ALLEN & MAJOR
ASSOCIATES, INC.

SITE LOCUS: 1" = 500'

APPLE HILL ESTATES

31 HUNTING LANE

SHERBORN, MASSACHUSETTS

DRAINAGE REPORT

DATE PREPARED:
NOVEMBER 18, 2020

REVISED:
March 1, 2021
April 9, 2021

APPLICANT:
BARSKY ESTATE REALTY TRUST
23 HUNTING LANE
SHERBORN, MA 01770

PREPARED BY:
ALLEN & MAJOR ASSOCIATES, INC.
100 COMMERCE WAY, SUITE 5
WOBURN, MASSACHUSETTS 01801

COMMONWEALTH OF MASSACHUSETTS
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Date: 2021.04.09 12:22:33 -04'00'

A&M PROJECT NO. : 2513-02

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A&M PROJECT #2513-02

Table of Contents

1. **NARRATIVE**
2. **OPERATION & MAINTENANCE PLAN**
3. **HYDROCAD WORKSHEETS………………………..EXISTING CONDITIONS**
4. **HYDROCAD WORKSHEETS………………………..PROPOSED CONDITIONS**
5. **APPENDIX**
6. **WATERSHED PLANS**
7. **PLAN SET (UNDER SEPARATE COVER)**

SECTION 1.0

NARRATIVE

Section 1.0 Narrative

Table of Contents

SECTION 1.0 NARRATIVE 1-1

TABLE OF CONTENTS 1-1

- INTRODUCTION 1-2
- SITE CATEGORIZATION FOR STORMWATER REGULATIONS 1-2
- SITE LOCATION AND ACCESS 1-2
- WATERSHED 1-2
- EXISTING SITE CONDITIONS 1-3
- EXISTING SOIL CONDITIONS 1-3
- FEMA FLOODPLAIN 1-4
- DRAINAGE ANALYSIS METHODOLOGY 1-4
- PEAK RATE OF RUNOFF 1-4
- MA DEP STORMWATER PERFORMANCE STANDARDS 1-5

- **INTRODUCTION**

The purpose of this drainage report is to provide an overview of the proposed stormwater management system for the proposed site development at 31 Hunting Lane in Sherborn, MA. The report will show by means of narrative, calculations and exhibits that the project meets the MassDEP and the Town of Sherborn's Stormwater Management Regulations.

The proposed project consists of the development of a single 16.9 acre parcel shown on Sherborn Assessor's Map 1 as lot 3C. The project includes 27 new single-family residential homes along a roadway constructed to Town of Sherborn subdivision standards. The stormwater management onsite has been designed to meet the treatment requirements of the Town of Sherborn and the Massachusetts Department of Environmental Protection, Stormwater Standards and Stormwater Handbook.

The proposed site preparations include the clearing of trees necessary for the development and removal of the existing driveway and tennis court. After clearing, the site will be rough graded to install the road house pads.

The proposed stormwater management system (SMS) incorporates structural and non-structural BMPs to provide stormwater quality treatment and conveyance. The SMS includes drainage piping and structures, water quality units (proprietary separators), a filter, subsurface infiltration, and bioretention areas. Roof runoff from each structure onsite will be directed to an individually dedicated leaching catch basin or set of basins.

The proposed development plan will increase the impervious area onsite by approximately 92,199 square feet. The primary mechanisms to mitigate this increase in impervious area is through the proposed bioretention areas and the subsurface infiltration system. The result is a reduction in the peak rate of stormwater runoff to the Study Points for all design storm events.

- **SITE CATEGORIZATION FOR STORMWATER REGULATIONS**

The proposed site improvements are considered a new development under the Massachusetts Department of Environmental Protection (MADEP) Stormwater Management Standards. A "new development" project is required to meet all ten (10) of the Stormwater Management Standards listed within the MA DEP Stormwater Handbook.

- **SITE LOCATION AND ACCESS**

The site is a single lot with frontage on Hunting Lane, entirely within the Town of Sherborn and is located approximately 0.3 miles from the intersection of Hunting Lane and North Main Street. The site has one existing building at the rear of the site, which will remain. A road with cul-de-sac will be constructed within the site, along which the proposed buildings will be situated. The connection to Hunting Lane will widen compared to the existing driveway but will remain in more or less the same location.

- **WATERSHED**

The site is located within the Charles River Watershed, approximately 2.1 miles from the Charles River. The Charles River Watershed has an area of approximately 308 square miles, encompassing 35 City and cities south and west of Boston Massachusetts. There are 20 dams along the 80-mile long Charles River, which ultimately flows to Boston Harbor. Exhibit 1 shows the limits of the Charles River Watershed.

The existing site discharges untreated stormwater to the north and east which eventually ends up in either the Hunting Lane stormwater infrastructure or the wetlands system to the east of the site. The site being located within the Charles River Watershed requires a TDML goal of a 18% reduction in the total phosphorus load discharged from the proposed site. With the installation of bioretention areas, a subsurface infiltration system, JellFish® filter, enhanced catch basin cleaning, monthly street sweeping, and reduced fertilization, the drainage system reduction goal has been met. Please refer to the loading calculations located in the Appendix of this report.

