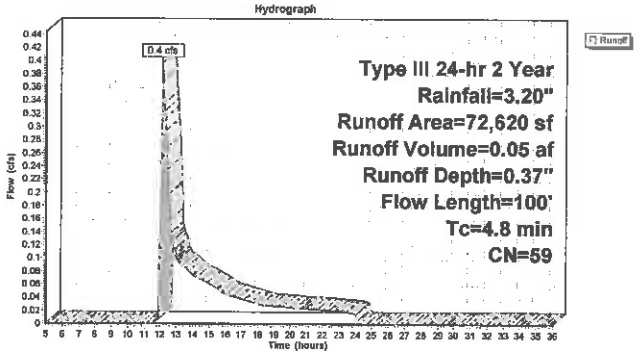
Runoff = 0.4 cfs @ 12.12 hrs, Volume= 0.05 af, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.20"

Area (sf)	CN	Description
48,420	39	>75% Grass cover, Good, HSG A
11,400	98	Paved roads w/curbs & sewers, HSG A
12,800	98	Paved parking, HSG A
72,620	59	Weighted Average
48,420		66.68% Pervious Area
24,200		33.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0800	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
0.2	50	0.3000	3.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.8	100	Total			

Subcatchment P1b: Proposed to Drain System



Summary for Subcatchment P2: Proposed to East

[45] Hint: Runoff=Zero

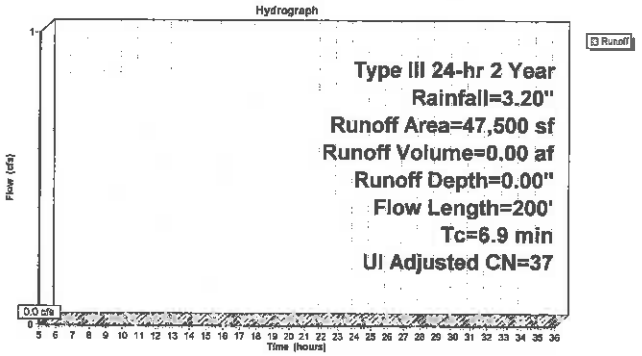
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.20"

Area (sf)	CN	Description
23,660	39	>75% Grass cover, Good, HSG A
20,540	30	Woods, Good, HSG A
3,300	98	Unconnected pavement, HSG A
47,500	39	Weighted Average, UI Adjusted CN = 37
44,200		93.05% Pervious Area
3,300		6.95% Impervious Area
3,300		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0500	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
1.2	150	0.1600	2.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.9	200	Total			

Subcatchment P2: Proposed to East



Summary for Subcatchment P3: Proposed to Sherman Bridge Road

[45] Hint: Runoff=Zero

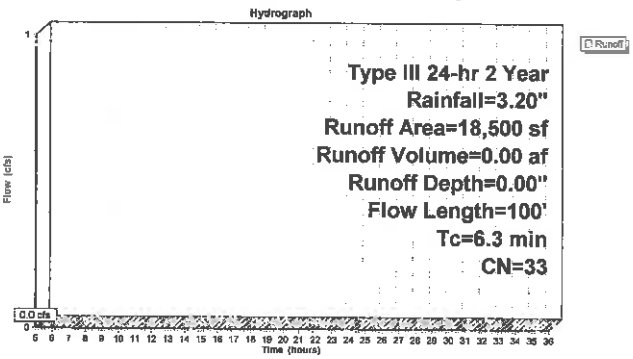
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.20"

Area (sf)	CN	Description
15,300	30	Woods, Good, HSG A
550	98	Paved roads w/curbs & sewers, HSG A
2,650	39	>75% Grass cover, Good, HSG A
18,500	33	Weighted Average
17,950		97.03% Pervious Area
550		2.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.1200	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.4	50	0.2000	2.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.3	100	Total			

Subcatchment P3: Proposed to Sherman Bridge Road



Summary for Subcatchment P4: Proposed to Rear

[45] Hint: Runoff=Zero

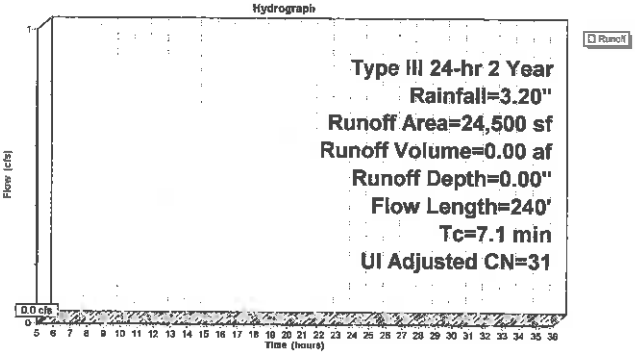
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.20"

Area (sf)	CN	Description
22,400	30	Woods, Good, HSG A
1,600	39	>75% Grass cover, Good, HSG A
500	98	Unconnected pavement, HSG A
24,500	32	Weighted Average, UI Adjusted CN = 31
24,000		97.96% Pervious Area
500		2.04% Impervious Area
500		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0500	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
1.5	190	0.1700	2.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.1	240	Total			

Subcatchment P4: Proposed to Rear



Summary for Subcatchment P5: Proposed to West

[45] Hint: Runoff=Zero

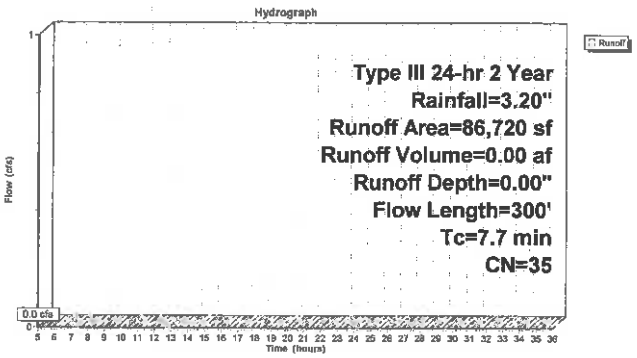
Runoff = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.20"

Area (sf)	CN	Description
49,120	30	Woods, Good, HSG A
35,600	39	>75% Grass cover, Good, HSG A
2,000	98	Unconnected pavement, HSG A
86,720	35	Weighted Average
84,720		97.69% Pervious Area
2,000		2.31% Impervious Area
2,000		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0500	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
0.9	140	0.1500	2.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.2	110	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.7	300	Total			

Subcatchment P5: Proposed to West



Summary for Pond P6: Proposed IVW

Inflow Area = 3.960 ac, 14.61% Impervious, Inflow Depth = 0.00" for 2 Year event
Inflow = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af
Outflow = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Atten= 0%, Lag= 0.0 min

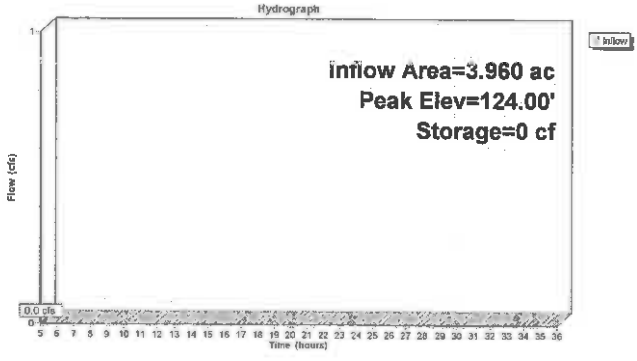
Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 124.00' @ 5.00 hrs Surf.Area= 6,740 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	520,260 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	6,740	0	0
126.00	8,950	15,690	15,690
128.00	11,590	20,540	36,230
130.00	14,500	26,090	62,320
140.00	31,230	228,650	290,970
146.00	45,200	229,290	520,260

Pond P6: Proposed IVW



Summary for Pond P7: Stormwater Basin

Inflow Area = 1.667 ac, 33.32% Impervious, Inflow Depth = 0.37" for 2 Year event
Inflow = 0.4 cfs @ 12.12 hrs, Volume= 0.05 af
Outflow = 0.3 cfs @ 12.22 hrs, Volume= 0.05 af, Atten= 15%, Lag= 5.7 min
Discarded = 0.3 cfs @ 12.22 hrs, Volume= 0.05 af
Primary = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af

Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 146.04' @ 12.22 hrs Surf.Area= 1,919 sf Storage= 70 cf

Plug-Flow detention time= 3.5 min calculated for 0.05 af (100% of inflow)
Center-of-Mass det. time= 3.5 min (928.7 - 925.3)

Volume	Invert	Avail.Storage	Storage Description
#1	146.00'	12,319 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

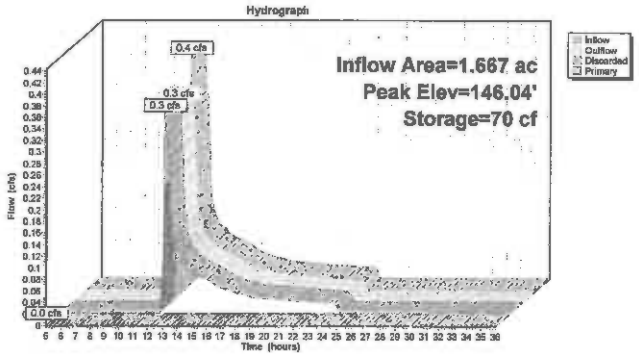
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
146.00	1,900	0	0	1,900
148.00	3,100	4,951	4,951	3,151
150.00	4,300	7,367	12,319	4,425

Device	Routing	Invert	Outlet Devices
#1	Discarded	146.00'	**8.270 in/hr Exfiltration over Wetted area**
#2	Primary	149.00'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.4 cfs @ 12.22 hrs HW=146.04' (Free Discharge)
↳**1=Exfiltration** (Exfiltration Controls 0.4 cfs)

Primary OutFlow Max=0.0 cfs @ 5.00 hrs HW=146.00' (Free Discharge)
↳**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond P7: Stormwater Basin



Summary for Subcatchment P8: Roof Area

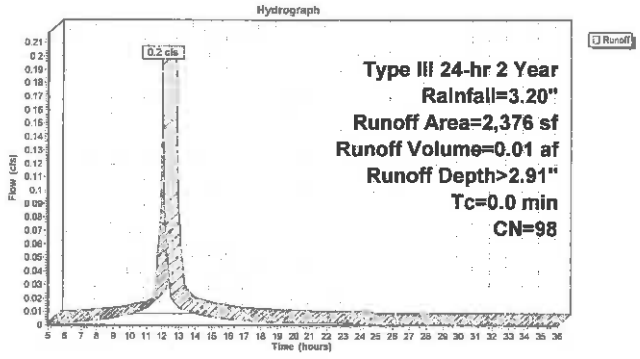
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.2 cfs @ 12.00 hrs, Volume= 0.01 af, Depth> 2.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Rainfall=3.20"

Area (sf)	CN	Description
2,376	98	Roofs, HSG A
2,376		100.00% Impervious Area

Subcatchment P8: Roof Area



Summary for Pond P9: Roof Drywell

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.055 ac,100.00% Impervious, Inflow Depth > 2.91" for 2 Year event
Inflow = 0.2 cfs @ 12.00 hrs, Volume= 0.01 af
Outflow = 0.1 cfs @ 12.29 hrs, Volume= 0.01 af, Atten= 73%, Lag= 17.5 min
Discarded = 0.1 cfs @ 12.29 hrs, Volume= 0.01 af

Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 0.99' @ 12.29 hrs Surf.Area= 216 sf Storage= 101 cf

Plug-Flow detention time= 9.9 min calculated for 0.01 af (100% of inflow)
Center-of-Mass det. time= 9.7 min (770.8 - 761.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	244 cf	**12.00'W x 18.00'L x 3.79'H Field A** 819 cf Overall - 209 cf Embedded = 610 cf x 40.0% Voids
#2A	0.75'	209 cf	**Cultec R-330XL** x 4 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
		453 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.1 cfs @ 12.29 hrs HW=0.99' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.1 cfs)

Pond P9: Roof Drywell - Chamber Wizard Field A

Chamber Model = Cultec R-330XL
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

52.0" Wide + 6.0" Spacing = 58.0" C-C

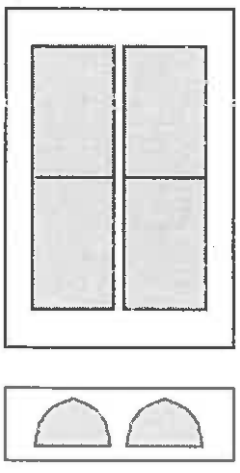
2 Chambers/Row x 7.00' Long = 14.00' + 24.0" End Stone x 2 = 18.00' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 17.0" Side Stone x 2 = 12.00' Base Width
9.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.79' Field Height

4 Chambers x 52.2 cf = 208.6 cf Chamber Storage

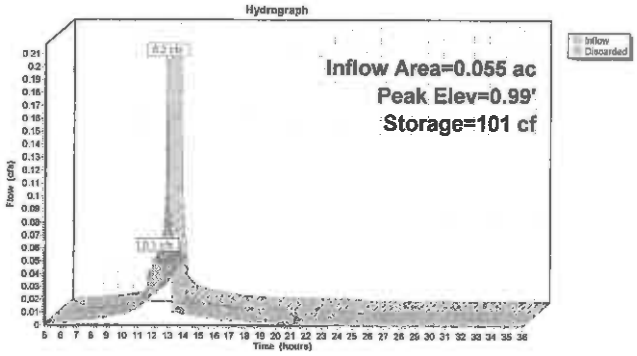
819.0 cf Field - 208.6 cf Chambers = 610.4 cf Stone x 40.0% Voids = 244.1 cf Stone Storage

Stone + Chamber Storage = 452.8 cf = 0.01 af

4 Chambers
30.3 cy Field
22.6 cy Stone



Pond P9: Roof Drywell



Summary for Subcatchment E1: Existing to Depression

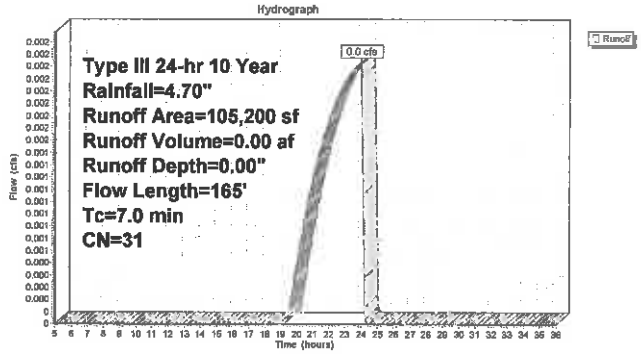
Runoff = 0.0 cfs @ 24.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

	Area (sf)	CN	Description
	104,105	30	Woods, Good, HSG A
*	830	96	Gravel Road
	265	98	Unconnected roofs, HSG A
	105,200	31	Weighted Average
	104,935		99.75% Pervious Area
	265		0.25% Impervious Area
	265		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.6	115	0.3500	2.96		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.0	165	Total			

Subcatchment E1: Existing to Depression



Summary for Subcatchment E2: Existing to East

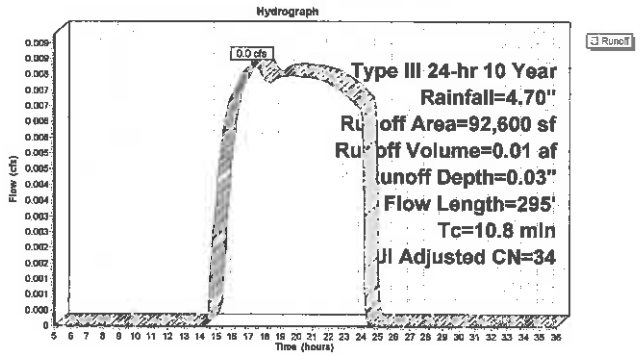
Runoff = 0.0 cfs @ 17.20 hrs, Volume= 0.01 af, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

