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STORMWATER REPORT

For

"Settler's Glen"

Red Brook Road
E. Wareham, MA 02576

Prepared for

TGCI Emnaca, LLC

1256 Furnace Brook Parkway
Quincy, MA 02169

Prepared by

G.A.F. Engineering, Inc.
266 Main Street
Wareham, MA 02571

February 2, 2021
G.A.F. Job No.: 18-9247

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DRAINAGE NARRATIVE

General Description

This project consists of the construction of ten two-family dwelling units on a 3.6 acre parcel of land. Access to the homes will be from a twenty foot wide paved roadway with a length of seven hundred twenty five feet from Red Brook Road into the property and around the cul-de-sac.

The project has been designed to meet or exceed the requirements of the Massachusetts Stormwater Handbook as well as those listed in the Town of Wareham Rules and Regulations Governing the Subdivision of Land.

The drainage system has been designed to match or reduce stormwater runoff rates and volumes to the adjacent properties and Red Brook Road. A system of catch basins, drain manholes, a sediment forebay, and an infiltration basin have been designed to provide the required pretreatment, infiltration, and water quality volume treatment.

The system was selected in part due to the ease of inspection and maintenance. This report includes provisions for both "Construction Phase Erosion and Sedimentation Controls" and a "Long Term Operation and Maintenance Plan".

There are no wetland resources in the vicinity of this site. Compliance with the regulations provides a presumption that groundwater supplies and adjacent properties are protected from potential negative impacts.

The project proponents will work cooperatively with the Town of Wareham and their engineering consultant to ensure that development of this project is in full compliance with the regulations.

Existing Conditions

The property is rectangular in shape, approximately two hundred forty seven feet wide and six hundred eighty feet deep. The lot is entirely wooded.

The property slopes from a high point with elevation forty eight in the center of the lot adjacent to Red Brook Road to several circular depressions in the middle of the lot bottom elevations of forty three and forty one. Due to the existing ground cover and pervious soils these depressions were assumed to retain any stormwater with no overflow. The southern end of the land includes small watersheds which slope toward adjacent properties. Existing conditions runoff analysis has been set up as follows.

Sub-catchment 1S is the portion of the property which slopes toward Red Brook Road.

Sub-catchment 2S is the portion of the property with discharge to the adjacent lot 1008D along the east property line.

Sub-catchment 3S is at the north end of the lot with discharge to the westerly abutter.

Sub-catchment 4S is a small depression and the surrounding area above the bottom. This area does not generate any outflow.

Sub-catchment 6S is a depression in the southwest corner of the lot with no outflow.

Sub-catchment 7S is at the far southwest corner of the property with discharge to adjacent lot 1007B.

Sub-catchment 8S is on the east side of the property opposite 7S with discharge to the east and Roger Lane.

A Link 1L was created to analyze the total flow to the easterly abutter.

Soils on the property as mapped by the USDA Natural Resources Conservation Service are classified as Carver loamy coarse sand (259B), 3-8 percent slopes, with a Hydrologic Soil Group rating A.

The rainfall volumes used in the program were taken from the information available online using NOAA Atlas 14, Volume 10, Version 3.

Proposed Conditions

The access road for the project, "Halyard Road", is centrally located on the property which provides for six buildings on the east side and five buildings on the west side. The proposed grades on both sides of the road are designed to direct the vast majority of the runoff toward the street and the drainage conveyance system. The grading also serves to minimize any runoff onto the adjacent properties.

The drainage system is comprised of four deep sump hooded catch basins, two drain manholes, a sediment forebay and an infiltration basin. There are fewer drainage sub-catchments under the proposed condition since most of the runoff is directed to the road and conveyed to the forebay and basin.

Sub-catchment 1S is a portion of the lawn area to the side and rear of unit 20 which contributes runoff to Red Brook Road. This area is compared with pre-development area 1S.

Sub-catchment 2S is a long narrow strip of landscaped or lawn area along the east property line. Area 2S is compared with the flow from pre-development Link 1L.

Sub-catchment 3S is the majority of the project which is collected in the catch basins and conveyed to the sediment forebay and infiltration basin.

Pond 1P is the infiltration basin not including the forebay. Only the basin bottom has been utilized for the exfiltration rate calculated at 8.27 inches per hour based on the Rawls rate for HSG A soils. The bottom of the basin is specified with a 2" layer of peastone over the existing sandy soils. This will reduce required maintenance by limiting vegetative growth and preventing compaction of the soils. A crushed stone wick is also specified along the bottom. This feature was not included in the calculations to be conservative with respect to the outflow rate and calculated peak elevations for each storm.

Pond 2P is the sediment forebay. The contours of the forebay were input as a pond so that the volume could be calculated and compared with the required minimum pretreatment volume of 0.10 inches of runoff per acre of impervious surface.

The summary table which follows lists the comparison of peak flow rates and volumes resulting from the construction of the stormwater management system for each design point.

In our opinion the successful development of this project in compliance with the design will not result in any adverse impacts to the environment or adjacent properties with respect to stormwater runoff, and provides compliance with the Massachusetts Stormwater Handbook.

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Drainage Summary

Table 1 – Pre-Development vs. Post-Development to East (1L/2S)

Storm Event	Pre		Post		Pre vs. Post changes	
	Peak Discharge (cfs)	Volume (ac-ft.)	Peak Discharge (cfs)	Volume (ac-ft.)	Peak Discharge (cfs)	Volume (ac-ft.)
2 yr	0	0	0	0	0	0
10 yr	0	0	0	.002	0	.002
25 yr	.01	.006	.02	.005	.01	-.001
100 yr	.05	.026	.08	.010	.03	-.016

Table 2 – Pre-Development vs. Post-Development to West (3S/ 3S→1P)

Storm Event	Pre		Post		Pre vs. Post changes	
	Peak Discharge (cfs)	Volume (ac-ft.)	Peak Discharge (cfs)	Volume (ac-ft.)	Peak Discharge (cfs)	Volume (ac-ft.)
2 yr	0	0	0	0	0	0
10 yr	0	0	0	0	0	0
25 yr	.01	.005	0	0	-.01	-.005
100 yr	.05	.020	0	0	-.05	-.020

Table 3 – Pre-Development vs. Post-Development to Red Brook Road (1S/1S)

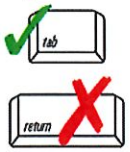
Storm Event	Pre		Post		Pre vs. Post changes	
	Peak Discharge (cfs)	Volume (ac-ft.)	Peak Discharge (cfs)	Volume (ac-ft.)	Peak Discharge (cfs)	Volume (ac-ft.)
2 yr	0	0	0	0	0	0
10 yr	0	0	0	0	0	0
25 yr	0	.001	0	.001	0	0
100 yr	.01	.002	0.02	.002	.01	0

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

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature

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): _____

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.

COMPLIANCE WITH THE STORMWATER MANAGEMENT STANDARDS

The Stormwater Management Standards

1. No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

    - *This project does not include any drainage outfalls. The infiltration basin has been sized to store and infiltrate all storm events up to and including the 100 year storm. An emergency spillway has been specified and at least one foot of freeboard is provided to the basin berm.*

2. Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

    - *The drainage calculations confirm that the proposed project matches or reduces the rate of runoff for all design storms.*

3. Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

    - *Recharge is provided within the infiltration basin. Volume calculations are included in the report and confirm that this standard is met.*

4. Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:

    a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;
    b. Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and

c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

- *This project includes deep sump hooded catch basins and a sediment forebay to provide the required 44% pretreatment prior to infiltration. Subsequent treatment within the infiltration basin meets the required 80% annual TSS removal.*

5. For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

   - *This project is not considered a land use with higher potential pollutant loads.*

6. Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

   - *This project is not located within a Zone II of a public water supply.*

7. A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice

requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

- *This project is considered new development. Full compliance with the standards is provided by the stormwater management system design.*

8. A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

    - *Construction period erosion and sedimentation control measures are included on the design plans and in this report.*

9. A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

    - *A long-term operation and maintenance plan has been listed on the design plans and is included in this report.*

10. All illicit discharges to the stormwater management system are prohibited.

    - *An illicit discharge compliance statement is included in the drainage report.*

Date: 2/2/2021

To whom it may concern:

I hereby certify that no illicit discharge connections to the drainage system are proposed at Settler's Glen in East Wareham, MA nor will any be permitted in the future.

Owner – TGCI Emnaca, LLC

Long Term Operation and Maintenance Plan

Responsible Party: Settler's Glen Homeowners Association
Red Brook Road
East Wareham, MA 02538

The property owner is responsible for the inspection, operation and maintenance of the Stormwater Management System. The director of the facility will be provided with copies of the approved site design and as-built plans to make them aware of the locations of system components. A copy of this Operation and Maintenance (O & M) Plan should also be provided.

System Description: The drainage system consists of a number of Best Management Practices, BMPs, which collect, treat, and infiltrate stormwater runoff from all storm events up to and including the 100 year storm event. Runoff is collected within the roadway using deep sump hooded catch basins. The catch basins are connected to drain manholes which are piped to a sediment forebay on the upstream side of an infiltration basin. The infiltration basin is specified with a peastone bottom. A crushed stone wick will be installed along the center of the bottom of the basin to promote infiltration during winter months.

Street Sweeping: Street sweeping is an effective non-structural source control that will remove sediment from paved surfaces. Street sweeping should be done with a high efficiency vacuum sweeper or regenerative air sweeper. Street sweeping should be done twice per year. Once removed from paved surfaces, the sweepings must be handled and disposed of properly in one of the ways approved by MassDEP. (See Policy #BAW-18-001: Reuse and Disposal of Street Sweepings)

Deep Sump Catch Basins: Deep sump catch basins are underground retention systems designed to remove trash, debris, and coarse sediment from stormwater runoff and serve as temporary spill containment devices for floatables such as oils and grease. Inspect catch basins monthly and clean out at least two times per year at the end of the foliage and snow removal seasons. Sediment must also be removed whenever the depth of the deposits is greater than or equal to one-half the distance from the bottom of the structure to the outlet invert. Sediment shall be removed through the use of a vacuum truck. Sediment must be handled and disposed of properly in one of the ways approved by MassDEP. Refer to their policy on the management of catch basin cleanings. If there is evidence that they have been contaminated by a spill or other means, the cleanings must be evaluated in accordance with the MassDEP hazardous waste regulations, 310 CMR 30.00 and handled as hazardous waste.