EXHIBIT 1: Charles River Watershed

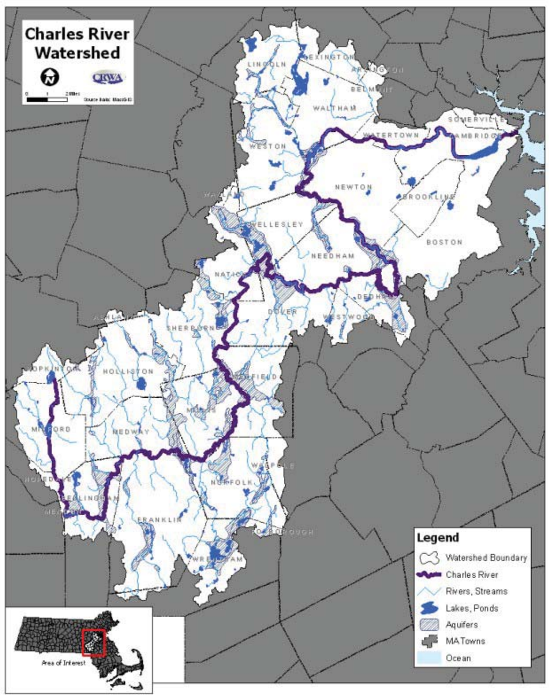

Image Source: Charles River Watershed Association

- **EXISTING SITE CONDITIONS**

The existing house to remain sits on the rear of the site. The site is predominantly wooded with some areas of grass and a paved driveway leading to the house from Hunting Lane. The topography onsite is moderately steep and slopes from the high point in the west to the low point in the east. The high point onsite is along the westerly property line at elevation 326±. The existing house is near the westerly high point and is at elevation 314±. The grades slope easterly towards the offsite wetlands where the lowest point onsite is elevation 200±. The existing driveway connection to Hunting Lane on the north side of the site is elevation 212±.

The surface drainage flows have been analyzed at four (4) Study Points. Study Point #1 is the summation of onsite flows to the rear of 41 Hunting Lane. Study Point #2 is the summation of onsite flows to the rear of 39 Hunting Lane. Study Point #3 is the summation of onsite flows to Hunting Lane. There are two existing catch basins within Hunting Lane adjacent to the site's driveway connection. Stormwater from a large portion of the site overland flows and eventually enters one of these two catch basins and into the municipal stormwater system. Study Point #4 is the summation of onsite flows to the easterly property line adjacent to the property identified on Sherborn Assessor's Map 11 as Lot 3B.

- **EXISTING SOIL CONDITIONS**

The on-site soils have been identified utilizing the USDA Natural Resources Conservation Services (NRCS) Soil Survey for Middlesex County. The eastern side of the site is soil type 307C – Paxton fine sandy loam. The western side of the site is primarily soil type 103C – Charlton-Hollis-Rock outcrop complex but also includes soil types 104C and D – Hollis-Rock outcrop-Charlton complex, and 307B – Paxton fine sandy loam. A copy of the soil map is included in the appendix of this report.

Allen & Major conducted three (3) test pits on March 21, 2021, in the location of the proposed bioretention areas. The test pit's show underlying soils to be primarily loamy sand with lenses of sandy loam. An exfiltration rate for sandy loam has been determined to be 1.02 inches per hour based upon Table 2.3.3 1982 Rawls Rate, Volume 3: Documenting Compliance with the Massachusetts's Stormwater Handbook.

- **FEMA FLOODPLAIN**

The site is located within the FEMA *Zone "X"* or area outside the 0.2-percent-annual-chance-flood. The official Flood Insurance Rate Map (FIRM) on file with the Town of Sherborn is dated June 4, 2010, community panel 25017C0632E. A copy of this map is provided in the appendix of this report.

- **DRAINAGE ANALYSIS METHODOLOGY**

A peak rate of runoff has been determined using techniques and data found in the following:

1. Urban Hydrology for Small Watersheds – Technical Release 55 by the United States Department of Agriculture Soils Conservation Service, June 1986. Runoff curve numbers and 24-hour precipitation values were obtained from this reference.

2. HydroCAD© Stormwater Modeling System by HydroCAD Software Solutions LLC, version 10.00, 2020. The HydroCAD program was used to generate the runoff hydrographs for the watershed areas, to determine discharge/stage/storage characteristics for the stormwater BMPs, to perform drainage routing and to combine the results of the runoff hydrographs. HydroCAD uses the TR-20 methodology of the SCS Unit Hydrograph procedure (SCS-UH).

3. Soil Survey of Middlesex County Massachusetts by United States Department of Agriculture, NRCS. Soil types and boundaries were obtained from this reference.

- **PEAK RATE OF RUNOFF**

A stormwater runoff analysis has been prepared for both the existing and proposed conditions and includes an estimate of the peak rate of runoff from various rainfall events. Peak runoff rates have been developed using TR-55 Urban Hydrology for Small Watersheds, developed by the U.S. Department of Commerce, Engineering Division and the HydroCAD 10.00 computer program. Further, the analysis has been prepared in accordance with the Town of Sherborn requirements and standard engineering practices. The peak rate and volume of runoff will be estimated for each watershed during the 2, 10, 25 and 100-year storm events.