Area (sf)	CN	Description
40,840	39	>75% Grass cover, Good, HSG A
50,655	30	Woods, Good, HSG A
1,105	98	Unconnected roofs, HSG A
92,600	35	Weighted Average, UI Adjusted CN = 34
91,495		98.81% Pervious Area
1,105		1.19% Impervious Area
1,105		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
1.3	120	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.5	90	0.1600	2.80		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.6	35	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.8	295	Total			

Subcatchment E2: Existing to East



Summary for Subcatchment E3: Existing to Sherman Bridge Road

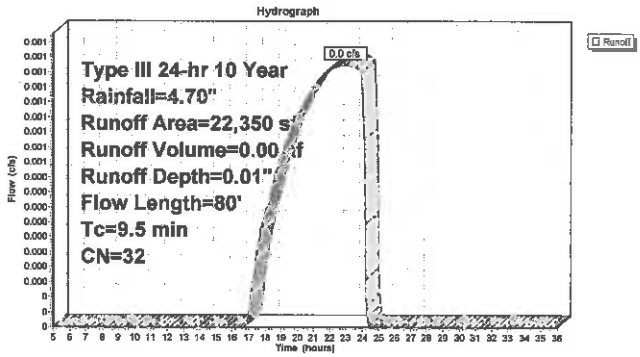
Runoff = 0.0 cfs @ 22.89 hrs, Volume= 0.00 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

	Area (sf)	CN	Description
	21,800	30	Woods, Good, HSG A
*	550	96	Gravel Driveway
	22,350	32	Weighted Average
	22,350		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.3	30	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.5	80	Total			

Subcatchment E3: Existing to Sherman Bridge Road



Summary for Subcatchment E4: Existing to Rear

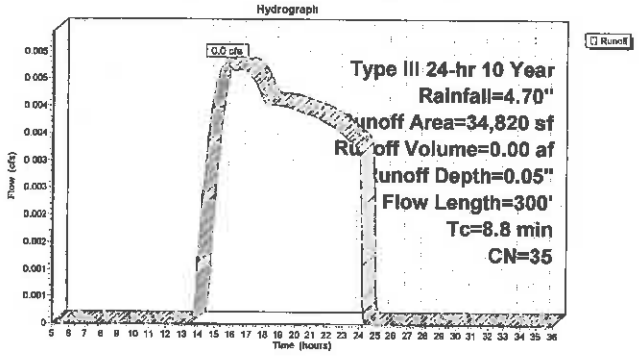
Runoff = 0.0 cfs @ 15.67 hrs, Volume= 0.00 af, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

	Area (sf)	CN	Description
	31,920	30	Woods, Good, HSG A
*	2,900	96	Gravel Driveway
	34,820	35	Weighted Average
	34,820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
2.4	250	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.8	300	Total			

Subcatchment E4: Existing to Rear



Summary for Subcatchment E5: Existing to West

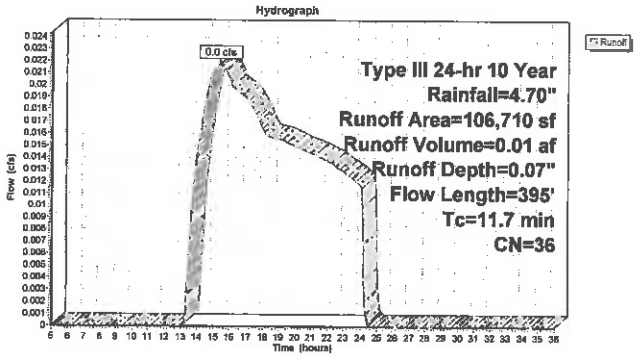
Runoff = 0.0 cfs @ 15.37 hrs, Volume= 0.01 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

	Area (sf)	CN	Description
	94,350	30	Woods, Good, HSG A
*	7,570	96	Gravel Drives
	1,630	98	Unconnected roofs, HSG A
	3,160	39	>75% Grass cover, Good, HSG A
	106,710	36	Weighted Average
	105,080		98.47% Pervious Area
	1,630		1.53% Impervious Area
	1,630		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
3.3	345	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.7	395	Total			

Subcatchment E5: Existing to West



Summary for Pond E6: Existing IVW

Inflow Area = 2.415 ac, 0.25% Impervious, Inflow Depth = 0.00" for 10 Year event
Inflow = 0.0 cfs @ 24.00 hrs, Volume= 0.00 af
Outflow = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Atten= 100%, Lag= 0.0 min

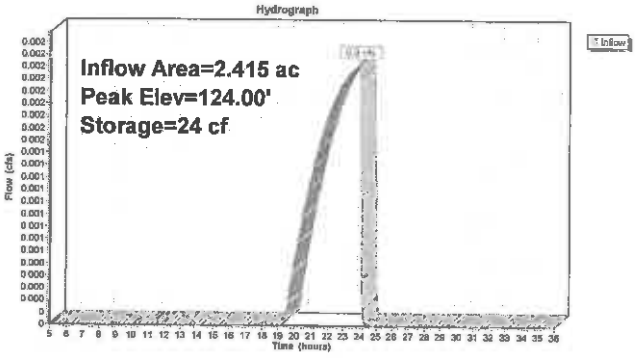
Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 124.00' @ 24.45 hrs Surf.Area= 6,744 sf Storage= 24 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	520,260 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	6,740	0	0
126.00	8,950	15,690	15,690
128.00	11,590	20,540	36,230
130.00	14,500	26,090	62,320
140.00	31,230	228,650	290,970
146.00	45,200	229,290	520,260

Pond E6: Existing IVW



Summary for Subcatchment P1a: Proposed to Depression

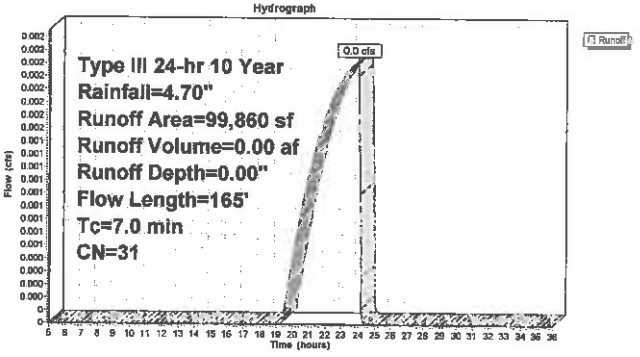
Runoff = 0.0 cfs @ 24.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

	Area (sf)	CN	Description
	91,050	30	Woods, Good, HSG A
	7,810	39	>75% Grass cover, Good, HSG A
	1,000	98	Unconnected pavement, HSG A
	99,860	31	Weighted Average
	98,860		99.00% Pervious Area
	1,000		1.00% Impervious Area
	1,000		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.6	115	0.3500	2.96		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.0	165	Total			

Subcatchment P1a: Proposed to Depression



Summary for Subcatchment P1b: Proposed to Drain System

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

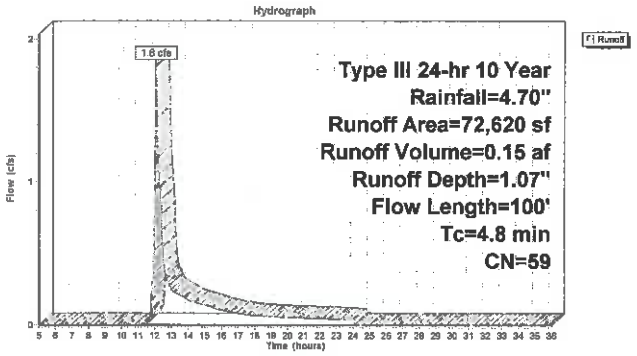
Runoff = 1.8 cfs @ 12.09 hrs, Volume= 0.15 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

Area (sf)	CN	Description
48,420	39	>75% Grass cover, Good, HSG A
11,400	98	Paved roads w/curbs & sewers, HSG A
12,800	98	Paved parking, HSG A
72,620	59	Weighted Average
48,420		66.68% Pervious Area
24,200		33.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0800	0.18		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30"
0.2	50	0.3000	3.83		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
4.8	100	Total			

Subcatchment P1b: Proposed to Drain System



Summary for Subcatchment P2: Proposed to East

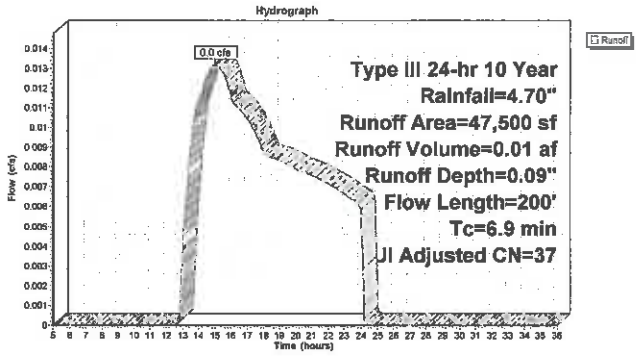
Runoff = 0.0 cfs @ 14.98 hrs, Volume= 0.01 af, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

Area (sf)	CN	Description
23,660	39	>75% Grass cover, Good, HSG A
20,540	30	Woods, Good, HSG A
3,300	98	Unconnected pavement, HSG A
47,500	39	Weighted Average, UI Adjusted CN = 37
44,200		93.05% Pervious Area
3,300		6.95% Impervious Area
3,300		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.0500	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30"
1.2	150	0.1600	2.00		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
6.9	200	Total			

Subcatchment P2: Proposed to East



Summary for Subcatchment P3: Proposed to Sherman Bridge Road

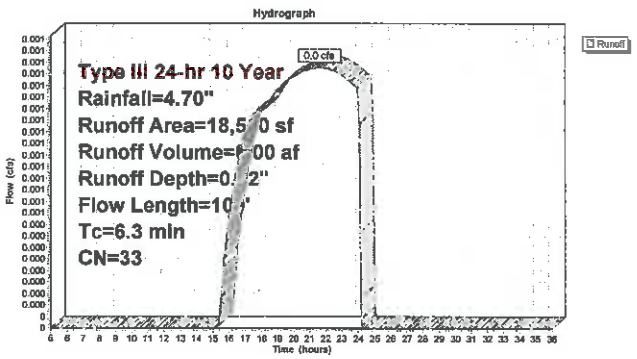
Runoff = 0.0 cfs @ 21.58 hrs, Volume= 0.00 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

Area (sf)	CN	Description
15,300	30	Woods, Good, HSG A
550	98	Paved roads w/curbs & sewers, HSG A
2,650	39	>75% Grass cover, Good, HSG A
18,500	33	Weighted Average
17,950		97.03% Pervious Area
550		2.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.1200	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.30"
0.4	50	0.2000	2.24		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
6.3	100	Total			

Subcatchment P3: Proposed to Sherman Bridge Road



Summary for Subcatchment P4: Proposed to Rear

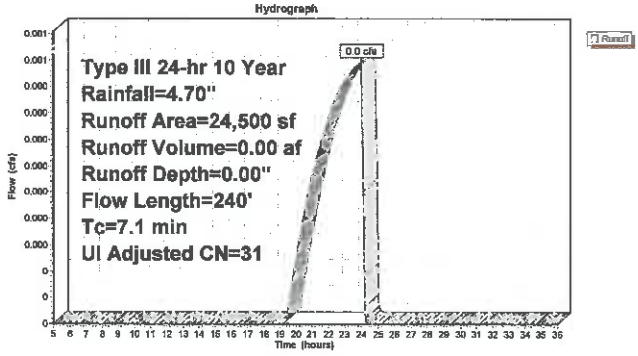
Runoff = 0.0 cfs @ 24.00 hrs, Volume= 0.00 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

Area (sf)	CN	Description
22,400	30	Woods, Good, HSG A
1,600	39	>75% Grass cover, Good, HSG A
500	98	Unconnected pavement, HSG A
24,500	32	Weighted Average, UI Adjusted CN = 31
24,000		97.96% Pervious Area
500		2.04% Impervious Area
500		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0500	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30"
1.5	190	0.1700	2.06		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
7.1	240	Total			

Subcatchment P4: Proposed to Rear



Summary for Subcatchment P5: Proposed to West

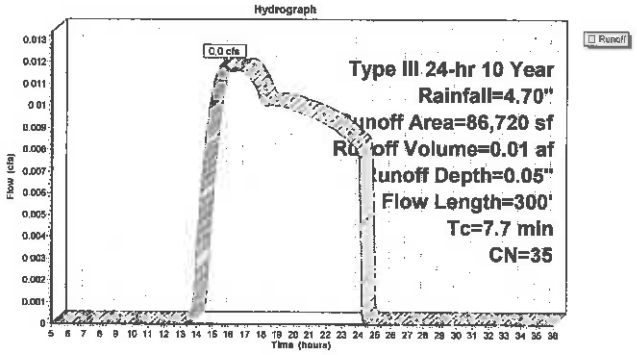
Runoff = 0.0 cfs @ 15.66 hrs, Volume= 0.01 af, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

Area (sf)	CN	Description
49,120	30	Woods, Good, HSG A
35,600	39	>75% Grass cover, Good, HSG A
2,000	98	Unconnected pavement, HSG A
86,720	35	Weighted Average
84,720		97.69% Pervious Area
2,000		2.31% Impervious Area
2,000		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0500	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
0.9	140	0.1500	2.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.2	110	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.7	300	Total			

Subcatchment P5: Proposed to West



Summary for Pond P6: Proposed IVW

Inflow Area = 3.960 ac, 14.61% Impervious, Inflow Depth = 0.00" for 10 Year event
Inflow = 0.0 cfs @ 24.00 hrs, Volume= 0.00 af
Outflow = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Atten= 100%, Lag= 0.0 min

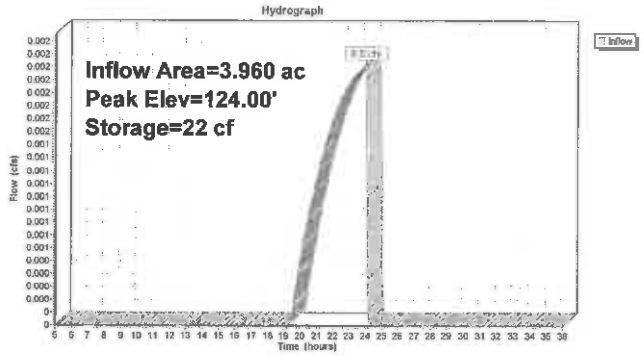
Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 124.00' @ 24.45 hrs Surf.Area= 6,744 sf Storage= 22 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	520,260 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	6,740	0	0
126.00	8,950	15,690	15,690
128.00	11,590	20,540	36,230
130.00	14,500	26,090	62,320
140.00	31,230	228,650	290,970
146.00	45,200	229,290	520,260

Pond P6: Proposed IVW



Summary for Pond P7: Stormwater Basin

Inflow Area = 1.667 ac, 33.32% Impervious, Inflow Depth = 1.07" for 10 Year event
Inflow = 1.8 cfs @ 12.09 hrs, Volume= 0.15 af
Outflow = 0.4 cfs @ 12.55 hrs, Volume= 0.15 af, Atten= 76%, Lag= 27.8 min
Discarded = 0.4 cfs @ 12.55 hrs, Volume= 0.15 af
Primary = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af

Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 146.68' @ 12.55 hrs Surf.Area= 2,273 sf Storage= 1,408 cf

Plug-Flow detention time= 21.8 min calculated for 0.15 af (100% of inflow)
Center-of-Mass det. time= 21.8 min (904.3 - 882.5)

Volume	Invert	Avail.Storage	Storage Description
#1	146.00'	12,319 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