Sediment Forebays: Sediment forebays are excavated pits, bermed areas designed to slow incoming stormwater runoff and facilitate the gravity separation of suspended solids. Sediment forebays shall be inspected monthly and cleaned out at least four times per year. When mowing

grasses, set the mower blades no lower than three inches. Mow when the height approaches six inches. Check for signs of rilling and gullying and repair as needed. After removing sediment, replace any vegetation damaged during the cleanout by reseeding or resodding. When reseeding, incorporate practices such as hydroseeding with a tackifier, blanket, or similar practice to ensure that no scour occurs in the forebay while the seeds germinate and develop roots.

Infiltration Basins: The basin should be inspected monthly for bare spots and re-seeded if necessary. Any debris, trash, or sediment should be removed. Mowing of the basin will be infrequent, once or twice a year, primarily to prevent the growth of undesirable weeds, trees, and shrubs. Check the emergency outlet spillway for erosion and reset the stone and concrete curb if necessary. Remove any sediment which has entered the basin. Dispose of any sediment in accordance with local, state, and federal guidelines and regulations.

Operation and Maintenance Budget: The estimated annual cost for inspection, mowing, and sediment removal associated with the maintenance of the Stormwater Management System is $2,500.

Reference: For full details on drainage system Construction, Operation and Maintenance refer to the current edition of the Massachusetts Stormwater Handbook.

Construction Period Pollution Prevention and

Erosion & Sedimentation Control Plan

Narrative: This project consists of construction of a 725' dead end residential subdivision road which provides access to ten two-family homes. The roadway construction includes the installation of municipal water, sewer, underground electric, gas, a closed drainage system, and infiltration basin.

Responsible Parties: The site contractor and the owner.

Construction Period Operation / Maintenance Plan:

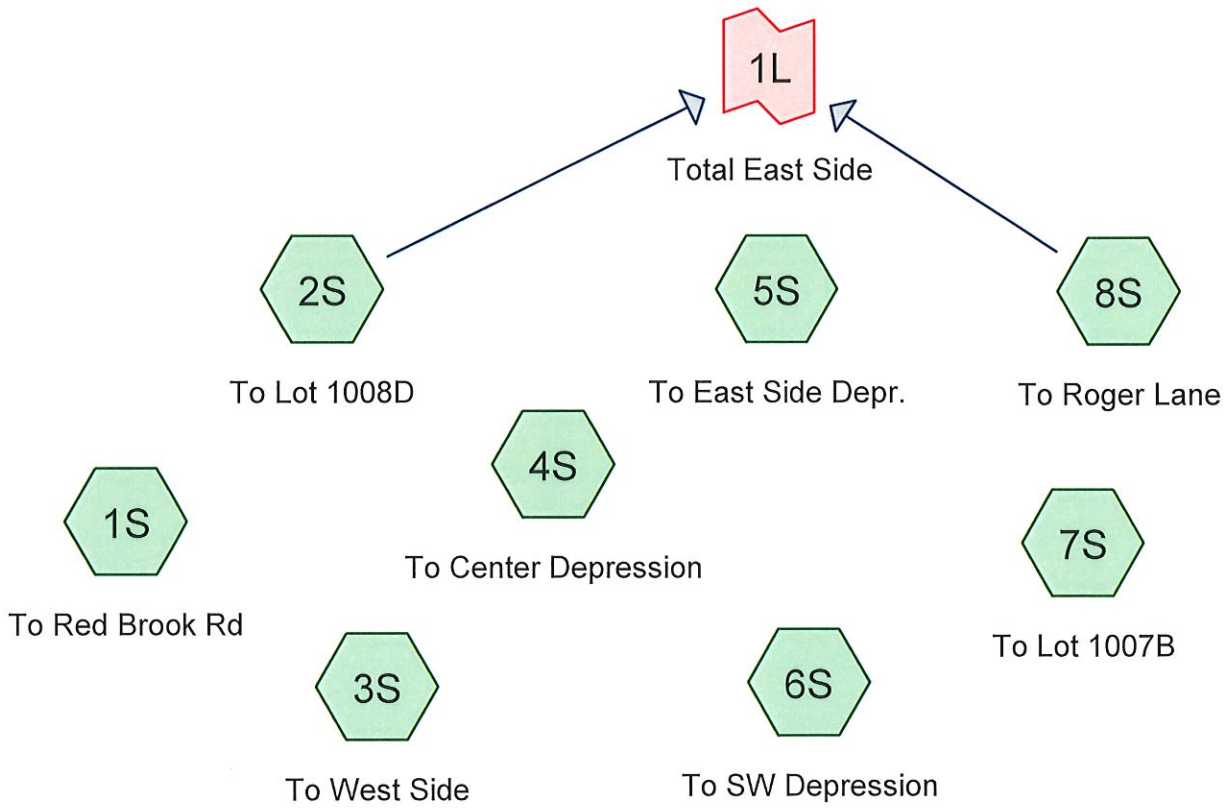
- Provide sufficient refuse containers and empty as needed.
- Inspect erosion controls daily. Repair or replace as needed.
- Police the area for safety hazards and trash on a daily basis.
- Store materials away from drainage and resource areas.
- Provide or receive only the materials which can be installed promptly.
- Inspect vehicles for leaks and repair or replace when necessary.
- Provide dust control with watering.
- Maintain truck runoff pads.
- Provide a contact person for complaints and to receive notification of problems.
- Direct dewatering to adequately sized containment areas.

Construction Sequence:

- Install erosion controls per the plans.
- Install silt sacks in existing catch basins.
- Clear the land, remove stumps, and rough grade.
- Install the underground utilities.
- Install drainage structures and piping.
- Install roadway base material.
- Install base course pavement.
- Install foundations. Extend utilities to homes.
- Construct sidewalk.
- Install landscaping and lighting.
- Loam and seed disturbed areas.
- Install top course pavement.
- Remove erosion controls.

Maintenance Schedule:

- Erosion controls are to be inspected daily and repaired or replaced as needed.
- Trash is to be picked up daily.
- Water shall be used for dust control as needed.
- Silt sacks shall be emptied or replaced when full.
- Vehicles shall be inspected daily for any leaks and repaired or replaced as needed.



Subcat Reach Pond Link

Routing Diagram for 9247 Pre
Prepared by G.A.F. Engineering, Inc., Printed 2/1/2021

Project Notes

Rainfall events imported from "9247 Trial.hcp"

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2 Year Storm	Type III 24-hr		Default	24.00	1	3.44	2
2	10 Year Storm	Type III 24-hr		Default	24.00	1	5.03	2
3	25 Year Storm	Type III 24-hr		Default	24.00	1	6.02	2
4	100 Year Storm	Type III 24-hr		Default	24.00	1	7.55	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.598	30	Woods, Good, HSG A (1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S)
3.598	**30**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
3.598	HSG A	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
3.598		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
3.598	0.000	0.000	0.000	0.000	3.598	Woods, Good	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S
3.598	**0.000**	**0.000**	**0.000**	**0.000**	**3.598**	**TOTAL AREA**	

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Red Brook Rd Runoff Area=3,600 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 2S: To Lot 1008D Runoff Area=28,485 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=198' Tc=9.6 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 3S: To West Side Runoff Area=33,615 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=195' Tc=11.1 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 4S: To Center Depression Runoff Area=12,150 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=114' Tc=11.8 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 5S: To East Side Depr. Runoff Area=25,740 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=140' Tc=20.0 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 6S: To SW Depression Runoff Area=32,000 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=115' Tc=15.1 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 7S: To Lot 1007B Runoff Area=7,528 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=92' Tc=17.6 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 8S: To Roger Lane Runoff Area=13,590 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=100' Tc=19.7 min CN=30 Runoff=0.00 cfs 0.000 af

Link 1L: Total East Side Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 3.598 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.00"
100.00% Pervious = 3.598 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: To Red Brook Rd

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
3,600	30	Woods, Good, HSG A
3,600		100.00% Pervious Area

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

Summary for Subcatchment 2S: To Lot 1008D

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
28,485	30	Woods, Good, HSG A
28,485		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0460	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
1.1	148	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.6	198	Total			

Summary for Subcatchment 3S: To West Side

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
33,615	30	Woods, Good, HSG A
33,615		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.7	145	0.0470	3.49		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.1	195	Total			

Summary for Subcatchment 4S: To Center Depression

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
12,150	30	Woods, Good, HSG A
12,150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.0220	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.3	64	0.0480	3.53		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.8	114	Total			

Summary for Subcatchment 5S: To East Side Depr.