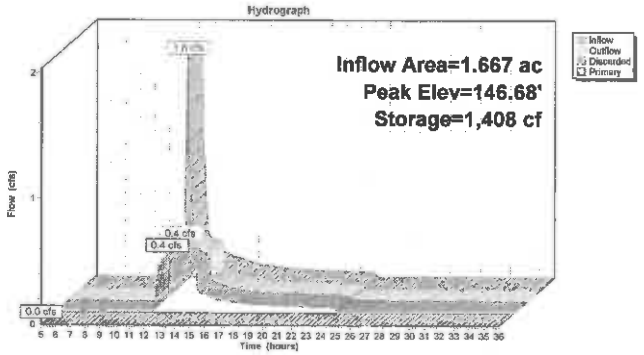
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
146.00	1,900	0	0	1,900
148.00	3,100	4,951	4,951	3,151
150.00	4,300	7,367	12,319	4,425

Device	Routing	Invert	Outlet Devices
#1	Discarded	146.00'	**8.270 in/hr Exfiltration over Wetted area**
#2	Primary	149.00'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.4 cfs @ 12.55 hrs HW=146.68' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.4 cfs)

Primary OutFlow Max=0.0 cfs @ 5.00 hrs HW=146.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond P7: Stormwater Basin



Summary for Subcatchment P8: Roof Area

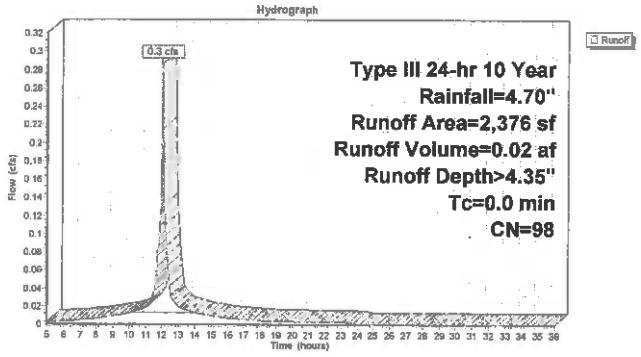
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.3 cfs @ 12.00 hrs, Volume= 0.02 af, Depth> 4.35"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.70"

Area (sf)	CN	Description
2,376	98	Roofs, HSG A
2,376		100.00% Impervious Area

Subcatchment P8: Roof Area



Summary for Pond P9: Roof Drywell

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.055 ac,100.00% Impervious, Inflow Depth > 4.35" for 10 Year event
Inflow = 0.3 cfs @ 12.00 hrs, Volume= 0.02 af
Outflow = 0.1 cfs @ 12.37 hrs, Volume= 0.02 af, Atten= 79%, Lag= 22.2 min
Discarded = 0.1 cfs @ 12.37 hrs, Volume= 0.02 af

Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 1.63' @ 12.37 hrs Surf.Area= 216 sf Storage= 197 cf

Plug-Flow detention time= 18.5 min calculated for 0.02 af (100% of inflow)
Center-of-Mass det. time= 18.4 min (776.2 - 757.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	244 cf	**12.00'W x 18.00'L x 3.79'H Field A** 819 cf Overall - 209 cf Embedded = 610 cf x 40.0% Voids
#2A	0.75'	209 cf	**Cultec R-330XL** x 4 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
		453 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.1 cfs @ 12.37 hrs HW=1.63' (Free Discharge)
↳**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Pond P9: Roof Drywell - Chamber Wizard Field A

Chamber Model = Cultec R-330XL
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

52.0" Wide + 6.0" Spacing = 58.0" C-C

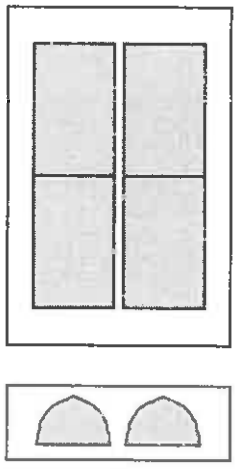
2 Chambers/Row x 7.00' Long = 14.00' + 24.0" End Stone x 2 = 18.00' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 17.0" Side Stone x 2 = 12.00' Base Width
9.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.79' Field Height

4 Chambers x 52.2 cf = 208.6 cf Chamber Storage

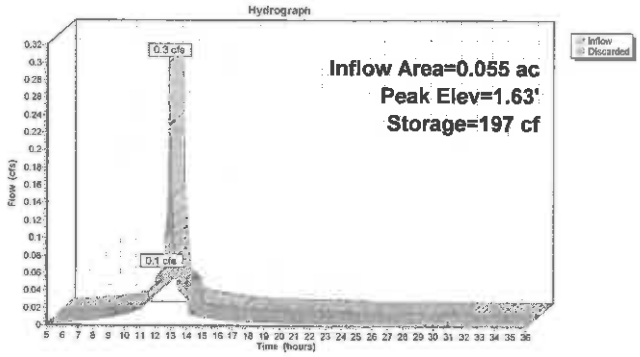
819.0 cf Field - 208.6 cf Chambers = 610.4 cf Stone x 40.0% Voids = 244.1 cf Stone Storage

Stone + Chamber Storage = 452.8 cf = 0.01 af

4 Chambers
30.3 cy Field
22.6 cy Stone



Pond P9: Roof Drywell



Summary for Subcatchment E1: Existing to Depression

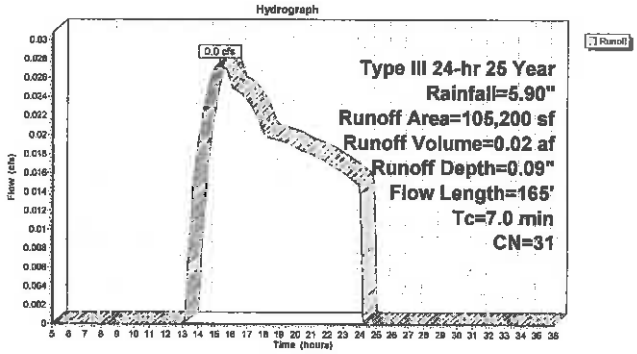
Runoff = 0.0 cfs @ 15.27 hrs, Volume= 0.02 af, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.90"

	Area (sf)	CN	Description
	104,105	30	Woods, Good, HSG A
*	830	98	Gravel Road
	265	98	Unconnected roofs, HSG A
	105,200	31	Weighted Average
	104,935		99.75% Pervious Area
	265		0.25% Impervious Area
	265		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.6	115	0.3500	2.96		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.0	165	Total			

Subcatchment E1: Existing to Depression



Summary for Subcatchment E2: Existing to East

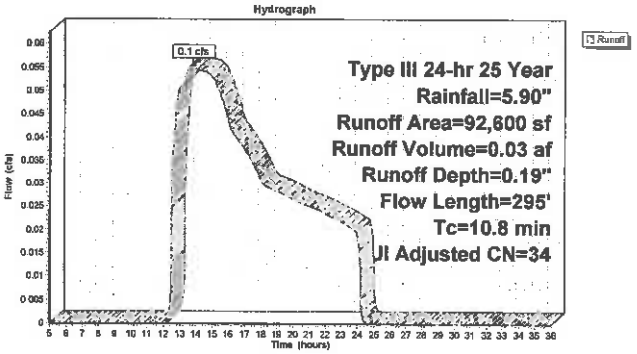
Runoff = 0.1 cfs @ 13.79 hrs, Volume= 0.03 af, Depth= 0.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.90"

Area (sf)	CN	Description
40,840	39	>75% Grass cover, Good, HSG A
50,655	30	Woods, Good, HSG A
1,105	98	Unconnected roofs, HSG A
92,600	35	Weighted Average, UI Adjusted CN = 34
91,495		98.81% Pervious Area
1,105		1.19% Impervious Area
1,105		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
1.3	120	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.5	90	0.1600	2.80		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.6	35	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.8	295	Total			

Subcatchment E2: Existing to East



Summary for Subcatchment E3: Existing to Sherman Bridge Road

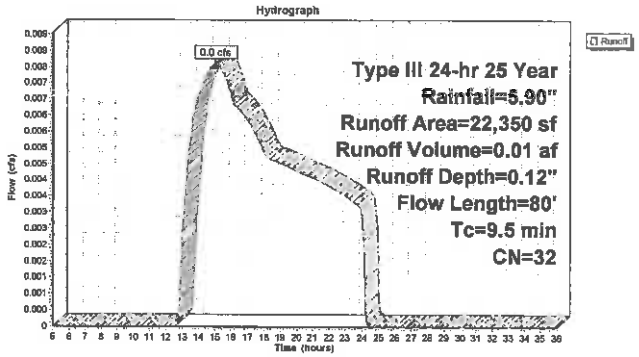
Runoff = 0.0 cfs @ 14.99 hrs, Volume= 0.01 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.90"

	Area (sf)	CN	Description
	21,800	30	Woods, Good, HSG A
*	550	96	Gravel Driveway
	22,350	32	Weighted Average
	22,350		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.3	30	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.5	80	Total			

Subcatchment E3: Existing to Sherman Bridge Road



Summary for Subcatchment E4: Existing to Rear

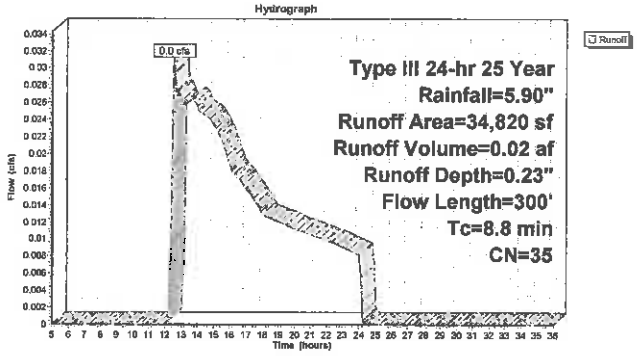
Runoff = 0.0 cfs @ 12.53 hrs, Volume= 0.02 af, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.90"

Area (sf)	CN	Description
31,920	30	Woods, Good, HSG A
* 2,900	96	Gravel Driveway
34,820	35	Weighted Average
34,820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
2.4	250	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.8	300	Total			

Subcatchment E4: Existing to Rear



Summary for Subcatchment E5: Existing to West

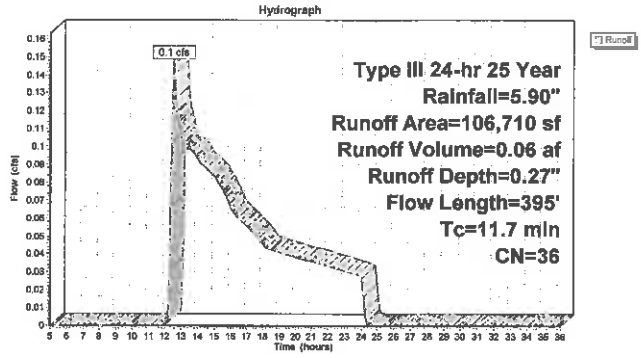
Runoff = 0.1 cfs @ 12.53 hrs, Volume= 0.06 af, Depth= 0.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.90"

Area (sf)	CN	Description
94,350	30	Woods, Good, HSG A
* 7,570	96	Gravel Drives
1,630	98	Unconnected roofs, HSG A
3,160	39	>75% Grass cover, Good, HSG A
106,710	36	Weighted Average
105,080		98.47% Pervious Area
1,630		1.53% Impervious Area
1,630		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
3.3	345	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.7	395	Total			

Subcatchment E5: Existing to West



Summary for Pond E6: Existing IVW

Inflow Area = 2.415 ac, 0.25% Impervious, Inflow Depth = 0.09" for 25 Year event
Inflow = 0.0 cfs @ 15.27 hrs, Volume= 0.02 af
Outflow = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Atten= 100%, Lag= 0.0 min

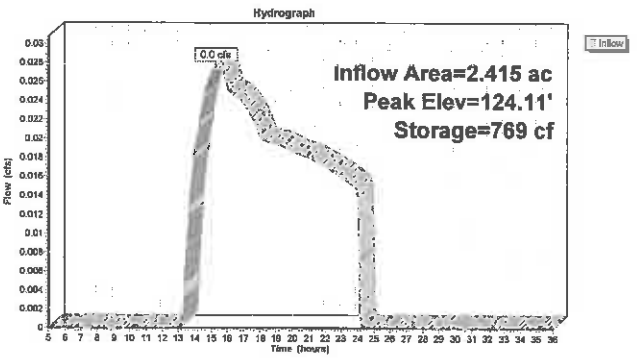
Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 124.11' @ 24.45 hrs Surf.Area= 6,885 sf Storage= 769 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	520,260 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	6,740	0	0
126.00	8,950	15,690	15,690
128.00	11,590	20,540	36,230
130.00	14,500	26,090	62,320
140.00	31,230	228,650	290,970
146.00	45,200	229,290	520,260

Pond E6: Existing IVW



Summary for Subcatchment P1a: Proposed to Depression

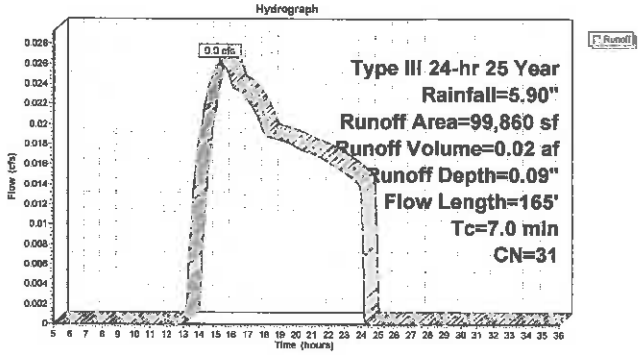
Runoff = 0.0 cfs @ 15.27 hrs, Volume= 0.02 af, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.90"

Area (sf)	CN	Description
91,050	30	Woods, Good, HSG A
7,810	39	>75% Grass cover, Good, HSG A
1,000	98	Unconnected pavement, HSG A
99,860	31	Weighted Average
98,860		99.00% Pervious Area
1,000		1.00% Impervious Area
1,000		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.6	115	0.3500	2.98		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.0	165	Total			

Subcatchment P1a: Proposed to Depression



Summary for Subcatchment P1b: Proposed to Drain System

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

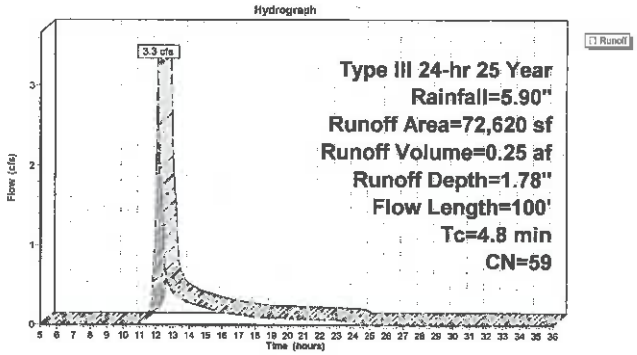
Runoff = 3.3 cfs @ 12.09 hrs, Volume= 0.25 af, Depth= 1.78"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.90"

Area (sf)	CN	Description
48,420	39	>75% Grass cover, Good, HSG A
11,400	98	Paved roads w/curbs & sewers, HSG A
12,800	98	Paved parking, HSG A
72,620	59	Weighted Average
48,420		66.68% Pervious Area
24,200		33.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0800	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
0.2	50	0.3000	3.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.8	100	Total			

Subcatchment P1b: Proposed to Drain System



Summary for Subcatchment P2: Proposed to East

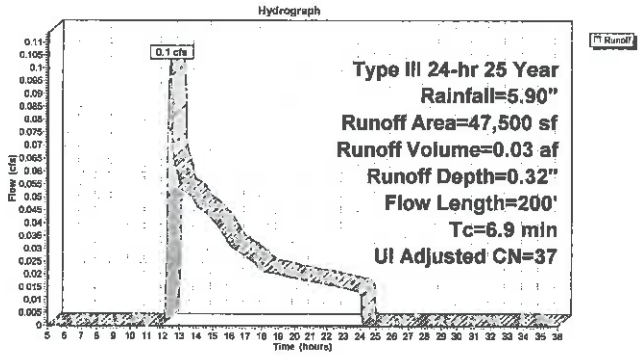
Runoff = 0.1 cfs @ 12.42 hrs, Volume= 0.03 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.90"