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
25,740	30	Woods, Good, HSG A
25,740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	50	0.0060	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.7	90	0.0160	2.04		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
20.0	140	Total			

Summary for Subcatchment 6S: To SW Depression

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
32,000	30	Woods, Good, HSG A
32,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	50	0.0120	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.5	65	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.1	115	Total			

Summary for Subcatchment 7S: To Lot 1007B

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
7,528	30	Woods, Good, HSG A
7,528		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	50	0.0080	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.4	42	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
17.6	92	Total			

Summary for Subcatchment 8S: To Roger Lane

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
13,590	30	Woods, Good, HSG A
13,590		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	50	0.0060	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.4	50	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
19.7	100	Total			

Summary for Link 1L: Total East Side

Inflow Area = 0.966 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2 Year Storm event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

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

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Red Brook Rd Runoff Area=3,600 sf 0.00% Impervious Runoff Depth=0.01"
Tc=6.0 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 2S: To Lot 1008D Runoff Area=28,485 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=198' Tc=9.6 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 3S: To West Side Runoff Area=33,615 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=195' Tc=11.1 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 4S: To Center Depression Runoff Area=12,150 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=114' Tc=11.8 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 5S: To East Side Depr. Runoff Area=25,740 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=140' Tc=20.0 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 6S: To SW Depression Runoff Area=32,000 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=115' Tc=15.1 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 7S: To Lot 1007B Runoff Area=7,528 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=92' Tc=17.6 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment 8S: To Roger Lane Runoff Area=13,590 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=100' Tc=19.7 min CN=30 Runoff=0.00 cfs 0.000 af

Link 1L: Total East Side Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 3.598 ac Runoff Volume = 0.002 af Average Runoff Depth = 0.01"
100.00% Pervious = 3.598 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: To Red Brook Rd

Runoff = 0.00 cfs @ 23.74 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
3,600	30	Woods, Good, HSG A
3,600		100.00% Pervious Area

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

Summary for Subcatchment 2S: To Lot 1008D

Runoff = 0.00 cfs @ 23.82 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
28,485	30	Woods, Good, HSG A
28,485		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0460	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
1.1	148	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.6	198	Total			

Summary for Subcatchment 3S: To West Side

Runoff = 0.00 cfs @ 23.79 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
33,615	30	Woods, Good, HSG A
33,615		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.7	145	0.0470	3.49		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.1	195	Total			

Summary for Subcatchment 4S: To Center Depression

Runoff = 0.00 cfs @ 23.85 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
12,150	30	Woods, Good, HSG A
12,150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.0220	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.3	64	0.0480	3.53		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.8	114	Total			

Summary for Subcatchment 5S: To East Side Depr.

Runoff = 0.00 cfs @ 23.98 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
25,740	30	Woods, Good, HSG A
25,740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	50	0.0060	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.7	90	0.0160	2.04		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
20.0	140	Total			

Summary for Subcatchment 6S: To SW Depression

Runoff = 0.00 cfs @ 23.84 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
32,000	30	Woods, Good, HSG A
32,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	50	0.0120	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.5	65	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.1	115	Total			

Summary for Subcatchment 7S: To Lot 1007B

Runoff = 0.00 cfs @ 23.88 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
7,528	30	Woods, Good, HSG A
7,528		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	50	0.0080	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.4	42	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
17.6	92	Total			

Summary for Subcatchment 8S: To Roger Lane

Runoff = 0.00 cfs @ 23.97 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
13,590	30	Woods, Good, HSG A
13,590		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	50	0.0060	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.4	50	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
19.7	100	Total			

Summary for Link 1L: Total East Side

Inflow Area = 0.966 ac, 0.00% Impervious, Inflow Depth = 0.01" for 10 Year Storm event
Inflow = 0.00 cfs @ 23.84 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 23.84 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

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

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Red Brook Rd Runoff Area=3,600 sf 0.00% Impervious Runoff Depth=0.07"
Tc=6.0 min CN=30 Runoff=0.00 cfs 0.001 af

Subcatchment 2S: To Lot 1008D Runoff Area=28,485 sf 0.00% Impervious Runoff Depth=0.07"
Flow Length=198' Tc=9.6 min CN=30 Runoff=0.01 cfs 0.004 af

Subcatchment 3S: To West Side Runoff Area=33,615 sf 0.00% Impervious Runoff Depth=0.07"
Flow Length=195' Tc=11.1 min CN=30 Runoff=0.01 cfs 0.005 af

Subcatchment 4S: To Center Depression Runoff Area=12,150 sf 0.00% Impervious Runoff Depth=0.07"
Flow Length=114' Tc=11.8 min CN=30 Runoff=0.00 cfs 0.002 af

Subcatchment 5S: To East Side Depr. Runoff Area=25,740 sf 0.00% Impervious Runoff Depth=0.07"
Flow Length=140' Tc=20.0 min CN=30 Runoff=0.01 cfs 0.004 af

Subcatchment 6S: To SW Depression Runoff Area=32,000 sf 0.00% Impervious Runoff Depth=0.07"
Flow Length=115' Tc=15.1 min CN=30 Runoff=0.01 cfs 0.005 af

Subcatchment 7S: To Lot 1007B Runoff Area=7,528 sf 0.00% Impervious Runoff Depth=0.07"
Flow Length=92' Tc=17.6 min CN=30 Runoff=0.00 cfs 0.001 af

Subcatchment 8S: To Roger Lane Runoff Area=13,590 sf 0.00% Impervious Runoff Depth=0.07"
Flow Length=100' Tc=19.7 min CN=30 Runoff=0.00 cfs 0.002 af

Link 1L: Total East Side Inflow=0.01 cfs 0.006 af
Primary=0.01 cfs 0.006 af

Total Runoff Area = 3.598 ac Runoff Volume = 0.022 af Average Runoff Depth = 0.07"
100.00% Pervious = 3.598 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: To Red Brook Rd

Runoff = 0.00 cfs @ 15.46 hrs, Volume= 0.001 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
3,600	30	Woods, Good, HSG A
3,600		100.00% Pervious Area

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

Summary for Subcatchment 2S: To Lot 1008D

Runoff = 0.01 cfs @ 15.52 hrs, Volume= 0.004 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
28,485	30	Woods, Good, HSG A
28,485		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0460	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
1.1	148	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.6	198	Total			

Summary for Subcatchment 3S: To West Side

Runoff = 0.01 cfs @ 15.55 hrs, Volume= 0.005 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
33,615	30	Woods, Good, HSG A
33,615		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.7	145	0.0470	3.49		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.1	195	Total			

Summary for Subcatchment 4S: To Center Depression

Runoff = 0.00 cfs @ 15.56 hrs, Volume= 0.002 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
12,150	30	Woods, Good, HSG A
12,150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.0220	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.3	64	0.0480	3.53		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.8	114	Total			

Summary for Subcatchment 5S: To East Side Depr.

Runoff = 0.01 cfs @ 15.71 hrs, Volume= 0.004 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
25,740	30	Woods, Good, HSG A
25,740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	50	0.0060	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.7	90	0.0160	2.04		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
20.0	140	Total			

Summary for Subcatchment 6S: To SW Depression

Runoff = 0.01 cfs @ 15.62 hrs, Volume= 0.005 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
32,000	30	Woods, Good, HSG A
32,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	50	0.0120	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.5	65	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.1	115	Total			

Summary for Subcatchment 7S: To Lot 1007B

Runoff = 0.00 cfs @ 15.66 hrs, Volume= 0.001 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
7,528	30	Woods, Good, HSG A
7,528		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	50	0.0080	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.4	42	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
17.6	92	Total			

Summary for Subcatchment 8S: To Roger Lane

Runoff = 0.00 cfs @ 15.69 hrs, Volume= 0.002 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
13,590	30	Woods, Good, HSG A
13,590		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	50	0.0060	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.4	50	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
19.7	100	Total			

Summary for Link 1L: Total East Side

Inflow Area = 0.966 ac, 0.00% Impervious, Inflow Depth = 0.07" for 25 Year Storm event
Inflow = 0.01 cfs @ 15.56 hrs, Volume= 0.006 af
Primary = 0.01 cfs @ 15.56 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

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

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Red Brook Rd Runoff Area=3,600 sf 0.00% Impervious Runoff Depth=0.32"
Tc=6.0 min CN=30 Runoff=0.01 cfs 0.002 af

Subcatchment 2S: To Lot 1008D Runoff Area=28,485 sf 0.00% Impervious Runoff Depth=0.32"
Flow Length=198' Tc=9.6 min CN=30 Runoff=0.04 cfs 0.017 af

Subcatchment 3S: To West Side Runoff Area=33,615 sf 0.00% Impervious Runoff Depth=0.32"
Flow Length=195' Tc=11.1 min CN=30 Runoff=0.05 cfs 0.020 af

Subcatchment 4S: To Center Depression Runoff Area=12,150 sf 0.00% Impervious Runoff Depth=0.32"
Flow Length=114' Tc=11.8 min CN=30 Runoff=0.02 cfs 0.007 af

Subcatchment 5S: To East Side Depr. Runoff Area=25,740 sf 0.00% Impervious Runoff Depth=0.32"
Flow Length=140' Tc=20.0 min CN=30 Runoff=0.03 cfs 0.016 af

Subcatchment 6S: To SW Depression Runoff Area=32,000 sf 0.00% Impervious Runoff Depth=0.32"
Flow Length=115' Tc=15.1 min CN=30 Runoff=0.04 cfs 0.019 af

Subcatchment 7S: To Lot 1007B Runoff Area=7,528 sf 0.00% Impervious Runoff Depth=0.32"
Flow Length=92' Tc=17.6 min CN=30 Runoff=0.01 cfs 0.005 af

Subcatchment 8S: To Roger Lane Runoff Area=13,590 sf 0.00% Impervious Runoff Depth=0.32"
Flow Length=100' Tc=19.7 min CN=30 Runoff=0.02 cfs 0.008 af

Link 1L: Total East Side Inflow=0.05 cfs 0.026 af
Primary=0.05 cfs 0.026 af

Total Runoff Area = 3.598 ac Runoff Volume = 0.095 af Average Runoff Depth = 0.32"
100.00% Pervious = 3.598 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: To Red Brook Rd

Runoff = 0.01 cfs @ 12.46 hrs, Volume= 0.002 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=7.55"

Area (sf)	CN	Description
3,600	30	Woods, Good, HSG A
3,600		100.00% Pervious Area

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

Summary for Subcatchment 2S: To Lot 1008D

Runoff = 0.04 cfs @ 12.52 hrs, Volume= 0.017 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=7.55"

Area (sf)	CN	Description
28,485	30	Woods, Good, HSG A
28,485		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0460	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
1.1	148	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.6	198	Total			

Summary for Subcatchment 3S: To West Side

Runoff = 0.05 cfs @ 12.54 hrs, Volume= 0.020 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=7.55"

Area (sf)	CN	Description
33,615	30	Woods, Good, HSG A
33,615		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.4	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.7	145	0.0470	3.49		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.1	195	Total			

Summary for Subcatchment 4S: To Center Depression

Runoff = 0.02 cfs @ 12.55 hrs, Volume= 0.007 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=7.55"

Area (sf)	CN	Description
12,150	30	Woods, Good, HSG A
12,150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.0220	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.3	64	0.0480	3.53		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.8	114	Total			

Summary for Subcatchment 5S: To East Side Depr.

Runoff = 0.03 cfs @ 12.73 hrs, Volume= 0.016 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=7.55"

Area (sf)	CN	Description
25,740	30	Woods, Good, HSG A
25,740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	50	0.0060	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.7	90	0.0160	2.04		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
20.0	140	Total			

Summary for Subcatchment 6S: To SW Depression

Runoff = 0.04 cfs @ 12.61 hrs, Volume= 0.019 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=7.55"

Area (sf)	CN	Description
32,000	30	Woods, Good, HSG A
32,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	50	0.0120	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.5	65	0.0200	2.28		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
15.1	115	Total			

Summary for Subcatchment 7S: To Lot 1007B

Runoff = 0.01 cfs @ 12.66 hrs, Volume= 0.005 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=7.55"

Area (sf)	CN	Description
7,528	30	Woods, Good, HSG A
7,528		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.2	50	0.0080	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.4	42	0.0120	1.76		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
17.6	92	Total			

Summary for Subcatchment 8S: To Roger Lane

Runoff = 0.02 cfs @ 12.72 hrs, Volume= 0.008 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=7.55"

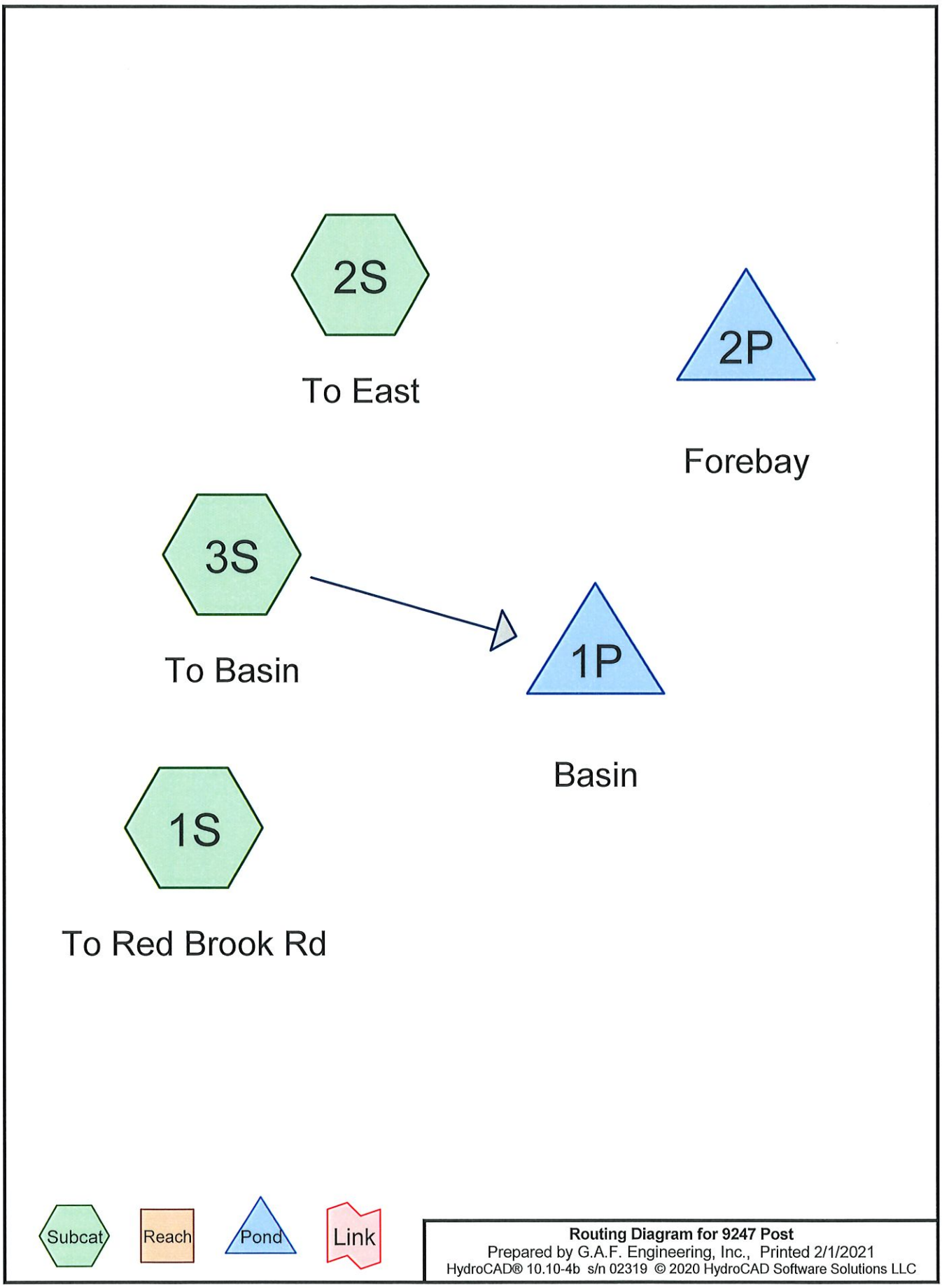
Area (sf)	CN	Description
13,590	30	Woods, Good, HSG A
13,590		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.3	50	0.0060	0.04		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
0.4	50	0.0180	2.16		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
19.7	100	Total			

Summary for Link 1L: Total East Side

Inflow Area = 0.966 ac, 0.00% Impervious, Inflow Depth = 0.32" for 100 Year Storm event
Inflow = 0.05 cfs @ 12.56 hrs, Volume= 0.026 af
Primary = 0.05 cfs @ 12.56 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min

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



Routing Diagram for 9247 Post
Prepared by G.A.F. Engineering, Inc., Printed 2/1/2021

Project Notes

Rainfall events imported from "9247 Pre.hcp"

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2 Year Storm	Type III 24-hr		Default	24.00	1	3.44	2
2	10 Year Storm	Type III 24-hr		Default	24.00	1	5.03	2
3	25 Year Storm	Type III 24-hr		Default	24.00	1	6.02	2
4	100 Year Storm	Type III 24-hr		Default	24.00	1	7.55	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.035	39	>75% Grass cover, Good, HSG A (1S, 2S, 3S)
0.698	98	Paved Road, driveways, sidewalks (3S)
0.865	98	Roofs, decks, bulkheads, stairs (3S)
3.598	**65**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.035	HSG A	1S, 2S, 3S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
1.562	Other	3S
3.598		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatch Numbers
2.035	0.000	0.000	0.000	0.000	2.035	>75% Grass cover, Good	
0.000	0.000	0.000	0.000	0.698	0.698	Paved Road, driveways, sidewalks	
0.000	0.000	0.000	0.000	0.865	0.865	Roofs, decks, bulkheads, stairs	
2.035	**0.000**	**0.000**	**0.000**	**1.562**	**3.598**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	3S	0.00	0.00	355.0	0.0050	0.012	0.0	12.0	0.0

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Red Brook Rd Runoff Area=1,140 sf 0.00% Impervious Runoff Depth=0.01"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment 2S: To East Runoff Area=5,391 sf 0.00% Impervious Runoff Depth=0.01"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment 3S: To Basin Runoff Area=150,177 sf 45.32% Impervious Runoff Depth=0.77"
Flow Length=539' Tc=11.7 min CN=66 Runoff=2.16 cfs 0.221 af

Pond 1P: Basin Peak Elev=36.73' Storage=2,154 cf Inflow=2.16 cfs 0.221 af
Outflow=0.60 cfs 0.221 af

Pond 2P: Forebay Peak Elev=0.00' Storage=0 cf

Total Runoff Area = 3.598 ac Runoff Volume = 0.221 af Average Runoff Depth = 0.74"
56.57% Pervious = 2.035 ac 43.43% Impervious = 1.562 ac

Summary for Subcatchment 1S: To Red Brook Rd

Runoff = 0.00 cfs @ 23.06 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
1,140	39	>75% Grass cover, Good, HSG A
1,140		100.00% Pervious Area

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

Summary for Subcatchment 2S: To East

Runoff = 0.00 cfs @ 23.06 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.44"

Area (sf)	CN	Description
5,391	39	>75% Grass cover, Good, HSG A
5,391		100.00% Pervious Area

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

Summary for Subcatchment 3S: To Basin

Runoff = 2.16 cfs @ 12.18 hrs, Volume= 0.221 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Storm Rainfall=3.44"

	Area (sf)	CN	Description
*	30,400	98	Paved Road, driveways, sidewalks
*	37,660	98	Roofs, decks, bulkheads, stairs
	82,117	39	>75% Grass cover, Good, HSG A
	150,177	66	Weighted Average
	82,117		54.68% Pervious Area
	68,060		45.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	50	0.0060	0.09		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.44"
0.3	40	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	94	0.0075	1.76		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.7	355	0.0050	3.47	2.73	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
11.7	539	Total			

Summary for Pond 1P: Basin

Inflow Area = 3.448 ac, 45.32% Impervious, Inflow Depth = 0.77" for 2 Year Storm event
Inflow = 2.16 cfs @ 12.18 hrs, Volume= 0.221 af
Outflow = 0.60 cfs @ 12.71 hrs, Volume= 0.221 af, Atten= 72%, Lag= 31.5 min
Discarded = 0.60 cfs @ 12.71 hrs, Volume= 0.221 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 36.73' @ 12.71 hrs Surf.Area= 3,156 sf Storage= 2,154 cf

Plug-Flow detention time= 32.1 min calculated for 0.221 af (100% of inflow)
Center-of-Mass det. time= 32.0 min (921.9 - 890.0)

Volume	Invert	Avail.Storage	Storage Description
#1	34.00'	132 cf	**3.00'W x 55.00'L x 2.00'H Prismatoid** 330 cf Overall x 40.0% Voids
#2	36.00'	42,066 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		42,198 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.00	2,540	0	0
37.00	3,156	2,848	2,848
38.00	4,704	3,930	6,778
39.00	5,580	5,142	11,920
40.00	6,504	6,042	17,962
41.00	7,508	7,006	24,968
42.00	8,524	8,016	32,984
43.00	9,640	9,082	42,066