Area (sf)	CN	Description
23,660	39	>75% Grass cover, Good, HSG A
20,540	30	Woods, Good, HSG A
3,300	98	Unconnected pavement, HSG A
47,500	39	Weighted Average, UI Adjusted CN = 37
44,200		93.05% Pervious Area
3,300		6.95% Impervious Area
3,300		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0500	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
1.2	150	0.1600	2.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.9	200	Total			

Subcatchment P2: Proposed to East



Summary for Subcatchment P3: Proposed to Sherman Bridge Road

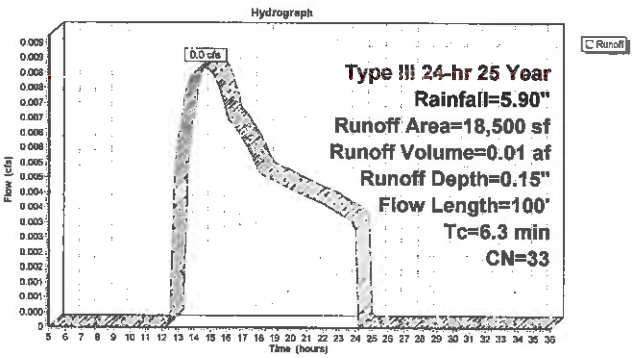
Runoff = 0.0 cfs @ 14.66 hrs, Volume= 0.01 af, Depth= 0.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.90"

Area (sf)	CN	Description
15,300	30	Woods, Good, HSG A
550	98	Paved roads w/curbs & sewers, HSG A
2,650	39	>75% Grass cover, Good, HSG A
18,500	33	Weighted Average
17,950		97.03% Pervious Area
550		2.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.1200	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.4	50	0.2000	2.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.3	100	Total			

Subcatchment P3: Proposed to Sherman Bridge Road



Summary for Subcatchment P4: Proposed to Rear

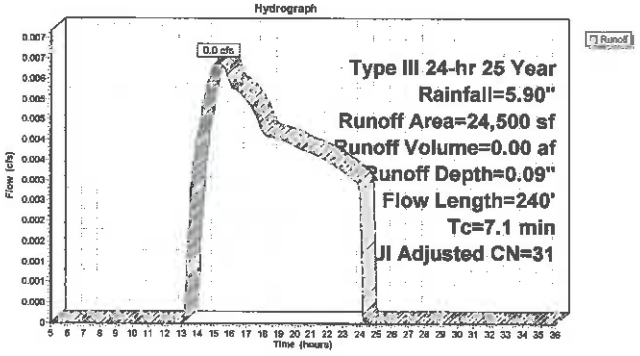
Runoff = 0.0 cfs @ 15.28 hrs, Volume= 0.00 af, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.90"

Area (sf)	CN	Description
22,400	30	Woods, Good, HSG A
1,800	39	>75% Grass cover, Good, HSG A
500	98	Unconnected pavement, HSG A
24,500	32	Weighted Average, UI Adjusted CN = 31
24,000		97.96% Pervious Area
500		2.04% Impervious Area
500		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0500	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
1.5	190	0.1700	2.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.1	240	Total			

Subcatchment P4: Proposed to Rear



Summary for Subcatchment P5: Proposed to West

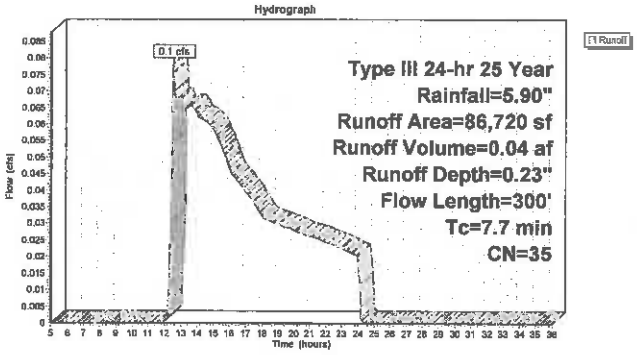
Runoff = 0.1 cfs @ 12.51 hrs, Volume= 0.04 af, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.90"

Area (sf)	CN	Description
49,120	30	Woods, Good, HSG A
35,600	39	>75% Grass cover, Good, HSG A
2,000	98	Unconnected pavement, HSG A
86,720	35	Weighted Average
84,720		97.69% Pervious Area
2,000		2.31% Impervious Area
2,000		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0500	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30"
0.9	140	0.1500	2.71		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	110	0.0900	1.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
7.7	300	Total			

Subcatchment P5: Proposed to West



Summary for Pond P6: Proposed IVW

Inflow Area = 3.960 ac, 14.61% Impervious, Inflow Depth = 0.05" for 25 Year event
Inflow = 0.0 cfs @ 15.27 hrs, Volume= 0.02 af
Outflow = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Atten= 100%, Lag= 0.0 min

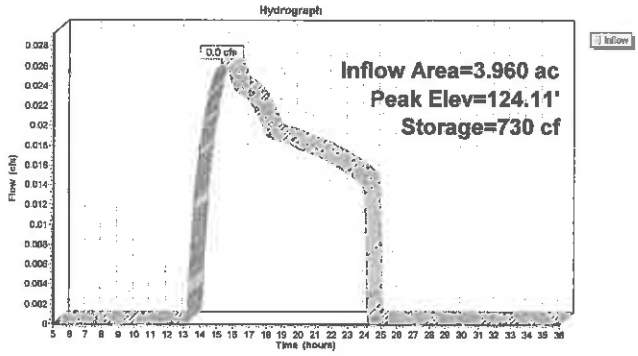
Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 124.11' @ 24.45 hrs Surf.Area= 6,859 sf Storage= 730 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	520,260 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	6,740	0	0
126.00	8,950	15,690	15,690
128.00	11,590	20,540	36,230
130.00	14,500	26,090	62,320
140.00	31,230	228,650	290,970
146.00	45,200	229,290	520,260

Pond P6: Proposed IVW



Summary for Pond P7: Stormwater Basin

Inflow Area = 1.667 ac, 33.32% Impervious, Inflow Depth = 1.78" for 25 Year event
Inflow = 3.3 cfs @ 12.09 hrs, Volume= 0.25 af
Outflow = 0.5 cfs @ 12.71 hrs, Volume= 0.25 af, Atten= 84%, Lag= 37.5 min
Discarded = 0.5 cfs @ 12.71 hrs, Volume= 0.25 af
Primary = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af

Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 147.40' @ 12.71 hrs Surf.Area= 2,707 sf Storage= 3,200 cf

Plug-Flow detention time= 52.7 min calculated for 0.25 af (100% of inflow)
Center-of-Mass det. time= 52.6 min (918.1 - 865.5)

Volume	Invert	Avail.Storage	Storage Description
#1	146.00'	12,319 cf	Custom Stage Data (Conic) Listed below (Recalc)

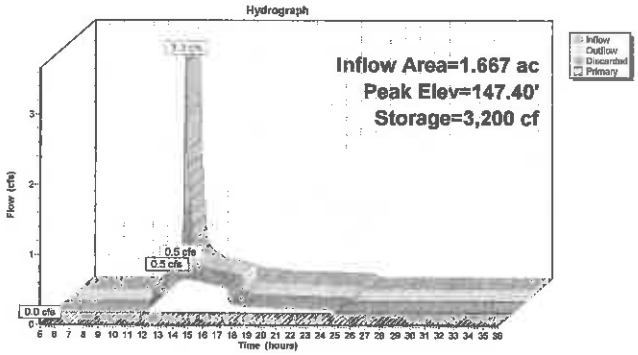
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
146.00	1,900	0	0	1,900
148.00	3,100	4,951	4,951	3,151
150.00	4,300	7,367	12,319	4,425

Device	Routing	Invert	Outlet Devices
#1	Discarded	146.00'	8.270 in/hr Exfiltration over Wetted area
#2	Primary	149.00'	10.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.5 cfs @ 12.71 hrs HW=147.40' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.5 cfs)

Primary OutFlow Max=0.0 cfs @ 5.00 hrs HW=146.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond P7: Stormwater Basin



Summary for Subcatchment P8: Roof Area

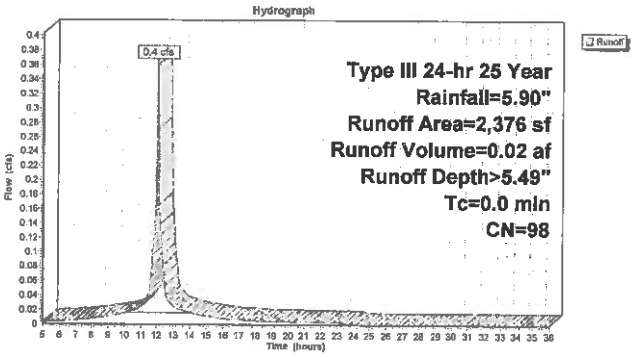
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.4 cfs @ 12.00 hrs, Volume= 0.02 af, Depth> 5.49"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Rainfall=5.90"

Area (sf)	CN	Description
2,376	98	Roofs, HSG A
2,376		100.00% Impervious Area

Subcatchment P8: Roof Area



Summary for Pond P9: Roof Drywell

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.055 ac,100.00% Impervious, Inflow Depth > 5.49" for 25 Year event
Inflow = 0.4 cfs @ 12.00 hrs, Volume= 0.02 af
Outflow = 0.1 cfs @ 12.40 hrs, Volume= 0.02 af, Atten= 82%, Lag= 24.1 min
Discarded = 0.1 cfs @ 12.40 hrs, Volume= 0.02 af

Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 2.18' @ 12.40 hrs Surf.Area= 216 sf Storage= 278 cf

Plug-Flow detention time= 25.4 min calculated for 0.02 af (100% of inflow)
Center-of-Mass det. time= 25.2 min (781.7 - 756.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	244 cf	**12.00'W x 18.00'L x 3.79'H Field A** 819 cf Overall - 209 cf Embedded = 610 cf x 40.0% Voids
#2A	0.75'	209 cf	**Cultec R-330XL** x 4 *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
		453 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.1 cfs @ 12.40 hrs HW=2.18' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Pond P9: Roof Drywell - Chamber Wizard Field A

Chamber Model = Cultec R-330XL
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

52.0" Wide + 6.0" Spacing = 58.0" C-C

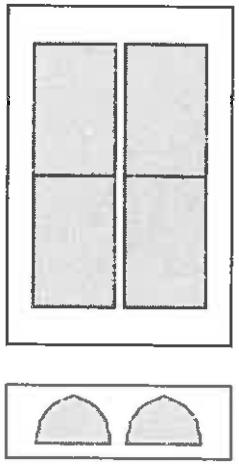
2 Chambers/Row x 7.00' Long = 14.00' + 24.0" End Stone x 2 = 18.00' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 17.0" Side Stone x 2 = 12.00' Base Width
9.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.79' Field Height

4 Chambers x 52.2 cf = 208.6 cf Chamber Storage

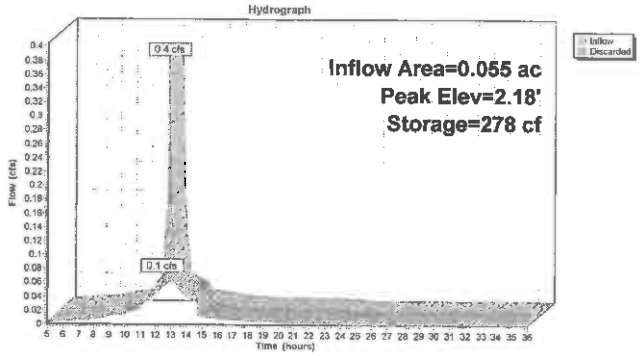
819.0 cf Field - 208.6 cf Chambers = 610.4 cf Stone x 40.0% Voids = 244.1 cf Stone Storage

Stone + Chamber Storage = 452.8 cf = 0.01 af

4 Chambers
30.3 cy Field
22.6 cy Stone



Pond P9: Roof Drywell



Summary for Subcatchment E1: Existing to Depression

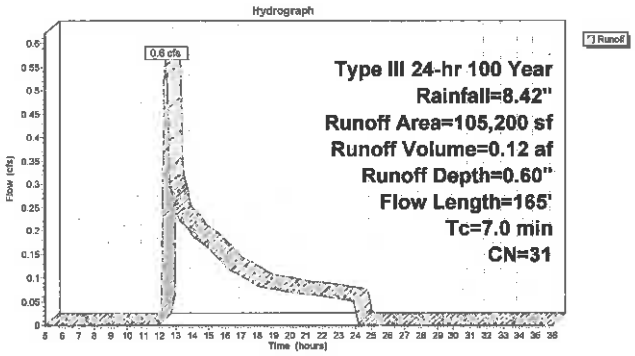
Runoff = 0.6 cfs @ 12.37 hrs, Volume= 0.12 af, Depth= 0.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.42"

Area (sf)	CN	Description
104,105	30	Woods, Good, HSG A
* 830	98	Gravel Road
265	98	Unconnected roofs, HSG A
105,200	31	Weighted Average
104,935		99.75% Pervious Area
265		0.25% Impervious Area
265		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.6	115	0.3500	2.96		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.0	165	Total			

Subcatchment E1: Existing to Depression



Summary for Subcatchment E2: Existing to East

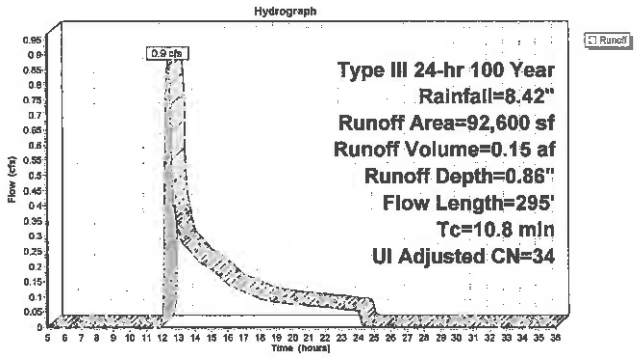
Runoff = 0.9 cfs @ 12.34 hrs, Volume= 0.15 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.42"

Area (sf)	CN	Description
40,840	39	>75% Grass cover, Good, HSG A
50,655	30	Woods, Good, HSG A
1,105	98	Unconnected roofs, HSG A
92,600	35	Weighted Average, UI Adjusted CN = 34
91,495		98.81% Pervious Area
1,105		1.19% Impervious Area
1,105		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
1.3	120	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.5	90	0.1600	2.80		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.6	35	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.8	295	Total			

Subcatchment E2: Existing to East



Summary for Subcatchment E3: Existing to Sherman Bridge Road

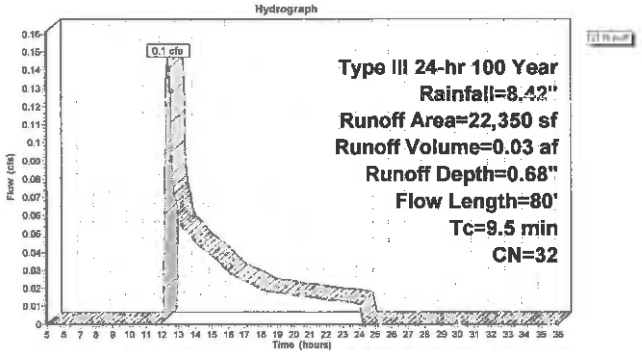
Runoff = 0.1 cfs @ 12.38 hrs, Volume= 0.03 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.42"

Area (sf)	CN	Description
21,800	30	Woods, Good, HSG A
* 550	96	Gravel Driveway
22,350	32	Weighted Average
22,350		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.3	30	0.1500	1.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.5	80	Total			