Device	Routing	Invert	Outlet Devices
#1	Discarded	34.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.60 cfs @ 12.71 hrs HW=36.73' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.60 cfs)

Summary for Pond 2P: Forebay

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	1,350 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.00	460	0	0
37.00	700	580	580
38.00	840	770	1,350

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Red Brook Rd Runoff Area=1,140 sf 0.00% Impervious Runoff Depth=0.21"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment 2S: To East Runoff Area=5,391 sf 0.00% Impervious Runoff Depth=0.21"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.002 af

Subcatchment 3S: To Basin Runoff Area=150,177 sf 45.32% Impervious Runoff Depth=1.75"
Flow Length=539' Tc=11.7 min CN=66 Runoff=5.59 cfs 0.502 af

Pond 1P: Basin Peak Elev=38.10' Storage=7,406 cf Inflow=5.59 cfs 0.502 af
Outflow=0.95 cfs 0.502 af

Pond 2P: Forebay Peak Elev=0.00' Storage=0 cf

Total Runoff Area = 3.598 ac Runoff Volume = 0.505 af Average Runoff Depth = 1.68"
56.57% Pervious = 2.035 ac 43.43% Impervious = 1.562 ac

Summary for Subcatchment 1S: To Red Brook Rd

Runoff = 0.00 cfs @ 12.47 hrs, Volume= 0.000 af, Depth= 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
1,140	39	>75% Grass cover, Good, HSG A
1,140		100.00% Pervious Area

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

Summary for Subcatchment 2S: To East

Runoff = 0.00 cfs @ 12.47 hrs, Volume= 0.002 af, Depth= 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=5.03"

Area (sf)	CN	Description
5,391	39	>75% Grass cover, Good, HSG A
5,391		100.00% Pervious Area

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

Summary for Subcatchment 3S: To Basin

[47] Hint: Peak is 205% of capacity of segment #4

Runoff = 5.59 cfs @ 12.17 hrs, Volume= 0.502 af, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Storm Rainfall=5.03"

	Area (sf)	CN	Description
*	30,400	98	Paved Road, driveways, sidewalks
*	37,660	98	Roofs, decks, bulkheads, stairs
	82,117	39	>75% Grass cover, Good, HSG A
	150,177	66	Weighted Average
	82,117		54.68% Pervious Area
	68,060		45.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	50	0.0060	0.09		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.44"
0.3	40	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	94	0.0075	1.76		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.7	355	0.0050	3.47	2.73	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
11.7	539	Total			

Summary for Pond 1P: Basin

Inflow Area = 3.448 ac, 45.32% Impervious, Inflow Depth = 1.75" for 10 Year Storm event
Inflow = 5.59 cfs @ 12.17 hrs, Volume= 0.502 af
Outflow = 0.95 cfs @ 12.93 hrs, Volume= 0.502 af, Atten= 83%, Lag= 45.6 min
Discarded = 0.95 cfs @ 12.93 hrs, Volume= 0.502 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 38.10' @ 12.93 hrs Surf.Area= 4,961 sf Storage= 7,406 cf

Plug-Flow detention time= 79.7 min calculated for 0.502 af (100% of inflow)
Center-of-Mass det. time= 79.9 min (942.9 - 863.1)

Volume	Invert	Avail.Storage	Storage Description
#1	34.00'	132 cf	**3.00'W x 55.00'L x 2.00'H Prismatoid**
			330 cf Overall x 40.0% Voids
#2	36.00'	42,066 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		42,198 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.00	2,540	0	0
37.00	3,156	2,848	2,848
38.00	4,704	3,930	6,778
39.00	5,580	5,142	11,920
40.00	6,504	6,042	17,962
41.00	7,508	7,006	24,968
42.00	8,524	8,016	32,984
43.00	9,640	9,082	42,066

Device	Routing	Invert	Outlet Devices
#1	Discarded	34.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=0.95 cfs @ 12.93 hrs HW=38.10' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.95 cfs)

Summary for Pond 2P: Forebay

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	1,350 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.00	460	0	0
37.00	700	580	580
38.00	840	770	1,350

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Red Brook Rd Runoff Area=1,140 sf 0.00% Impervious Runoff Depth=0.45"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.001 af

Subcatchment 2S: To East Runoff Area=5,391 sf 0.00% Impervious Runoff Depth=0.45"
Tc=6.0 min CN=39 Runoff=0.02 cfs 0.005 af

Subcatchment 3S: To Basin Runoff Area=150,177 sf 45.32% Impervious Runoff Depth=2.46"
Flow Length=539' Tc=11.7 min CN=66 Runoff=8.05 cfs 0.705 af

Pond 1P: Basin Peak Elev=38.94' Storage=11,693 cf Inflow=8.05 cfs 0.705 af
Outflow=1.09 cfs 0.705 af

Pond 2P: Forebay Peak Elev=0.00' Storage=0 cf

Total Runoff Area = 3.598 ac Runoff Volume = 0.711 af Average Runoff Depth = 2.37"
56.57% Pervious = 2.035 ac 43.43% Impervious = 1.562 ac

Summary for Subcatchment 1S: To Red Brook Rd

Runoff = 0.00 cfs @ 12.34 hrs, Volume= 0.001 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
1,140	39	>75% Grass cover, Good, HSG A
1,140		100.00% Pervious Area

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

Summary for Subcatchment 2S: To East

Runoff = 0.02 cfs @ 12.34 hrs, Volume= 0.005 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.02"

Area (sf)	CN	Description
5,391	39	>75% Grass cover, Good, HSG A
5,391		100.00% Pervious Area

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

Summary for Subcatchment 3S: To Basin

[47] Hint: Peak is 295% of capacity of segment #4

Runoff = 8.05 cfs @ 12.17 hrs, Volume= 0.705 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Storm Rainfall=6.02"

	Area (sf)	CN	Description
*	30,400	98	Paved Road, driveways, sidewalks
*	37,660	98	Roofs, decks, bulkheads, stairs
	82,117	39	>75% Grass cover, Good, HSG A
	150,177	66	Weighted Average
	82,117		54.68% Pervious Area
	68,060		45.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	50	0.0060	0.09		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.44"
0.3	40	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	94	0.0075	1.76		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.7	355	0.0050	3.47	2.73	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
11.7	539	Total			

Summary for Pond 1P: Basin

Inflow Area = 3.448 ac, 45.32% Impervious, Inflow Depth = 2.46" for 25 Year Storm event
Inflow = 8.05 cfs @ 12.17 hrs, Volume= 0.705 af
Outflow = 1.09 cfs @ 13.09 hrs, Volume= 0.705 af, Atten= 86%, Lag= 55.5 min
Discarded = 1.09 cfs @ 13.09 hrs, Volume= 0.705 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 38.94' @ 13.09 hrs Surf.Area= 5,688 sf Storage= 11,693 cf

Plug-Flow detention time= 112.0 min calculated for 0.705 af (100% of inflow)
Center-of-Mass det. time= 112.0 min (964.9 - 852.9)

Volume	Invert	Avail.Storage	Storage Description
#1	34.00'	132 cf	**3.00'W x 55.00'L x 2.00'H Prismatoid**
			330 cf Overall x 40.0% Voids
#2	36.00'	42,066 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		42,198 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.00	2,540	0	0
37.00	3,156	2,848	2,848
38.00	4,704	3,930	6,778
39.00	5,580	5,142	11,920
40.00	6,504	6,042	17,962
41.00	7,508	7,006	24,968
42.00	8,524	8,016	32,984
43.00	9,640	9,082	42,066

Device	Routing	Invert	Outlet Devices
#1	Discarded	34.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=1.09 cfs @ 13.09 hrs HW=38.94' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 1.09 cfs)

Summary for Pond 2P: Forebay

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	1,350 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.00	460	0	0
37.00	700	580	580
38.00	840	770	1,350

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Red Brook Rd Runoff Area=1,140 sf 0.00% Impervious Runoff Depth=0.97"
Tc=6.0 min CN=39 Runoff=0.02 cfs 0.002 af

Subcatchment 2S: To East Runoff Area=5,391 sf 0.00% Impervious Runoff Depth=0.97"
Tc=6.0 min CN=39 Runoff=0.08 cfs 0.010 af

Subcatchment 3S: To Basin Runoff Area=150,177 sf 45.32% Impervious Runoff Depth=3.64"
Flow Length=539' Tc=11.7 min CN=66 Runoff=12.14 cfs 1.046 af

Pond 1P: Basin Peak Elev=40.20' Storage=19,415 cf Inflow=12.14 cfs 1.046 af
Outflow=1.32 cfs 1.047 af

Pond 2P: Forebay Peak Elev=0.00' Storage=0 cf

Total Runoff Area = 3.598 ac Runoff Volume = 1.059 af Average Runoff Depth = 3.53"
56.57% Pervious = 2.035 ac 43.43% Impervious = 1.562 ac

Summary for Subcatchment 1S: To Red Brook Rd

Runoff = 0.02 cfs @ 12.13 hrs, Volume= 0.002 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=7.55"

Area (sf)	CN	Description
1,140	39	>75% Grass cover, Good, HSG A
1,140		100.00% Pervious Area

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

Summary for Subcatchment 2S: To East

Runoff = 0.08 cfs @ 12.13 hrs, Volume= 0.010 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=7.55"

Area (sf)	CN	Description
5,391	39	>75% Grass cover, Good, HSG A
5,391		100.00% Pervious Area

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

Summary for Subcatchment 3S: To Basin

[47] Hint: Peak is 445% of capacity of segment #4

Runoff = 12.14 cfs @ 12.16 hrs, Volume= 1.046 af, Depth= 3.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Storm Rainfall=7.55"

	Area (sf)	CN	Description
*	30,400	98	Paved Road, driveways, sidewalks
*	37,660	98	Roofs, decks, bulkheads, stairs
	82,117	39	>75% Grass cover, Good, HSG A
	150,177	66	Weighted Average
	82,117		54.68% Pervious Area
	68,060		45.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	50	0.0060	0.09		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.44"
0.3	40	0.0150	1.97		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.9	94	0.0075	1.76		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.7	355	0.0050	3.47	2.73	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
11.7	539	Total			

Summary for Pond 1P: Basin

Inflow Area = 3.448 ac, 45.32% Impervious, Inflow Depth = 3.64" for 100 Year Storm event
Inflow = 12.14 cfs @ 12.16 hrs, Volume= 1.046 af
Outflow = 1.32 cfs @ 13.36 hrs, Volume= 1.047 af, Atten= 89%, Lag= 71.9 min
Discarded = 1.32 cfs @ 13.36 hrs, Volume= 1.047 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 40.20' @ 13.36 hrs Surf.Area= 6,870 sf Storage= 19,415 cf

Plug-Flow detention time= 162.7 min calculated for 1.046 af (100% of inflow)
Center-of-Mass det. time= 162.8 min (1,004.1 - 841.3)

Volume	Invert	Avail.Storage	Storage Description
#1	34.00'	132 cf	**3.00'W x 55.00'L x 2.00'H Prismatoid** 330 cf Overall x 40.0% Voids
#2	36.00'	42,066 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		42,198 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.00	2,540	0	0
37.00	3,156	2,848	2,848
38.00	4,704	3,930	6,778
39.00	5,580	5,142	11,920
40.00	6,504	6,042	17,962
41.00	7,508	7,006	24,968
42.00	8,524	8,016	32,984
43.00	9,640	9,082	42,066

Device	Routing	Invert	Outlet Devices
#1	Discarded	34.00'	**8.270 in/hr Exfiltration over Horizontal area**

Discarded OutFlow Max=1.32 cfs @ 13.36 hrs HW=40.20' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 1.32 cfs)

Summary for Pond 2P: Forebay

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1	36.00'	1,350 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.00	460	0	0
37.00	700	580	580
38.00	840	770	1,350

INSTRUCTIONS:

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

Version 1, Automated: Mar. 4, 2008

Location: Settler's Glen, Red Brook Road, Wareham

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Sediment Forebay	0.25	0.75	0.19	0.56
Infiltration Basin	0.80	0.56	0.45	0.11
	0.00	0.11	0.00	0.11
	0.00	0.11	0.00	0.11

Total TSS Removal = 89%

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

Project: Settler's Glen JN 18-9247

Prepared By: GAF Engineering, Inc.

Date: 2-Feb-21

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

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

1. From MassDEP Stormwater Handbook Vol. 1

Recharge Volume Calculation

Required Recharge Depth = 0.60 inch volume from impervious surfaces (HSG A Soil)

The 1.00 inch water quality volume calculations confirm that the capacity of the infiltration basin exceeds that required volume therefore they also exceed the 0.60 inch required recharge volume.

The system drawdown calculations are as follows. The storage volume input is based on the 100 year volume listed in the HydroCAD calculations.

Recharge System Drawdown time (72 hrs. max.)

$$\text{Time} = \frac{\text{Storage Volume}}{(\text{Rawls Rate})\,(\text{Bottom Area})}$$

Infiltration Basin - Pond 1P:

$$\text{Time} = \frac{19{,}415 \text{ cf}}{(8.27 \text{ inches/hour})(1 \text{ ft}/12 \text{ inches})(2{,}540 \text{ sf})}$$

11.1 hours ≤ 72 hours – OK

Water Quality Volume Calculation

Required Water Quality Depth = 1.00 inch volume from impervious surfaces.

Impervious Area to Infiltration Basin 1P = 68,060 sf

Water Quality Volume = 68,060 sf x 1.00/12 = 5,671.7 cf

Total Storage: Infiltration Basin Pond 1P = 32,984 cf (elev. 42.0)

32,984 cf > 5,671.7 cf OK

Sediment Forebay Sizing Calculations

Minimum Required Volume for pretreatment is 0.10 inch per impervious acre (Handbook)

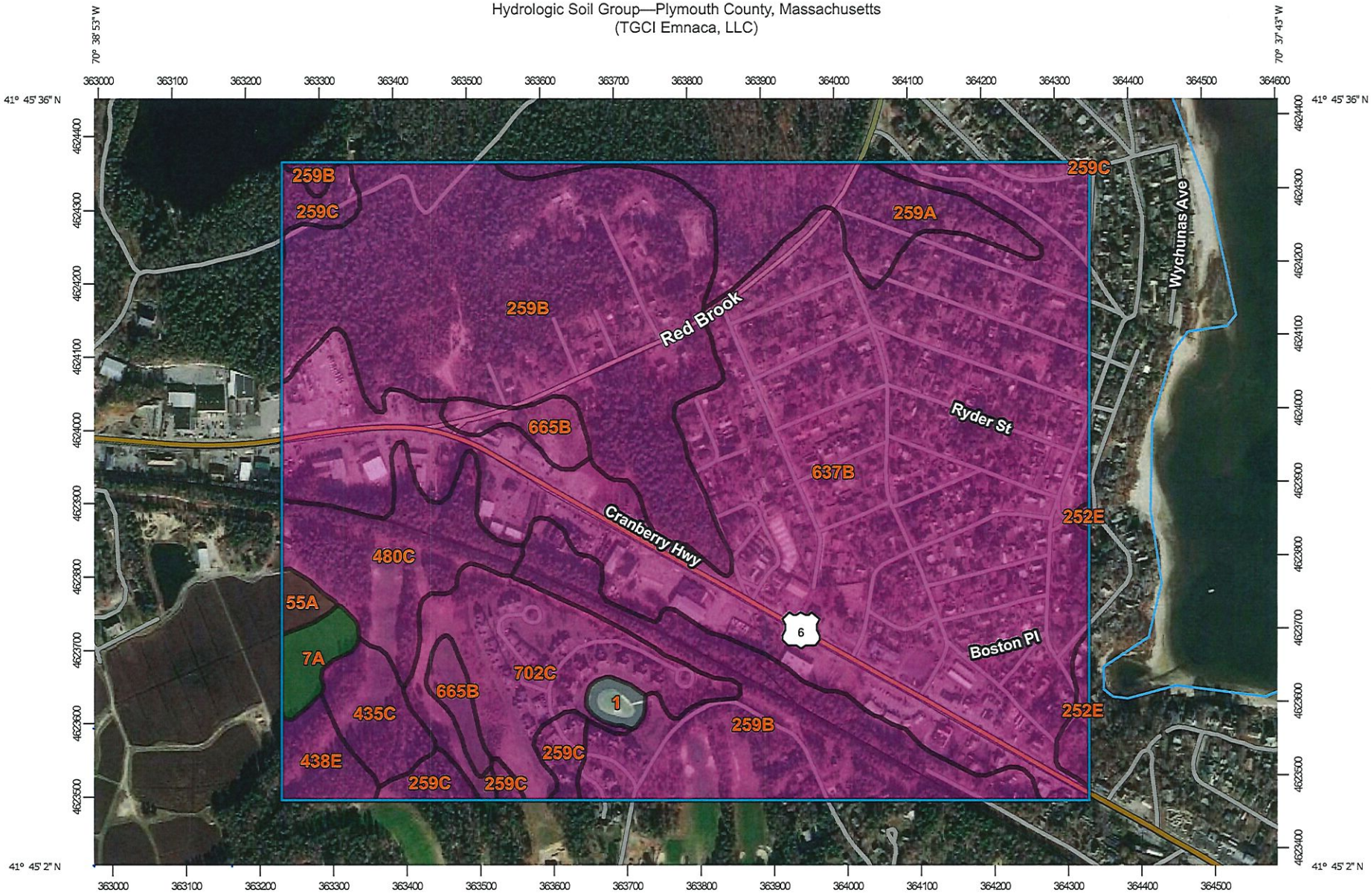
Sub-catchment 3S Impervious Area = 68,060 sf

Required Forebay Volume = 68,060 sf x 0.10"/12 = 567.2 cf

Total Storage in Forebay = 1,350 cf (from HydroCAD)

1,350 cf > 567.2 cf OK

Hydrologic Soil Group—Plymouth County, Massachusetts
(TGCI Emnaca, LLC)



MAP LEGEND

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

Soils

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

Soil Survey Area: Plymouth County, Massachusetts
Survey Area Data: Version 12, Sep 12, 2019

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

Date(s) aerial images were photographed: Jul 10, 2018—Nov 17, 2018

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		1.1	0.4%
7A	Rainberry coarse sand, 0 to 3 percent slopes, sanded surface	A/D	2.3	1.0%
55A	Freetown coarse sand, 0 to 3 percent slopes, sanded surface	B/D	1.0	0.4%
252E	Carver coarse sand, 15 to 35 percent slopes	A	1.4	0.6%
259A	Carver loamy coarse sand, 0 to 3 percent slopes	A	11.5	4.9%
259B	Carver loamy coarse sand, 3 to 8 percent slopes	A	70.0	29.5%
259C	Carver loamy coarse sand, 8 to 15 percent slopes	A	5.0	2.1%
435C	Plymouth loamy coarse sand, 8 to 15 percent slopes	A	4.4	1.9%
438E	Plymouth loamy coarse sand, 15 to 35 percent slopes, extremely bouldery	A	3.1	1.3%
480C	Plymouth - Carver complex, 8 to 15 percent slopes	A	11.2	4.7%
637B	Carver - Urban land complex, 0 to 8 percent slopes	A	106.3	44.9%
665B	Udipsamments, 0 to 8 percent slopes	A	4.3	1.8%
702C	Udipsamments, 8 to 15 percent slopes	A	15.3	6.5%
Totals for Area of Interest			**236.8**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