Subcatchment E3: Existing to Sherman Bridge Road



Summary for Subcatchment E4: Existing to Rear

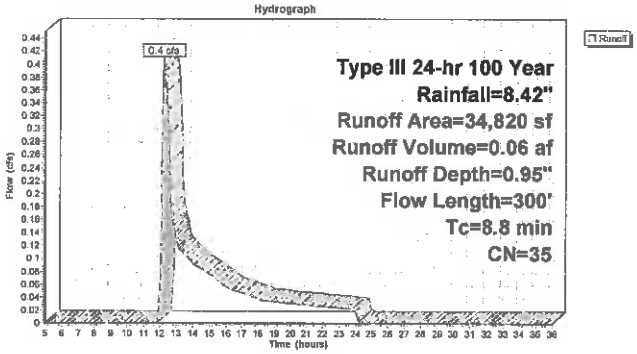
Runoff = 0.4 cfs @ 12.22 hrs, Volume= 0.06 af, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.42"

Area (sf)	CN	Description
31,920	30	Woods, Good, HSG A
* 2,900	96	Gravel Driveway
34,820	35	Weighted Average
34,820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.30"
2.4	250	0.1200	1.73		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
8.8	300	Total			

Subcatchment E4: Existing to Rear



Summary for Subcatchment E5: Existing to West

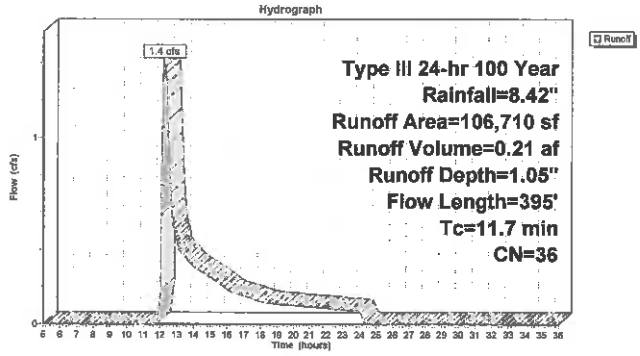
Runoff = 1.4 cfs @ 12.26 hrs, Volume= 0.21 af, Depth= 1.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.42"

Area (sf)	CN	Description
94,350	30	Woods, Good, HSG A
* 7,570	96	Gravel Drives
1,630	98	Unconnected roofs, HSG A
3,160	39	>75% Grass cover, Good, HSG A
106,710	36	Weighted Average
105,080		98.47% Pervious Area
1,630		1.53% Impervious Area
1,630		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.30"
3.3	345	0.1200	1.73		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
11.7	395	Total			

Subcatchment E5: Existing to West



Summary for Pond E6: Existing IVW

Inflow Area = 2.415 ac, 0.25% Impervious, Inflow Depth = 0.60" for 100 Year event
Inflow = 0.6 cfs @ 12.37 hrs, Volume= 0.12 af
Outflow = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Atten= 100%, Lag= 0.0 min

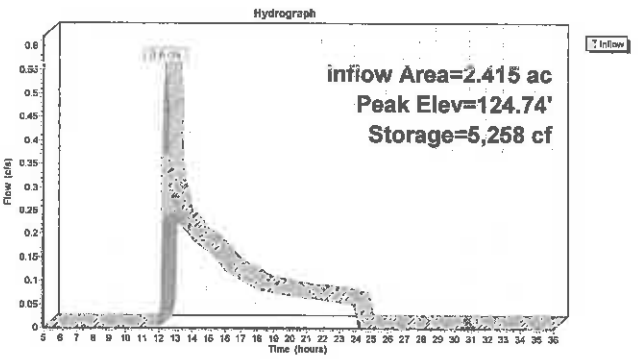
Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 124.74' @ 24.45 hrs Surf.Area= 7,553 sf Storage= 5,258 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	520,260 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	6,740	0	0
126.00	8,950	15,690	15,690
128.00	11,590	20,540	36,230
130.00	14,500	26,090	62,320
140.00	31,230	228,650	290,970
146.00	45,200	229,290	520,260

Pond E6: Existing IVW



Summary for Subcatchment P1a: Proposed to Depression

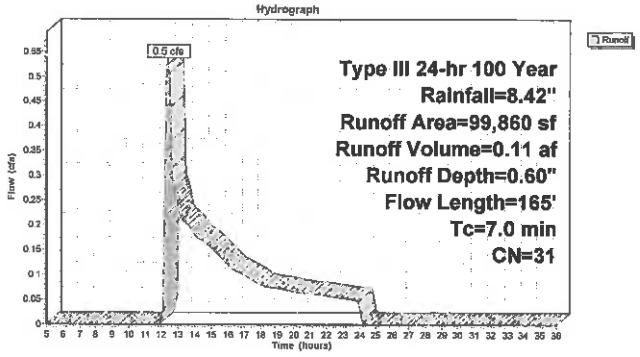
Runoff = 0.5 cfs @ 12.37 hrs, Volume= 0.11 af, Depth= 0.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.42"

Area (sf)	CN	Description
91,050	30	Woods, Good, HSG A
7,810	39	>75% Grass cover, Good, HSG A
1,000	98	Unconnected pavement, HSG A
99,860	31	Weighted Average
98,860		99.00% Pervious Area
1,000		1.00% Impervious Area
1,000		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.30"
0.6	115	0.3500	2.96		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
7.0	165	Total			

Subcatchment P1a: Proposed to Depression



Summary for Subcatchment P1b: Proposed to Drain System

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

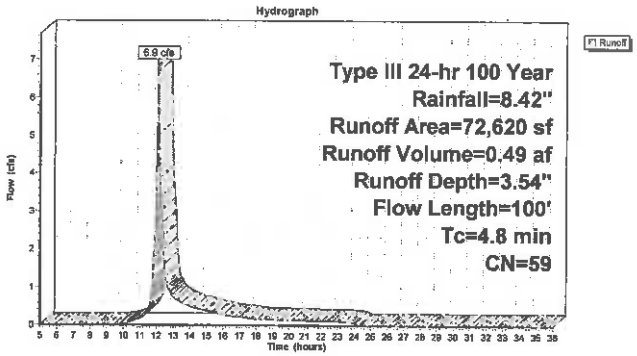
Runoff = 6.9 cfs @ 12.08 hrs, Volume= 0.49 af, Depth= 3.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.42"

Area (sf)	CN	Description
48,420	39	>75% Grass cover, Good, HSG A
11,400	98	Paved roads w/curbs & sewers, HSG A
12,800	98	Paved parking, HSG A
72,620	59	Weighted Average
48,420		66.68% Pervious Area
24,200		33.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0800	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
0.2	50	0.3000	3.83		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.8	100	Total			

Subcatchment P1b: Proposed to Drain System



Summary for Subcatchment P2: Proposed to East

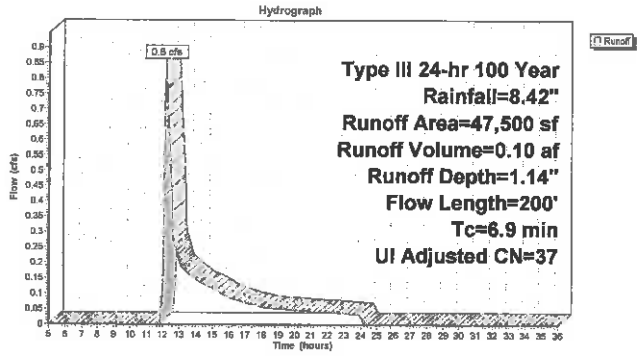
Runoff = 0.8 cfs @ 12.15 hrs, Volume= 0.10 af, Depth= 1.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.42"

Area (sf)	CN	Description
23,660	39	>75% Grass cover, Good, HSG A
20,540	30	Woods, Good, HSG A
3,300	98	Unconnected pavement, HSG A
47,500	39	Weighted Average, UI Adjusted CN = 37
44,200		93.05% Pervious Area
3,300		6.95% Impervious Area
3,300		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.0500	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
1.2	150	0.1600	2.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.9	200	Total			

Subcatchment P2: Proposed to East



Summary for Subcatchment P3: Proposed to Sherman Bridge Road

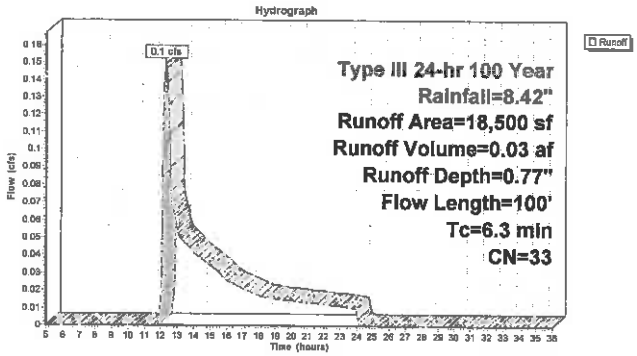
Runoff = 0.1 cfs @ 12.30 hrs, Volume= 0.03 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.42"

Area (sf)	CN	Description
15,300	30	Woods, Good, HSG A
550	98	Paved roads w/curbs & sewers, HSG A
2,650	39	>75% Grass cover, Good, HSG A
18,500	33	Weighted Average
17,950		97.03% Pervious Area
550		2.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.1200	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.30"
0.4	50	0.2000	2.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.3	100	Total			

Subcatchment P3: Proposed to Sherman Bridge Road



Summary for Subcatchment P4: Proposed to Rear

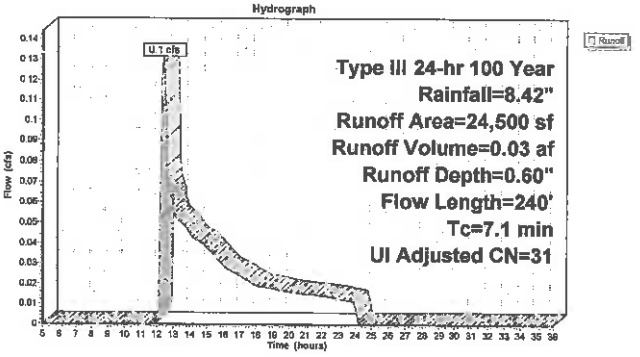
Runoff = 0.1 cfs @ 12.37 hrs, Volume= 0.03 af, Depth= 0.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.42"

Area (sf)	CN	Description
22,400	30	Woods, Good, HSG A
1,600	39	>75% Grass cover, Good, HSG A
500	98	Unconnected pavement, HSG A
24,500	32	Weighted Average, UI Adjusted CN = 31
24,000		97.96% Pervious Area
500		2.04% Impervious Area
500		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0500	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
1.5	190	0.1700	2.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.1	240	Total			

Subcatchment P4: Proposed to Rear



Summary for Subcatchment P5: Proposed to West

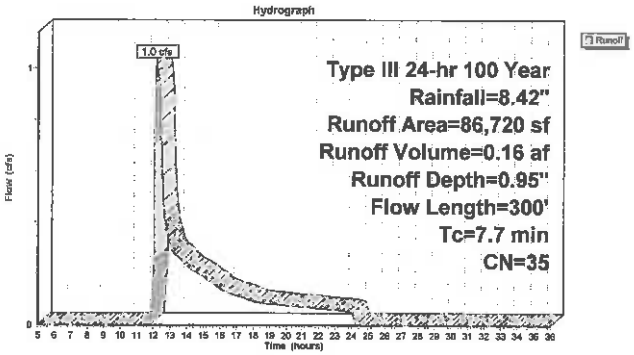
Runoff = 1.0 cfs @ 12.19 hrs, Volume= 0.16 af, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.42"

Area (sf)	CN	Description
49,120	30	Woods, Good, HSG A
35,600	39	>75% Grass cover, Good, HSG A
2,000	98	Unconnected pavement, HSG A
86,720	35	Weighted Average
84,720		97.69% Pervious Area
2,000		2.31% Impervious Area
2,000		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0500	0.15		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30"
0.9	140	0.1500	2.71		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	110	0.0900	1.50		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
7.7	300	Total			

Subcatchment P5: Proposed to West



Summary for Pond P6: Proposed IVW

Inflow Area = 3.960 ac, 14.61% Impervious, Inflow Depth = 0.35" for 100 Year event
Inflow = 0.5 cfs @ 12.37 hrs, Volume= 0.11 af
Outflow = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af, Atten= 100%, Lag= 0.0 min

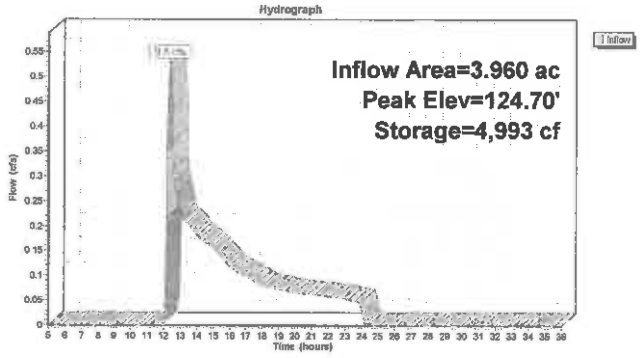
Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 124.70' @ 24.45 hrs Surf.Area= 7,514 sf Storage= 4,993 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	520,260 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	6,740	0	0
126.00	8,950	15,690	15,690
128.00	11,590	20,540	36,230
130.00	14,500	26,090	62,320
140.00	31,230	228,650	290,970
146.00	45,200	229,290	520,260

Pond P6: Proposed IVW



Summary for Pond P7: Stormwater Basin

Inflow Area = 1.667 ac, 33.32% Impervious, Inflow Depth = 3.54" for 100 Year event
Inflow = 6.9 cfs @ 12.08 hrs, Volume= 0.49 af
Outflow = 0.7 cfs @ 13.03 hrs, Volume= 0.49 af, Atten= 90%, Lag= 57.0 min
Discarded = 0.7 cfs @ 13.03 hrs, Volume= 0.49 af
Primary = 0.0 cfs @ 5.00 hrs, Volume= 0.00 af

Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 148.99' @ 13.03 hrs Surf.Area= 3,669 sf Storage= 8,295 cf

Plug-Flow detention time= 119.7 min calculated for 0.49 af (100% of inflow)
Center-of-Mass det. time= 119.5 min (964.0 - 844.5)

Volume	Invert	Avail.Storage	Storage Description
#1	146.00'	12,319 cf	Custom Stage Data (Conic) Listed below (Recalc)

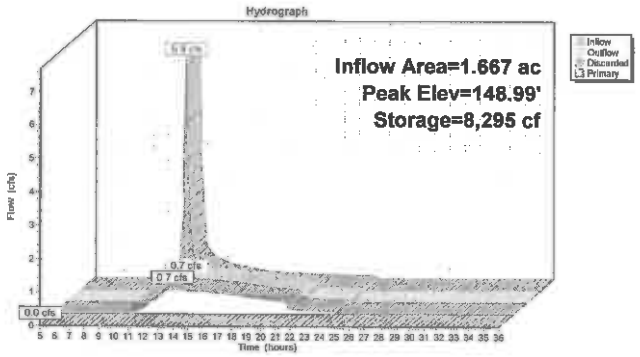
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
146.00	1,900	0	0	1,900
148.00	3,100	4,951	4,951	3,151
150.00	4,300	7,367	12,319	4,425

Device	Routing	Invert	Outlet Devices
#1	Discarded	146.00'	**8.270 in/hr Exfiltration over Wetted area**
#2	Primary	149.00'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.7 cfs @ 13.03 hrs HW=148.99' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.7 cfs)

Primary OutFlow Max=0.0 cfs @ 5.00 hrs HW=146.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Pond P7: Stormwater Basin



Summary for Subcatchment P8: Roof Area

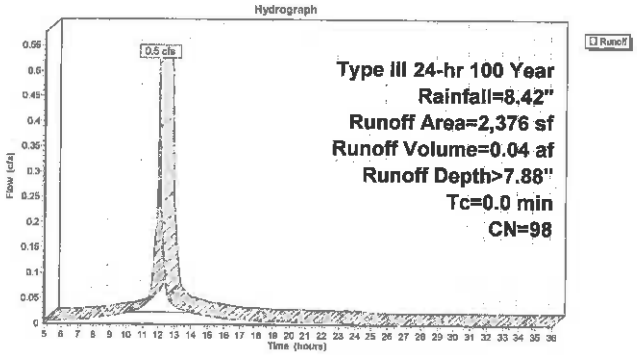
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.5 cfs @ 12.00 hrs, Volume= 0.04 af, Depth> 7.88"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Rainfall=8.42"

Area (sf)	CN	Description
2,376	98	Roofs, HSG A
2,376		100.00% Impervious Area

Subcatchment P8: Roof Area



Summary for Pond P9: Roof Drywell

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.055 ac,100.00% Impervious, Inflow Depth > 7.88" for 100 Year event
Inflow = 0.5 cfs @ 12.00 hrs, Volume= 0.04 af
Outflow = 0.1 cfs @ 12.43 hrs, Volume= 0.04 af, Atten= 84%, Lag= 25.6 min
Discarded = 0.1 cfs @ 12.43 hrs, Volume= 0.04 af

Routing by Stor-Ind method, Time Span= 5.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 3.78' @ 12.43 hrs Surf.Area= 216 sf Storage= 452 cf

Plug-Flow detention time= 38.0 min calculated for 0.04 af (100% of inflow)
Center-of-Mass det. time= 37.9 min (793.0 - 755.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	244 cf	**12.00'W x 18.00'L x 3.79'H Field A** 819 cf Overall - 209 cf Embedded = 610 cf x 40.0% Voids
#2A	0.75'	209 cf	**Cultec R-330XL** x 4 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
		453 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.1 cfs @ 12.43 hrs HW=3.77' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.1 cfs)

Pond P9: Roof Drywell - Chamber Wizard Field A

Chamber Model = Cultec R-330XL
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

52.0" Wide + 6.0" Spacing = 58.0" C-C

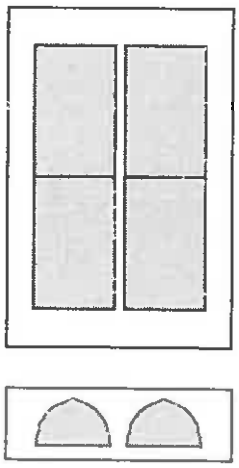
2 Chambers/Row x 7.00' Long = 14.00' + 24.0" End Stone x 2 = 18.00' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 17.0" Side Stone x 2 = 12.00' Base Width
9.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.79' Field Height

4 Chambers x 52.2 cf = 208.6 cf Chamber Storage

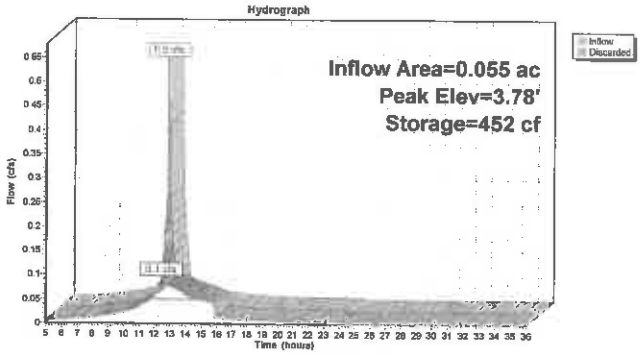
819.0 cf Field - 208.6 cf Chambers = 610.4 cf Stone x 40.0% Voids = 244.1 cf Stone Storage

Stone + Chamber Storage = 452.8 cf = 0.01 af

4 Chambers
30.3 cy Field
22.6 cy Stone



Pond P9: Roof Drywell



STORMWATER OPERATION & MAINTENANCE PLAN

Stormwater Operations and Management Plan

27 Sherman's Bridge Road Conservation Cluster
Wayland, MA

June 16, 2021

Stormwater Management System Owner: & Responsible Party

Name: Homeowners Association

Address: _____

_____

Tel #: _____

Signature: _____

This Operation and Maintenance Plan has been prepared in accordance with the Town of Wayland Stormwater Bylaw and recommendations outlined in the MassDEP stormwater handbook. This plan includes general site restrictions, routing/non-routine operation and maintenance; reporting and record keeping; and an estimated budget.

General Conditions:

1. The following site conditions are imposed as part of this Plan.
    - Illicit discharges into stormwater management system are perpetually prohibited.
    - Landscape contractors shall be notified of the following conditions:
        - The use of fertilizers should be limited to slow-release nitrogen, and low phosphorus fertilizers.
        - Apply fertilizers and pesticides sparingly to prevent washoff.
        - Use alternative deicers such as calcium chloride and magnesium chloride in lieu of sodium based deicers

2. The Conservation Commission, or its designee, shall be provided access to the site and stormwater system at reasonable times and in a reasonable manner for inspections. Notice shall be provided to the System Owner prior to inspection.

3. All material removed from the drainage system (i.e. catch basin cleanings) shall be legally disposed of off-site.

4. The owner of the property shall maintain a log of all operation and maintenance activities, including without limitation, inspections, repairs, replacement and disposal (for disposal, the log shall indicate the type of material and the disposal location).

5. Based on the findings of the inspection, the Responsible Party shall immediately schedule the appropriate maintenance. Some minor maintenance, such as the removal of blockages or debris accumulation may be conducted at the time of the inspection. Other maintenance shall be performed by qualified and licensed (where applicable) personnel.

Accompanying Plans

Plans "Conservation Cluster and Definitive Subdivision Plans, 27 Sherman's Bridge Road in Wayland MA," dated June 1, 2021 including any revisions, is part of this document and depict the locations of all stormwater BMP's.

Stormwater Inspection & Maintenance Schedule:

Stormwater systems should be inspected four times per year, and be scheduled, whenever possible, within 48 hours of a 1" or larger storm event. Upon completion of inspection, the inspector should specify any necessary corrective actions to be taken by ownership of the stormwater facility. Items to be inspected and maintained are described in the following sections.

Inspection Procedures:

All assessments can be based upon visual inspections and use of typical hand tools (shovel, bar, measuring tape, etc.). No specialized tools are required.

Drywell / Subsurface infiltration system

Drywells are located on each individual lot. Surface features for locating the system would include the cleanouts to grade.

Drywells shall be inspected after every major storm in the first few months after construction. After this initial period, the systems should be inspected per the schedule above. Observations can be made through the inspector ports. At least one of the yearly inspections shall be after a 1-inch storm, and remaining inspections scheduled to coincide with rain events to the extent practical. If the infiltration system does not drain within 48 hours of the end of a storm, then remediation may be necessary possibly including replacement of the system. A qualified engineer should be consulted for additional investigations. Heavy Machinery should not operate near of over the drywell.

Gutters should be cleaned twice per year or whenever debris is noted. Downspout connections should be inspected to verify connection and for any evidence of overflow.

Deep Sump Catch Basin

There are two catch basins near the intersection with Sherman Bridge Road and one within the cul-de-sac rain garden. These structures are accessed through the surface inlet grate.

Cleaning and maintaining the catch basins will help improve the long term functionality of the infiltration basin. 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 re-suspended and subsequently discharged. Frequent cleaning also results in more volume available for future storms and enhances the overall performance.

At a minimum, structures should be inspected four times annually, and cleaned whenever sediment accumulation exceeds 12 inches (or 36" inches below pipe invert). Cleaning shall be performed with a vacuum truck, and disposal of the accumulated sediment and hydrocarbons must be in accordance with applicable local, state, and federal guidelines and regulations. At each inspection, inspect gas trap hoods and repair as necessary. Inspect outlet pipe and remove debris.

Sediment Forebay

The inspector should look for debris accumulations in the basin bottom, at the inlet and outlet. Typical debris may include trash, leaves, tires, tree limbs, etc. Debris shall be removed at the time of the inspection, by hand if feasible or using heavy equipment. Sediment should be removed when depth exceeds six inches, or four times per year whichever is less.

Pipe Inlets / Outlet

The outlet channel itself shall be free from obstruction (e.g., fallen trees) and bank scour, or the undermining of riprap. The inspector shall ensure that there are no signs of scour around the inlets. Vegetation and riprap shall be in good condition (e.g., grass shall be dense and healthy looking; riprap shall be free from undermining and/or deterioration). Inlet structures shall be free from cracks, breaks, or deterioration of materials. If scour is evident, the damaged area shall be filled, compacted and reseeded, stabilized with a geotextile fabric, or lined with riprap in that order. If rip rapped areas have been damaged, the riprap shall be replaced or supplemented. The use of concentrated flow dissipation devices, such as level spreaders, may help to eliminate inlet scour problems.

Infiltration Basin

After every major storm during the first 3 months of operation and at least twice annually, the inspector shall visually inspect the basin, noting each of the items listed below (Vegetation, Dewatering, Inlets, Outlets and Structural Stability). If any of the items are in need of attention, it shall be noted and the proper remedial action initiated, as described below, as soon as possible.

At a minimum of twice per year, mow the buffer area, side slopes, and basin bottom. If grassed floor; rake if stone bottom; remove trash and debris; remove grass clippings and accumulated organic matter.

The inspector shall visit the site three to four days after the rainfall of a major storm has ended to ensure that the facility has drained to the appropriate level. If significant water remains ponded in the system three (3) days after the latest rainfall, sediment removal/blockage removal activities shall be investigated and/or performed. The embankment and side slopes of the detention basins should exhibit no visible signs of erosion, settlement, slope failure, wildlife damage, or vehicle damage. Damaged side slopes should be repaired using similar fill of adequate permeability. Damaged embankments should be filled and compacted with impermeable soils to prevent seepage. Eroded areas should be reseeded as discussed under "vegetation". Repeated repairs to side slopes may necessitate the flattening of the slopes to ensure structural stability. Signs of vehicle damage may necessitate the construction of fences around certain areas.

Vegetation should be dense (and aesthetically acceptable on all portions of the device, including the side slopes, basin floor, buffer strips and the embankments. The inspector shall determine: (1) whether fertilizing is required (2) the areas where grass should be mowed, and (3) the areas which should be protected against erosion. In addition, recently seeded areas should be inspected for failures. Grasses of the fescue family can be mowed a minimum of twice per year, in July and late September. In addition to grass maintenance, any other vegetation in the basin area or access areas which has reached nuisance levels, (e.g., bushes, trees and weeds) should be trimmed or removed.

Repairs to damaged or deteriorating structures shall be made as soon as possible. Materials that cannot be adequately repaired, must be replaced.

Vegetation

The on-site vegetation and landscaped areas shall be inspected. Vegetation shall be dense and healthy. The inspector shall determine and document: (1) whether fertilizing is required (2) the areas where maintenance is required, and (3) the areas which shall be protected against erosion. In addition, any 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 a recently established vegetated area is determined to be inadequate for erosion control it shall be re-fertilized with microbial release, not sulfur encapsulated, fertilizer, (using half of the rate originally applied). 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.

Street Sweeping
Street sweeping of the roadway should be performed at least twice per year, preferably in the spring after the snow has melted and in the fall, prior to snowfall. Disposal of the sweepings must be in accordance with applicable local, state, and federal guidelines and regulations. Sweeping can be performed with any type of typical sweeping equipment (vacuum or mechanical).

Snow Removal
Snow shall not be plowed toward the abutting properties. All catch basins shall be uncovered and functional immediately after snow plowing. Snow Storage Areas are depicted on the attached Stormwater Component Plan.

Rain Garden
Rain garden areas require attention while plants are being established and seasonal landscaping maintenance thereafter.

Activity	*Time of Year*	*Frequency*
Inspect & remove trash	Year round	Monthly
Mulch	Spring	Annually
Remove dead vegetation	Spring or Fall	Annually
Replace dead vegetation	Spring or Fall	Annually
Prune	Spring or Fall	Annually
Replace entire media &all vegetation	Late Spring/early Summer	As needed
Inspect Overflow outlet	Spring or Fall	Annually

Paying careful attention to pretreatment and operation & maintenance can extend the life of the Soil media. In many cases, a landscaping contractor working elsewhere on the site can complete maintenance tasks. Inspect pretreatment devices and bio-retention cells regularly for sediment build-up, structural damage, and standing water.

Inspect soil and repair eroded areas monthly. Re-mulch void areas as needed. Remove litter and debris monthly. Treat diseased vegetation as needed. Remove and replace dead vegetation twice per year (spring and fall). Proper selection of plant species and support during establishment of vegetation should minimize—if not eliminate—the need for fertilizers and pesticides. Remove invasive species as needed to prevent these species from spreading into the bio-retention area. Replace mulch every two years, in the early spring. Upon failure, excavate bio-retention area, scarify bottom and sides, replace filter fabric and soil, replant, and mulch. A summary of maintenance activities can be found above.

Plant maintenance is critical. Concentrated salts in roadway runoff may kill plants, necessitating removal of dead vegetation each spring and replanting. Cold Climate Considerations - Never store snow in Rain Garden areas.

Easements:
The site drainage system is located within the roadway right of way and "drainage easement," as shown on the applicable plans.

Changes to Operation and Maintenance Plans
The owner(s) of the stormwater management system must notify the Conservation Commission 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 and inspections. The maintenance logs shall be kept on site for a minimum of three (3) years and be available for inspection by the Town municipal departments or other auditing authority, including inspections, repairs, replacement and disposal (for disposal, the log shall indicate the type of material and the disposal location). 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. Recent rain events;
d. The condition of each BMP listed above;
e. Description of the need for maintenance or corrective actions;
f. Any cleaning and disposal records.

Estimated Budget

The estimated annual budget to perform the routine scheduled maintenance is approximately $3,000. This estimate does not include the repair of structures, pipes, embankments; cleaning drain lines; snow plowing; or other non-routine tasks.

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 amount of gasoline or other petroleum product is released, the following procedure should be followed:

1. Immediately contact the following agencies:

Wayland Fire Department	(508) 358-4747
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.

If the volume of spill has reached the catch basins or CDS Structure, the structures should be cleaned by a licensed liquid waste hauler. The drainage system and Outlet Control Structure should be inspected. If there is evidence of discharge from the CDS Structure, additional corrective actions must be taken based upon recommendations of a qualified LSP.