4/18/00

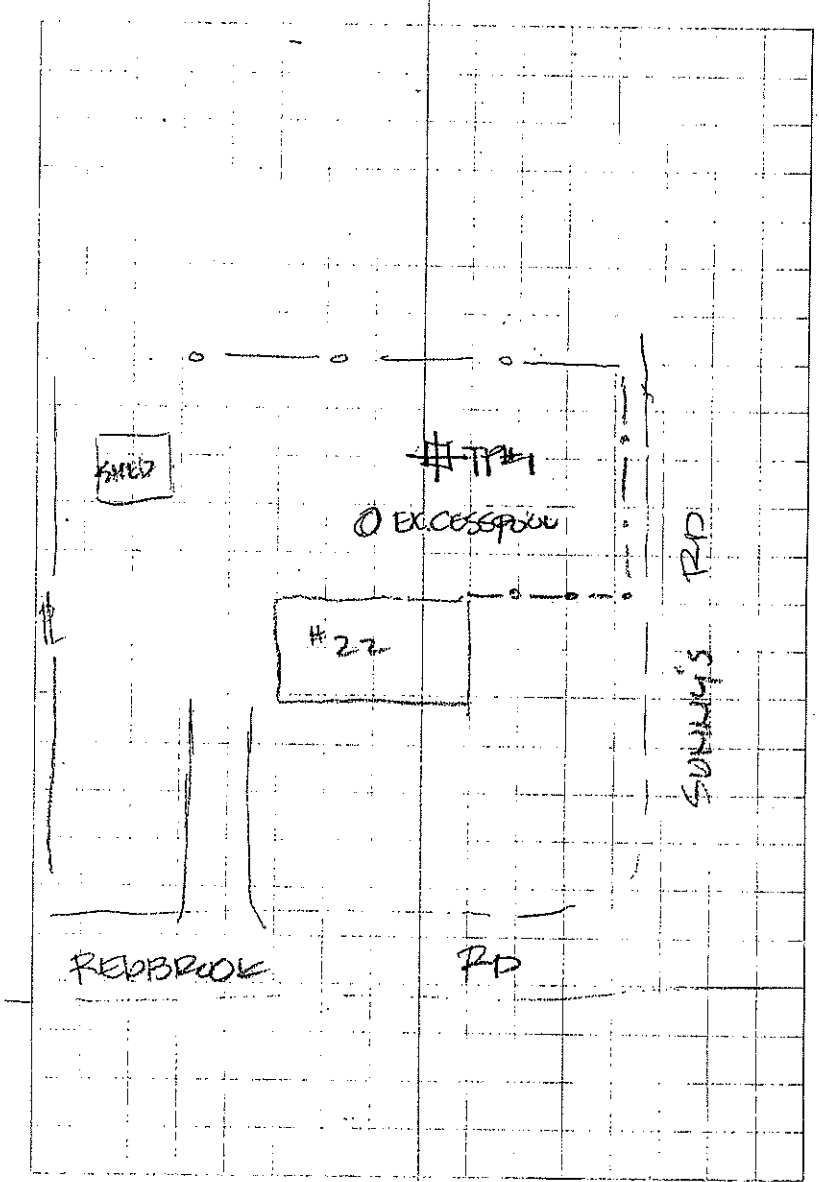
K.F.
PB — ROY WILLIAMS
22 REDBROOK RD
RAIN — WAZELTOWN
INSPECTOR: GLENN MONTEIRO
SOIL EVALUATOR: KEVIN FORSOC

TP#1

DEPTH	HORIZON	TEXTURE	COLOR	DESC.
0"-4"	A	SANDY LOAM	10YR 3/2	FRIABLE
4"-30"	B	LOAMY SAND	10YR 5/6	"
30"-144"	C	MED. SAND	2.5Y 5/6	LOOSE

NO H2O NO MOTTLES

PERC. TP#1 C 48"-66"
START PRESOAK 9:17 END PRESOAK 9:32
TIME @12" 9:32 @9" 9:39 @6" 9:55
9"-6" RATE =



NOAA Atlas 14, Volume 10, Version 3
Location name: Buzzards Bay, Massachusetts, USA*
Latitude: 41.7564°, Longitude: -70.64°
Elevation: 43.99 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.293 (0.238-0.357)	0.363 (0.295-0.443)	0.478 (0.388-0.584)	0.573 (0.462-0.702)	0.705 (0.552-0.894)	0.803 (0.618-1.03)	0.908 (0.681-1.20)	1.03 (0.729-1.37)	1.21 (0.826-1.65)	1.37 (0.910-1.89)
10-min	0.415 (0.338-0.505)	0.515 (0.418-0.627)	0.678 (0.549-0.827)	0.813 (0.655-0.996)	0.999 (0.782-1.27)	1.14 (0.875-1.47)	1.29 (0.964-1.71)	1.46 (1.03-1.94)	1.72 (1.17-2.34)	1.93 (1.29-2.67)
15-min	0.488 (0.397-0.594)	0.605 (0.492-0.738)	0.797 (0.646-0.973)	0.956 (0.771-1.17)	1.18 (0.920-1.49)	1.34 (1.03-1.72)	1.51 (1.13-2.01)	1.72 (1.21-2.29)	2.02 (1.38-2.75)	2.28 (1.52-3.14)
30-min	0.705 (0.573-0.858)	0.872 (0.709-1.06)	1.15 (0.928-1.40)	1.37 (1.11-1.68)	1.69 (1.32-2.14)	1.92 (1.48-2.47)	2.17 (1.63-2.88)	2.46 (1.74-3.28)	2.90 (1.97-3.95)	3.26 (2.17-4.50)
60-min	0.921 (0.750-1.12)	1.14 (0.926-1.39)	1.50 (1.21-1.83)	1.79 (1.44-2.20)	2.20 (1.72-2.79)	2.50 (1.92-3.22)	2.83 (2.12-3.75)	3.21 (2.27-4.27)	3.77 (2.57-5.14)	4.25 (2.83-5.87)
2-hr	1.24 (1.02-1.50)	1.54 (1.26-1.87)	2.03 (1.66-2.46)	2.44 (1.98-2.97)	3.00 (2.37-3.78)	3.41 (2.65-4.37)	3.86 (2.93-5.10)	4.40 (3.13-5.81)	5.21 (3.58-7.04)	5.91 (3.97-8.09)
3-hr	1.47 (1.21-1.77)	1.81 (1.49-2.19)	2.38 (1.95-2.88)	2.85 (2.32-3.46)	3.50 (2.78-4.39)	3.98 (3.10-5.08)	4.50 (3.43-5.92)	5.12 (3.67-6.74)	6.07 (4.19-8.17)	6.88 (4.65-9.38)
6-hr	1.91 (1.58-2.28)	2.33 (1.92-2.79)	3.01 (2.48-3.61)	3.57 (2.93-4.30)	4.35 (3.47-5.42)	4.93 (3.87-6.23)	5.55 (4.25-7.22)	6.29 (4.54-8.20)	7.39 (5.15-9.86)	8.32 (5.68-11.2)
12-hr	2.42 (2.02-2.87)	2.89 (2.40-3.43)	3.65 (3.03-4.35)	4.28 (3.54-5.12)	5.16 (4.14-6.35)	5.81 (4.58-7.26)	6.50 (4.99-8.33)	7.29 (5.31-9.42)	8.42 (5.92-11.1)	9.36 (6.44-12.5)
24-hr	2.91 (2.44-3.43)	3.44 (2.88-4.06)	4.31 (3.60-5.10)	5.03 (4.18-5.97)	6.02 (4.86-7.35)	6.77 (5.36-8.37)	7.55 (5.82-9.56)	8.41 (6.19-10.8)	9.62 (6.83-12.6)	10.6 (7.37-14.1)
2-day	3.35 (2.83-3.92)	3.97 (3.35-4.66)	4.99 (4.20-5.86)	5.84 (4.89-6.88)	7.00 (5.69-8.48)	7.88 (6.29-9.67)	8.79 (6.84-11.0)	9.80 (7.27-12.5)	11.2 (8.04-14.6)	12.4 (8.68-16.3)
3-day	3.68 (3.12-4.29)	4.33 (3.67-5.06)	5.41 (4.57-6.33)	6.30 (5.30-7.40)	7.53 (6.15-9.08)	8.46 (6.78-10.3)	9.42 (7.35-11.8)	10.5 (7.81-13.2)	11.9 (8.61-15.4)	13.1 (9.26-17.2)
4-day	3.97 (3.38-4.62)	4.64 (3.94-5.41)	5.74 (4.86-6.70)	6.65 (5.61-7.79)	7.91 (6.48-9.50)	8.86 (7.12-10.8)	9.84 (7.70-12.2)	10.9 (8.16-13.7)	12.4 (8.95-15.9)	13.6 (9.59-17.7)
7-day	4.73 (4.05-5.48)	5.43 (4.64-6.29)	6.57 (5.60-7.63)	7.52 (6.38-8.75)	8.82 (7.26-10.5)	9.82 (7.93-11.8)	10.8 (8.50-13.3)	11.9 (8.97-14.9)	13.3 (9.70-17.0)	14.4 (10.3-18.7)
10-day	5.44 (4.67-6.27)	6.16 (5.29-7.11)	7.34 (6.28-8.49)	8.33 (7.08-9.65)	9.68 (7.99-11.5)	10.7 (8.68-12.8)	11.8 (9.24-14.3)	12.8 (9.71-16.0)	14.2 (10.4-18.1)	15.2 (10.9-19.6)
20-day	7.53 (6.51-8.62)	8.34 (7.20-9.56)	9.67 (8.32-11.1)	10.8 (9.23-12.4)	12.3 (10.2-14.4)	13.5 (11.0-16.0)	14.6 (11.5-17.6)	15.7 (12.0-19.4)	17.1 (12.7-21.5)	18.1 (13.1-23.1)
30-day	9.28 (8.06-10.6)	10.2 (8.82-11.6)	11.6 (10.1-13.3)	12.8 (11.0-14.7)	14.5 (12.1-16.9)	15.8 (12.9-18.6)	17.1 (13.5-20.4)	18.2 (14.0-22.4)	19.6 (14.6-24.6)	20.6 (15.0-26.1)
45-day	11.5 (10.0-13.1)	12.5 (10.9-14.2)	14.1 (12.2-16.1)	15.4 (13.3-17.6)	17.3 (14.5-20.1)	18.8 (15.4-22.0)	20.1 (16.0-23.9)	21.3 (16.5-26.1)	22.8 (17.1-28.4)	23.7 (17.3-30.0)
60-day	13.4 (11.7-15.1)	14.4 (12.6-16.4)	16.2 (14.1-18.4)	17.7 (15.3-20.1)	19.7 (16.5-22.7)	21.3 (17.5-24.8)	22.7 (18.1-26.8)	24.0 (18.7-29.2)	25.5 (19.1-31.6)	26.4 (19.4-33.2)