Stormwater Operations and Maintenance BMP Inspection Form

Project: **27 Sherman's Bridge Road, Wayland** **Date:**

Owner: **By:**

Location: **Off Sherman's Bridge Road**
Wayland, MA

Rain Events: **24 hrs =**
72 hrs =

Deep Sump Catch Basin

	Sediment Depth	Oil depth	Structural Condition	Hood / Tee Condition	Last Cleaned	Action Required
Catch Basin 0+18R						
Catch Basin 0+18L						
CB - Rain Garden						

Infiltration Basin

Forebay sediment depth	Basin Sediment Depth	Water Depth	Vegetative Condition	Outlet Condition	Action Required

Rain Garden

Forebay sediment depth	Basin Sediment Depth	Water Depth	Vegetative Condition	Outlet Condition	Action Required

Riprap Swale / Outlets

Location	Condition	Action Required

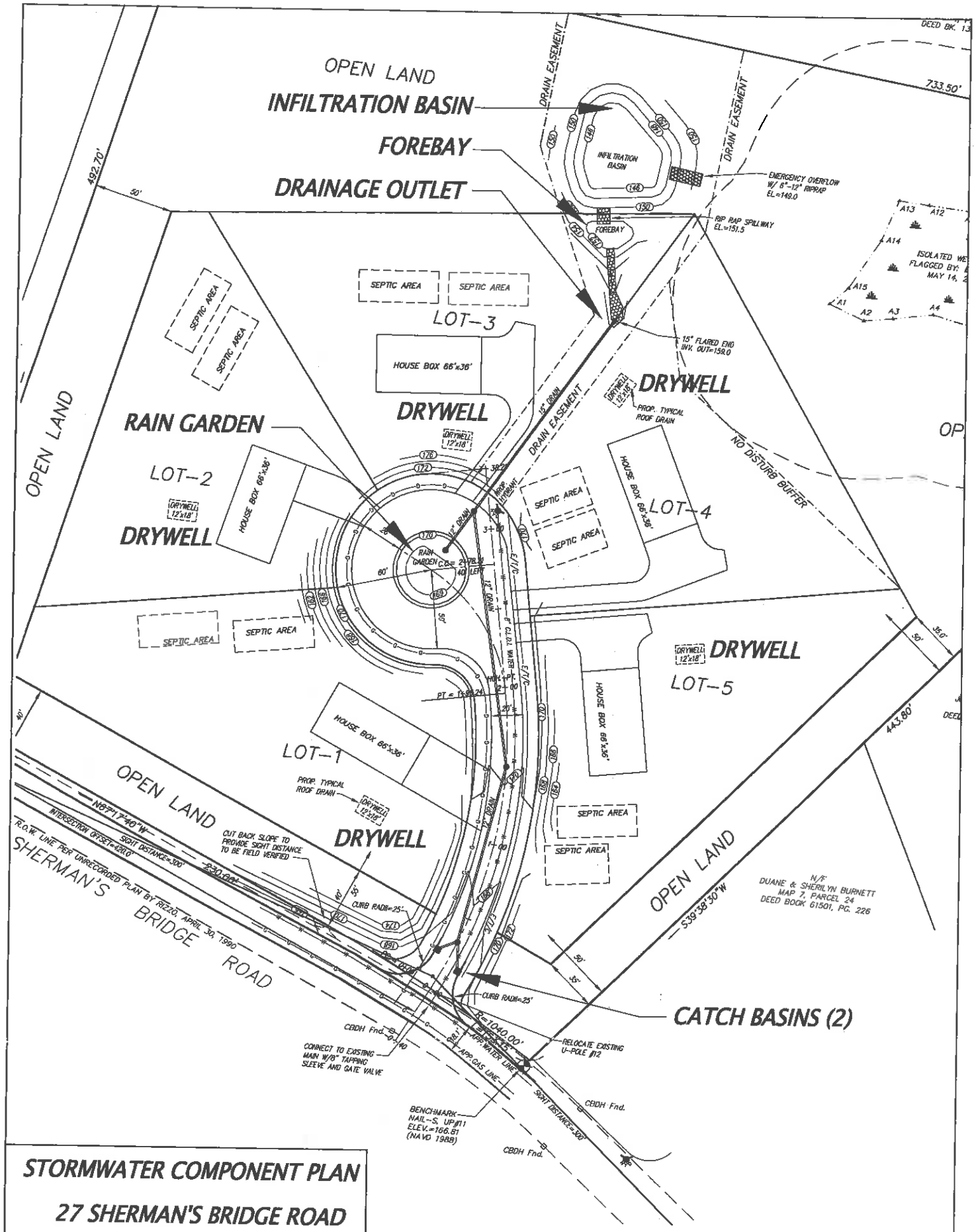
Drywells

Lot #	Sediment Depth	Water Depth	Action Required

Pavement / Vegetation

	Condition	Action Required
Driveway		
Vegetation		

Comments: _____



STORMWATER COMPONENT PLAN

27 SHERMAN'S BRIDGE ROAD

SCALE 1"=80'

STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

Stormwater Pollution Prevention Plan and Construction Period Pollution Prevention and Erosion and Sediment Control Plan.

June 17, 2021

27 Sherman's Bridge Road, Cluster Development
Wayland, MA

This Stormwater Pollution Prevention Pan has been prepared in accordance with the MA Department of Environmental Protection Stormwater Standards and NPDES General Construction Permit for Stormwater Discharges from Construction Activities. All work shall be in accordance with the order of conditions issued by the Local Conservation Commission.

1.1 Project Information

Project Name and Location:	27 Sherman's Bridge Road Wayland, MA
Owner Name and Address:	_____ _____ _____
Site Operator:	_____ _____ _____
Accompanying Documents:	"Conservation Cluster and Definitive Subdivision, 27 Sherman's Bridge Road in Wayland MA," dated June 1, 2021 including any revisions, is part of this document.
NDPES Tracking Number:	**MAR**_____
Latitude/Longitude:	Lat: 42.39830 Long: 71. 35590
Project Description:	Five Residential Lots
Estimated Dates:	Start: Fall 2021 Completion: Fall 2023
Name of Receiving Waters:	Hayward Brook
Estimated Area of Disturbance:	3.35 Acres

1.2 Contact Information / Responsible Parties (complete prior to construction)

Operator(s):

Company Name:
Address:
Telephone #:
Area of Control:

Project Manager(s) or Site Supervisor(s):

Company Name:
Name:
Address:
Telephone #:
Area of Control:

This SWPPP was Prepared by:

Sullivan Connors & Associates, Inc.
121 Boston Post Road
Sudbury, MA 01776
978-443-9566

Emergency 24-Hour Contact:

Company Name:
Name:
Address:
Telephone #:

Subcontractors:

Each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the Subcontractor Certifications/Agreement (Attached).

1.3 Existing Conditions

The site consists of a 5.5 acre parcel located at 105 Plain Road. The lot is currently developed as a single family house including several outbuildings, pool, and tennis court, and has an existing impervious area of 26,345 square feet. The rear portion of the site behind the pool/tennis court is currently wooded sloping down to the rear of the property. There are no known wetland resources within 100 feet of the site or proposed work. Site topography is fairly flat sloping down away from Plain Road toward the rear (south) and side (east) property lines with an overall elevation change of approximately 14 feet.

1.4 Proposed Development / Nature of Construction Activities

The proposed project consists of a cluster development subdivision consisting of two (2) total lots. The front lot shown as Lot 1 on the plan would contain and preserve the existing house. The rear lot shown as Lot 2 on the plan would contain four (4) detached dwelling units. Both lots would have access off a proposed 500 foot long private roadway. The site would be serviced by a private on-site septic system and municipal water extended from Plain Road. The total post development impervious area used in the calculations is 37,300 square feet. This includes the proposed roadway, existing roof and impervious areas to remain on Lot 1, and impervious areas for the proposed driveways and dwelling units (assumed allowance of 3,700 square feet of impervious per dwelling unit). In order to mitigate the increase in runoff due to the impervious area, a stormwater management system has been proposed, which will collect runoff from the common driveway and portions of the development area. The stormwater management includes two subsurface infiltration systems (cultec drywells). One located at the entrance of the roadway and the second at the end within the cul-de-sac. Surface runoff would be collected via catch basins and conveyed to a hydrodynamic separator for pretreatment, and then a subsurface infiltration system for final treatment, recharge, and reduction of peak flow rates.

1.5 Construction Site Estimates

Total parcel area	8.3 acres
Total land disturbance:	3.35 acres
Impervious area before construction:	0.1 acres
Impervious area after construction:	1.0 acres

1.6 Sensitive Areas / Wetland Resources

An isolated wetland has been identified on the rear northeast corner of the site. This area is a 25 foot depression with a bottom elevation of 124, while the developable area is up at elevation 150 to 170. All proposed work has been maintained 100 feet from the edge of wetland.

1.7 Discharge Information

Stormwater from the site generally flows to the property lines. Ultimately, this area would drain toward two unnamed tributaries (to the north and south of the site). These tributaries ultimately flow to the Sudbury River approximately 1,500 feet to the west. These tributaries are not listed classified under the Surface water Standards nor listed on the Massachusetts integrated list of waters this surface water as an impaired water.

1.8 Endangered Species Certification

The proposed project is not located in an Estimated or Priority Habitat of Rare Wildlife as indicated on the 2017 Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)

1.9 Potential Sources of Pollution

Potential sources of sediment to stormwater runoff:

- Clearing and grubbing operations
- Grading and site excavation operations
- Vehicle tracking
- Topsoil stripping and stockpiling
- Landscaping operations

Potential pollutants and sources, other than sediment, to stormwater runoff:

- Combined Staging Area—small fueling activities, minor equipment maintenance, sanitary facilities, and hazardous waste storage.
- Materials Storage Area—general building materials, solvents, adhesives, paving materials, paints, aggregates, trash, etc.
- Construction Activity—paving, curb/gutter installation, concrete pouring/mortar/stucco, and building construction.
- Concrete Washout Area

1.10 REQUIREMENT TO POST A NOTICE OF YOUR PERMIT COVERAGE.

The operator must post a sign or other notice conspicuously at a safe, publicly accessible location in close proximity to the project site. The notice must be located so that it is visible from the public road that is nearest to the active part of the construction site, and it must use a font large enough to be readily viewed from a public right-of-way. At a minimum, the notice must include

a. The NPDES ID (i.e., permit tracking number assigned to your NOI);
b. A contact name and phone number for obtaining additional construction site information;
c. The Uniform Resource Locator (URL) for the SWPPP (if available), or the following statement: "If you would like to obtain a copy of the Stormwater Pollution Prevention Plan (SWPPP) for this site, contact the EPA Regional Office at [include the appropriate CGP Regional Office contact information found at https://www.epa.gov/npdes/contact-us-stormwater#regional];" and

d. The following statement "If you observe indicators of stormwater pollutants in the discharge or in the receiving waterbody, contact the EPA through the following website: https://www.epa.gov/enforcement/report-environmental-violations."

2.1 General Construction Sequencing of Major Activities

Estimated Schedule: 24 months

Site Preparation

1. Install siltation barriers - erosion barriers as indicated on the plans
2. Construction stone tracking pad. Construction stone entrance to be replaced as needed to provide adequate storage capacity for accumulated sediment storage from vehicles leaving the site.
3. Prepare staging and stockpile areas
4. Install temporary sediment basin.
5. Demolish / raze existing site features.

Roadway

1. Rough grade driveway
2. Install utilities
3. Install drainage system components (drywell to remain offline until site is fully stabilized)
4. Gravel base for driveway
5. Driveway binder course pavement and berms
6. Stabilize slopes with hydroseed and/or mulch as construction areas are completed and/or construction temporarily ceases in areas.
7. Final Pavement
8. Remove temporary infiltration basin and install final infiltration basin only after tributary area is fully stabilized

Site development

1. Rough grade building pad.
2. Foundation and building construction
3. Install septic system, utilities, and drywell.
4. Stabilize slopes with hydroseed and/or mulch as construction areas are completed and/or construction temporarily ceases in areas.

Final Cleanup:

1. Ensure site is fully stabilized and remove all sediment control devices once verified by the engineer and conservation commission.
2. Perform final cleanup.

2.2 Erosion and Sediment Controls

General Conditions – 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 sedimentation and erosion control 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 plumes occur, the contractor shall stop work and install additional sedimentation control devices immediately to prevent further sedimentation.

Temporary Stabilization – Topsoil stockpiles and disturbed portions of the site where construction activity temporarily ceases for at least 7 days will be stabilized with a temporary seed and mulch no later than 7 days from the last construction activity in that area. The temporary seed shall be Erosion Control mix. Seeding shall be nutrient enriched hydroseed and cellulose or other degradable fibers capable of retaining moisture.

Permanent Stabilization – Initiate the installation of stabilization measures immediately in any areas of exposed soil where construction activities have permanently ceased or will be temporarily inactive for 7 or more calendar days; and Complete the installation of stabilization measures as soon as practicable, but no later than 7 calendar days after stabilization has been initiated.

Final Stabilization Criteria (for any areas not covered by permanent structures). Establish uniform, perennial vegetation (i.e., evenly distributed, without large bare areas) that provides 70 percent or more of the cover that is provided by vegetation native to local undisturbed areas; and/or implement permanent non-vegetative stabilization measures to provide effective cover. The permanent seed mix consists of tall fescue, and annual rye. Prior to seeding, ground agricultural limestone shall be applied. Seeding shall be nutrient enriched hydroseed and cellulose or other degradable fibers capable of retaining moisture.

Straw Wattles (or straw bales) and Silt Fence (Perimeter Controls) – Prior to the commencement of work, straw wattles/bales and silt fence (or approved equal) shall be installed along the edge of proposed development, and as indicated on the plans. Additional controls shall be located as conditions warrant or as directed by the owner, his representatives, or the local authority. In some areas wattles/silt fencing structures may have to be duplicated at regular intervals up gradient of wetlands, and it may be necessary to provide crushed stone armor to hay bales/silt fencing when anticipated flows are expected to be heavy or fast.

Track out controls / Construction Entrance – A stabilized stone apron construction entrance shall be at all construction entrances to help prevent vehicle tracking of sediments. All vehicles shall enter and exit the sit via the stabilized construction entrance. The contractor shall inspect the construction entrance daily and after heavy use. If mud and soil clogs the voids in the crushed stone reducing the effectiveness, the pad shall be top dressed with new, clean stone. If the pad becomes completely clogged, replacement of the entire pad may be necessary. Dump trucks hauling material from the construction site will be covered with a tarpaulin.

Track out controls / Street Sweeping – Street sweeping in the vicinity of the project area shall be performed as needed until the project limits have been stabilized. All sediment tracked outside the limit of work shall be swept at the end of each working day.

Temporary Sediment Traps / Basins – If required Sediment traps and/or basins shall be constructed as necessitated by field conditions. The minimum volume shall be 3600 cubic feet of storage for each acre of drainage area. Sediment traps/basins should be readily accessible for maintenance and sediment removal, and should remain in operation and be properly maintained until the site area is permanently stabilized by vegetation and/or when permanent structures are in place. Remove basin after drainage area has been permanently stabilized, inspected, and approved. Before removing dam, drain water and remove sediment; place waste material in designated disposal areas. Smooth site to blend with surrounding area and stabilize.

Inlet Protection – All existing and proposed drainage system inlets, which may receive stormwater flow from disturbed areas, shall be provided with inlet protection (ring of strawbales and catch basin inserts). The contractor shall maintain these devices until all work is completed and all areas have been adequately stabilized.

Dust Control – Dust control measures shall be implemented and maintained properly throughout dry weather periods until all disturbed areas have been permanently stabilized. Methods for dust control shall include water sprinkling and/or other methods approved by the engineer.

Soil Stockpiles – Soil stockpiles shall be stabilized to prevent erosion along with perimeter sedimentation controls. No materials subject to erosion shall be stockpiled overnight within 100 feet of a wetland unless covered. Stockpiling of "drier" glacial till material is not recommended unless protected from moisture.

Dewatering Operations – Dewatering operations, if required, shall discharge onto stabilized areas. All discharge water is to pass through sedimentation control devices to prevent impacts upon water bodies, bordering vegetated wetlands, drainage systems and abutting properties. No discharges from dewatering operations shall be discharged directly to the drainage system.

Snow Removal – Snow shall be plowed to the snow storage area indicated on the plans. Any excess of that which can be stored on-site shall be removed. Snow shall not be plowed into the 20-foot buffer zone to any wetland area. All catch basins shall be uncovered and functional immediately after snow plowing. The snow pile shall be placed so that it will not interfere with runoff flow.

Topsoil – Topsoil shall be stripped and stockpiled on-site for reuse, unless otherwise noted on the plans (per stockpile requirements). Materials shall be re-used on-site to the maximum extent practical. Any excess shall be properly exported off-site.

Minimize Soil Compaction – Within the limits of the infiltration galley, the use of heavy equipment shall be limited to the maximum extent practical.

Vehicle Washing – Vehicle and equipment washing, other than hose down with clean water, shall not be allowed. All wash down water shall be directed to a sediment control device (not directly to any stormwater drainage system or wetland).

Fertilizer Discharge Restrictions.