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

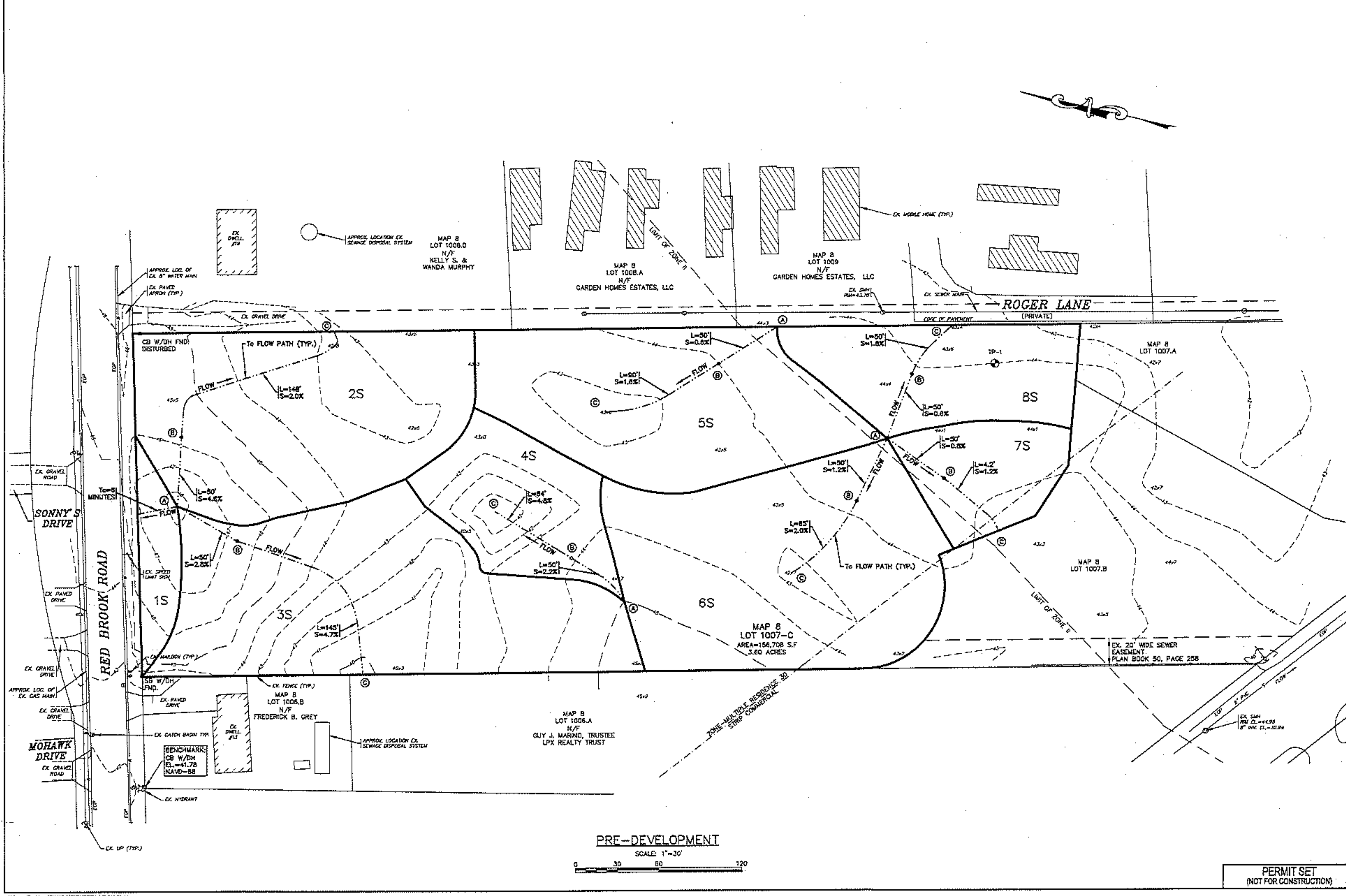
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

FLOW PATH NOTE:

1. FLOW PATHS NOT SHOWN FOR WATERSHEDS WITH TIMES OF CONCENTRATION CALCULATED TO BE 6.0 MINUTES AND UNDER.



PRE-DEVELOPMENT

SCALE: 1"=30'

0 30 60 120

REV.	DATE	BY	APP'D	DESCRIPTION

DATE: JAN. 12, 2021
DRAWN BY: JJP
CHECKED BY: RJR
JOB NO.: 18-9247
SCALE: 1" = 30'

APPROVED BY:

APPROVED BY:

G.A.F. ENGINEERING, INC.
PROFESSIONAL ENGINEERS & LAND SURVEYORS
266 MAIN STREET - WAREHAM, MA 02571
TEL: (508) 295-6600 FAX: (508) 295-6634
E-MAIL: gaf@gaf-eng.com

PRE-DEVELOPMENT
WATERSHED PLAN
RED BROOK ROAD WAREHAM, MA

PREPARED FOR:
TGCI EMNACA, LLC
1266 FURNACE BROOK PARKWAY QUINCY, MA

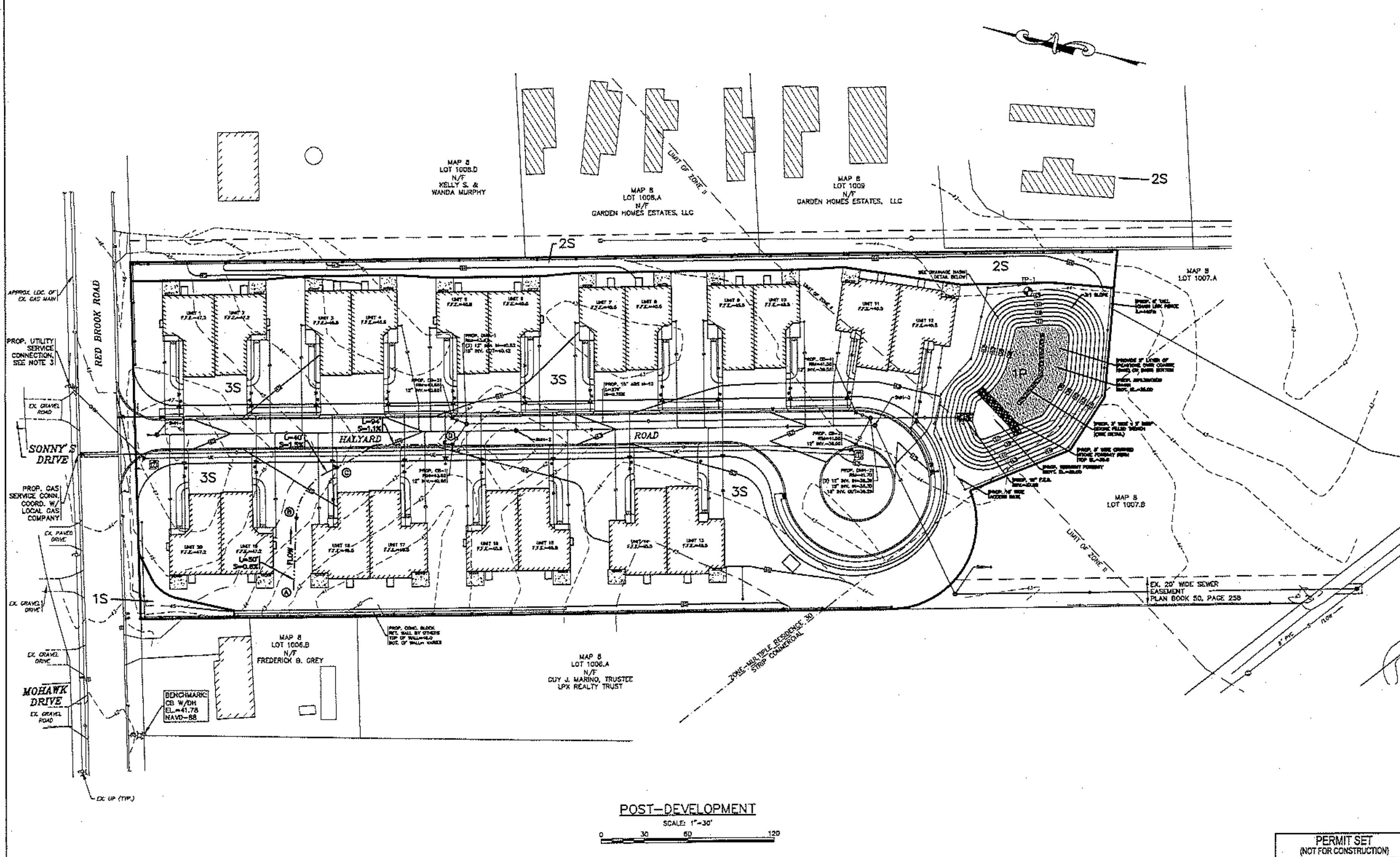
JOB NO.: 18-9247

DWG. 1 OF 2

PERMIT SET
(NOT FOR CONSTRUCTION)

FLOW PATH NOTE:

1. FLOW PATHS NOT SHOWN FOR WATERSHEDS WITH TIMES OF CONCENTRATION CALCULATED TO BE 6.0 MINUTES AND UNDER.



POST-DEVELOPMENT

SCALE: 1"=30'

0 30 60 120

PERMIT SET
(NOT FOR CONSTRUCTION)

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APPROVED BY:	APPROVED BY:
DATE: JAN. 12, 2021	
DRAWN BY: JMP	
CHECKED BY: RJR	
JOB NO.: 18-9247	
SCALE: 1" = 30'	

REV.	DATE	BY	APP'D	DESCRIPTION

JOB NO.: 18-9247

DWG. 2 OF 2