- Apply at a rate and in amounts consistent with manufacturer's specifications,
- Apply during the growing season, and preferably timed to coincide as closely as possible to the period of maximum vegetation uptake and growth;
- Avoid applying before heavy rains that could cause excess nutrients to be discharged;
- Never apply to frozen ground;
- Never apply to stormwater conveyance channels with flowing water; and
- Follow all other federal, state, and local requirements regarding fertilizer application.

Washing of Applicators and Containers used for Paint, Concrete, or Other Materials. - Direct all wash water into a leak-proof container or leak-proof pit. The container or pit must be designed so that no overflows can occur due to inadequate sizing or precipitation Handle washout or cleanout wastes as follows: Do not dump liquid wastes in storm sewers; Dispose of liquid wastes in accordance with applicable regulations; and. Remove and dispose of hardened concrete waste consistent with your handling of other construction wastes. Locate any washout or cleanout activities as far away as possible from surface waters and stormwater inlets or conveyances, and, to the extent practicable, designate areas to be used for these activities and conduct such activities only in these areas.

2.3 Buffers

There is no work proposed within 100 feet of the resource areas. This limit of work should be clearly delineated in the field.

2.4 Inspection and Maintenance Schedule

The responsible party 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 all sedimentation and erosion control measures shall be removed. These are the inspection and maintenance practices that will be used to maintain erosion and sediment controls during construction.

Schedule:

- All control measures will be inspected each working day including within 24 hours following any precipitation event of 0.25 inches.
- Depth of precipitation events shall be based upon NCDC reporting or an on-site rain gauge.

Maintenance Practices:

- All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of report of any deficiencies.
- Built up sediment shall be removed from the silt fence when it reaches a depth equal to one-third the height of the fence.
- The sediment basins shall be inspected for depth of sediment, and built up sediment will be removed when it reached 25 percent of the design capacity or at the end of the job. Check embankment for: settlement, seepage, or slumping along the toe or around pipe. Look for signs of piping. Repair immediately. Remove trash and other debris from principal spillway, emergency spillway, and pool area. Clean or replace gravel when sediment pool does not drain properly.
- Any diversion dikes will be inspected for breaches and promptly repaired.
- Temporary and permanent seeding and planting will be inspected for bare spots, washouts and healthy growth.
- Contractor to maintain a supply of erosion control devises on site at all times to repair any broken or damaged materials.

The site superintendent, will select three individuals who will be responsible for inspections, maintenance and repair activities, and filling out the inspection and maintenance reports. Personnel selected for inspection and maintenance responsibilities shall be a "qualified personnel" as defined in section 4. D of the GCP. Staff shall be trained in all inspection and maintenance practices for keeping the erosion and sediment controls used onsite in good working order.

An *inspection report* will be made after each inspection. Copies of the reports shall be maintained on site. At a minimum, the inspection report must include the following and be signed per the GCP.:

- The inspection date;
- Names, titles, and qualifications of personnel making the inspection;
- Weather information for the period since the last inspection including estimate of the beginning and duration of each storm event, approximate amount of rainfall for each storm event (in inches), and whether any discharges occurred;
- Location(s) of discharges of sediment or other pollutants from the site;
- Location(s) of BMPs that need to be maintained;
- Location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location;
- Location(s) where additional BMPs are needed that did not exist at the time of inspection; and
- Corrective action required including implementation dates.

2.5 Staff and Training Requirements.

Prior to the commencement of earth-disturbing activities or pollutant-generating activities, whichever occurs first, you must ensure that the following personnel understand the requirements of this permit and their specific responsibilities with respect to those requirements:

- Personnel who are responsible for the design, installation, maintenance, and/or repair of stormwater controls (including pollution prevention measures);
- Personnel responsible for the application and storage of treatment chemicals (if applicable);
- Personnel who are responsible for conducting inspections as required in Part 4.1.1; and
- Personnel who are responsible for taking corrective actions.

Notes: (1) If the person requiring training is a new employee, who starts after you commence earth-disturbing or pollutant-generating activities, you must ensure that this person has the proper understanding as required above prior to assuming particular responsibilities related to compliance with this permit. (2) For emergency-related construction activities, the requirement to train personnel prior to commencement of earth-disturbing activities does not apply, however, such personnel must have the required training prior to NOI submission.

The operator is responsible for ensuring that all activities on the site comply with the requirements of the permit. The operator is not required to provide or document formal training for subcontractors or other outside service providers, but you must ensure that such personnel understand any requirements of the permit that may be affected by the work they are subcontracted to perform. At a minimum, personnel must be trained to understand the following if related to the scope of their job duties (e.g., only personnel responsible for conducting inspections need to understand how to conduct inspections):

- The location of all stormwater controls on the site required by this permit, and how they are to be maintained;
- The proper procedures to follow with respect to the permit's pollution prevention requirements; and
- When and how to conduct inspections, record applicable findings, and take corrective actions.

3.1 Storage, Handling, and Waste Disposal

Building Products - Shall be covered or stored inside to prevent any discharge of pollutants. Comply with all application, disposal, and registration requirements.

Pesticides, herbicides, insecticides and fertilizers - Shall be covered or stored inside to prevent any discharge of pollutants. Comply with all application, disposal, and registration requirements.

Diesel fuel, oil, hydraulic fluids, other petroleum products, and other chemicals- store chemicals in water-tight containers, and provide either (1) cover (e.g., plastic sheeting or temporary roofs) to prevent these containers from coming into contact with rainwater, or (2) a similarly effective means designed to prevent the discharge of pollutants from these areas (e.g., spill kits), or provide secondary containment (e.g., spill berms, decks, spill containment pallets). Clean up spills immediately, using dry clean-up methods where possible, and dispose of used materials properly. Do not clean surfaces or spills by hosing the area down. Eliminate the source of the spill to prevent a discharge or a continuation of an ongoing discharge

Hazardous Waste - Separate hazardous or toxic waste from construction and domestic waste. Store waste in sealed containers, which are constructed of suitable materials to prevent leakage and corrosion, and which are labeled in accordance with applicable Resource Conservation and Recovery Act (RCRA) requirements and all other applicable federal, state, tribal, or local requirements; iii. Store all containers that will be stored outside within appropriatelysized secondary containment (e.g., spill berms, decks, spill containment pallets) to prevent spills from being discharged, or provide a similarly effective means designed to prevent the discharge of pollutants from these areas (e.g., storing chemicals in covered area or having a spill kit available on site);

Dispose of hazardous or toxic waste in accordance with the manufacturer's recommended method of disposal and in compliance with federal, state, tribal, and local requirements. site personnel will be instructed in these practice and the individual who manages the day to day site operations, will be responsible for seeing that these procedures are followed.

Clean up spills immediately, using dry clean-up methods where possible, and dispose of used materials properly. Do not clean surfaces or spills by hosing the area down. Eliminate the source of the spill to prevent a discharge or a furtherance of an ongoing discharge

Sanitary Waste – All sanitary waste will be collected from the portable units a minimum of once per week by the sanitary pumping company, licensed by the Commonwealth of Massachusetts and as required by the local regulation. Position units in a secure location where they cannot be tipped over.

Waste Materials – All waste materials will be collected and stored in a securely lidded metal dumpster rented from a licensed waster management company. Dumpsters shall be kept closed or covered when not in use and overnight. The dumpster will meet all local and State solid waster management regulations. All trash and construction debris from the site will be deposited in the dumpster. The dumpster will be emptied at least twice per month or more often if necessary, and the waste will be hauled to the waste management company. On work days, clean up and dispose of waste in designated waste containers. Clean up immediately if containers overflow. No construction waste materials will be buried onsite. All personnel will be instructed regarding the correct procedure for waste disposal. Notices stating these practices will be posted in the office trailer. The individual managing the day-to-day site operations will be responsible for seeing that these procedures are followed.

3.2 Building Material Inventory for Pollution Prevention Plan

The materials or substances listed below are expected to be present onsite during construction:

- Concrete
- Petroleum based products including asphalt concrete/emulsions, fuel(s), oil, etc.
- Wood
- Fertilizers and tachifiers
- Paints (enamel, latex and oil based stains)
- Metal studs and products
- Masonry block
- Roofing shingles
- Gypsum and plaster
- Stone products

Construction equipment and maintenance materials will be stored at the combined staging area and materials storage areas. A watertight container will be used to store hand tools, small parts, and other construction materials.

3.2 Spill Prevention Material Management Practices

The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff.

Good Housekeeping – The following good housekeeping practices will be followed onsite during the construction project.

- An effort will be made to store only enough products to do the job.
- All materials stored onsite will be stored in a neat, orderly manner in this appropriate containers and, if possible, under a roof or other enclosure.
- Products will be kept in their original containers and with the original manufacturers' label.
- Substances will not be mixed with one another unless recommended by the manufactures.
- Whenever possible, all of a product will be used up before disposing of the container.

- Manufacturers' recommendation for proper use and disposal will be followed.
- The Site Superintendent will inspect daily to ensure proper use and disposal of materials.
- Hazardous Procedures – In accordance with industry standards and Applicable regulations

Product Specific Practices – The following product specific practices will be followed onsite:
Petroleum Products – Transport and delivery of fuel in approved containers only.
Fertilizers – In accordance with labeling
Paints – In accordance with labeling

Spill Control Practices – Any spills of hazardous materials shall be contained and cleaned up immediately. If appropriate, the Massachusetts Department of Environmental Protection (DEP) shall be notified. There shall, at all times when work is underway on-site, be an individual present who is trained in proper spill control practices.

In the event that hazardous material, gasoline or other petroleum is released, the following procedure should be followed:

1. Immediately contact the following agencies:
   Wayland Fire Department (508) 358-4747
   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.

Where a release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR Part 110, 40 CFR Part 117 or 40 CFR Part 302, occurs during a 24-hour period:

- Provide notice to the National Response Center (NRC) (800–424–8802; in the Washington, DC, metropolitan area call 202–267–2675) in accordance with the requirements of 40 CFR Part 110, 40 CFR Part 117 and 40 CFR Part 302 as soon as site staff have knowledge of the discharge; and

- Within 7 calendar days of knowledge of the release, provide a description of the release, the circumstances leading to the release, and the date of the release. You must also implement measures to prevent the reoccurrence of such releases and to respond to such releases.

Vehicle Fueling and Maintenance – All major equipment/vehicle fueling and maintenance will be performed off-site if practical. When vehicle fueling must occur on-site, the fueling activity will occur in the staging area outside the buffer zone or resource area. Only minor equipment maintenance will occur on-site. All equipment fluids generated from maintenance activities will be disposed of into designated drums stored on spill pallets in accordance with Part 3.1 of the GCP. Absorbent, spill-cleanup materials and spill kits will be available at the combined staging and materials storage area. Drip pans will be placed under all equipment receiving maintenance and vehicles and equipment parked overnight.

3.3 Non-Storm Water Discharges

It is expected that the following non-storm water discharge will occur from the site during the construction period:

- Pavement wash waters (where no spills or leaks of toxic or hazardous material have occurred).
- Discharges from Fire Fighting activities
- Hydrant and water line flushing
- Landscape irrigation
- Vehicle wash
- Water for dust control
- Foundation / footing drains
- Construction dewatering water

4.0 Record Keeping / Updating of Documentation

This document is intended as a living document to be continuously revised and updated based on changing site conditions and the progression of construction. The SWPPP shall be continuously revised to indicate the condition and location of the various Best Management Practices.

Copies of the GCP, signed and certified NOI, and EPA notification of receipt must be included in the SWPPP. This SWPPP plan, the approved drawings made part of this document, inspection reports (made at least weekly), and required logs shall be maintained on site at all times. Inspection reports shall be retained with the SWPPP for at least three years from the date the permit coverage expires or is terminated..

The following inspection reports and logs shall be maintained:

- Inspection Reports
- Corrective Action Log
- SWPPP Amendment Log
- Grading and Stabilization Activities Log

5.0 Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: _____ Title: _____

Signature: _____ Date: _____

Contact information: _____

_____

SWPPP Attachments

- ***NOI and Acknowledgement Letter from EPA/State (Insert once received)***
- ***Inspection Reports***
- ***Corrective Action Log***
- ***Subcontractor Certifications/Agreements***
- ***NPDES Construction General Permit***

Download at: https://www.epa.gov/sites/production/files/2019-06/documents/final_2017_cgp_current_as_of_6-6-2019.pdf

Stormwater Construction Site Inspection Report

General Information			
Project Name	**27 Sherman's Bridge Road**		
	Wayland, MA	**Location**	
Date of Inspection		**Start/End Time**	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Describe present phase of construction			

Type of Inspection:
❑ Regular ❑ Pre-storm event ❑ During storm event ❑ Post-storm event

Weather Information

Has there been a storm event since the last inspection? ❑Yes ❑No
If yes, provide:
Within 24 Hours: _____ inches
Within 72 Hours: _____ inches
Within 7 days: _____ inches

Weather at time of this inspection?
❑ Clear ❑Cloudy ❑ Rain ❑ Sleet ❑ Fog ❑ Snowing ❑ High Winds
❑ Other: Temperature:

Have any discharges occurred since the last inspection? ❑Yes ❑No
If yes, describe:

Are there any discharges at the time of inspection? ❑Yes ❑No
If yes, describe:

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
1	Construction Entrance and Street Sweeping	❑Yes ❑No	❑Yes ❑No	
2	Sediment Basin/Trap (if Applicable)	❑Yes ❑No	❑Yes ❑No	Any Evidence of Overtopping_____ Sediment Depth_____
3	Erosion Barrier	❑Yes ❑No	❑Yes ❑No	Any Evidence of Overtopping_____ Sediment Depth_____
4	Soil Stockpile Protection / Stabilization	❑Yes ❑No	❑Yes ❑No	
5	Designated Construction Material Stockpile Areas	❑Yes ❑No	❑Yes ❑No	

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
6	Catch Basin Inlet Protection	❑Yes ❑No	❑Yes ❑No	Any Evidence of Bypass_____
7	Are all slopes and disturbed areas not actively being worked properly stabilized?	❑Yes ❑No	❑Yes ❑No	
8	Are natural resource areas protected with barriers or similar BMPs?	❑Yes ❑No	❑Yes ❑No	
9	Are discharge points and receiving waters free of any sediment deposits?	❑Yes ❑No	❑Yes ❑No	
10	Is trash/litter from work areas collected and placed in covered dumpsters?	❑Yes ❑No	❑Yes ❑No	
11	Are materials that are potential stormwater contaminants stored inside or under cover?	❑Yes ❑No	❑Yes ❑No	
12	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	❑Yes ❑No	❑Yes ❑No	
13	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	❑Yes ❑No	❑Yes ❑No	
14	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	❑Yes ❑No	❑Yes ❑No	
15	(Other)	❑Yes ❑No	❑Yes ❑No	

Non-Compliance

Describe any incidents of non-compliance not described above:

Additional Comments / Description of Current Site Work

CERTIFICATION STATEMENT

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Print name and title: _____

Signature: _____ **Date:** _____

Corrective Action Log

Project Name:
SWPPP Contact:

Inspection Date	Inspector Name(s)	Description of BMP Deficiency	Corrective Action Needed (including planned date/responsible person)	Date Action Taken/Responsible person

SUBCONTRACTOR CERTIFICATION
STORMWATER POLLUTION PREVENTION PLAN

Project Number: _____

Project Title: _____

Operator(s): _____

As a subcontractor, you are required to comply with the Stormwater Pollution Prevention Plan (SWPPP) for any work that you perform on-site. Any person or group who violates any condition of the SWPPP may be subject to substantial penalties or loss of contract. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP. A copy of the SWPPP is available for your review at the office trailer.

Each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement:

I certify under the penalty of law that I have read and understand the terms and conditions of the SWPPP for the above designated project and agree to follow the BMPs and practices described in the SWPPP.

This certification is hereby signed in reference to the above named project:

Company: _____

Address: _____

Telephone Number: _____

Type of construction service to be provided: _____

_____

_____

Signature: _____

Title: _____

Date: _____