The stormwater runoff model indicates that the proposed site development reduces the rate of runoff during all storm events at the identified points of analysis. The following tables provide a summary of the estimated peak rate, in Cubic Feet per Second (CFS) at each of the four (4) Study Points for each of the design storm events. The HydroCAD worksheets are included in Section 3 and 4 of this report.

STUDY POINT #1 (on-site flow to 41 Hunting Lane)				
	2-Year	10-Year	25-Year	100-Year
Existing Flow (CFS)	4.57	11.43	17.48	30.96
Proposed Flow (CFS)	4.37	10.60	16.05	28.11
Decrease (CFS)	**0.20**	**0.83**	**1.43**	**2.85**

STUDY POINT #2 (on-site flow to 39 Hunting Lane)				
	2-Year	10-Year	25-Year	100-Year
Existing Flow (CFS)	0.31	0.79	1.21	2.14
Proposed Flow (CFS)	0.24	0.57	0.85	1.47
Decrease (CFS)	**0.07**	**0.22**	**0.36**	**0.67**

STUDY POINT #3 (on-site flow to Hunting Lane)				
	2-Year	10-Year	25-Year	100-Year
Existing Flow (CFS)	2.77	6.69	10.12	17.68
Proposed Flow (CFS)	2.41	6.15	7.48	16.46
Decrease (CFS)	**0.36**	**0.54**	**2.64**	**1.22**

STUDY POINT #4 (on-site flow to Map 11, Lot 3B)				
	2-Year	10-Year	25-Year	100-Year
Existing Flow (CFS)	3.74	9.34	14.28	25.20
Proposed Flow (CFS)	3.38	7.73	11.33	22.27
Decrease (CFS)	**0.36**	**1.61**	**2.95**	**2.93**

- **MA DEP STORMWATER PERFORMANCE STANDARDS**

The MA DEP Stormwater Management Policy was developed to improve water quality by implementing performance standards for storm water management. The intent is to implement the stormwater management standards through the review of Notice of Intent filings by the issuing authority (Conservation Commission or DEP). The following section outlines how the proposed Stormwater Management System meets the standards set forth by the Policy.

BMP's implemented in the design include:

Deep sump Catch Basins
Hydro-dynamic (Proprietary) Separators
Jellyfish Filter
Bioretention Areas
Underground Infiltration System
Specific maintenance schedule

Stormwater Best Management Practices (BMP's) have been incorporated into the design of the project to mitigate the anticipated pollutant loading. The stormwater management system incorporates structural and non-structural BMP's to provide stormwater quality treatment and conveyance.

Temporary erosion and sedimentation controls will be incorporated into the construction phase of the project. These temporary controls may include tubular barriers, inlet sediment traps, diversion channels, slope stabilization, and stabilized construction entrances.

The Massachusetts Department of Environmental Protection has established ten (10) Stormwater Management Standards. A project that meets or exceeds the standards is presumed to satisfy the regulatory requirements regarding stormwater management. The Standards are enumerated below as well as a description as to how the Project will comply with the 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.*

   The proposed development will not introduce any new outfalls with direct discharge to a wetland area or waters of the Commonwealth of Massachusetts. All discharges will be treated for water quality and the rate will not be increased over existing conditions.

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 proposed development has been designed so that the post-development peak discharge rates do not exceed the predevelopment peak discharge rates. A summary of the existing and proposed discharge rates is included within this document.

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.*

   The existing annual recharge for the Site will be approximated in the developed condition. Infiltration basins were designed to approximate the loss of annual recharge resulting from the development of the Site. See recharge calculations below;

Existing impervious area	= 37,942± square feet
Proposed impervious area	= 130,141 ± square feet
Change in impervious area	**= 92,199± square feet**

   Total proposed impervious area (taken from HydroCAD model) = 130,141± square feet

   Recharge Volume (Rv) = (F) x (Impervious Area)

   Where:
   Rv = Required Recharge Volume, expressed in cubic feet
   F = Target Depth Factor associated with each Hydrologic Soil Group
   Impervious Area = proposed impervious pavement, sidewalk, rooftop in square feet

Recharge Volume (Rv) = (F) x (Impervious Area)
= (0.60 inches)*(1/12 inches/ft)* (0 square feet) (A Soils)
+ (0.35 inches)*(1/12 inches/ft)*(18,483 square feet) (B Soils)
+ (0.25 inches)*(1/12 inches/ft)*(111,177 square feet) (C Soils)
+ (0.10 inches)*(1/12 inches/ft)*(482 square feet) (D Soils)
= 2,859 cubic feet

Recharge Provided = 4,120 ft^3 (29 drywells) (See Appendix)
+2,861 ft^3 (IS1) (See Appendix)
6,981 ft^3

6,981 ft^3 Provided > 2,859 ft^3 Required

Additional recharge will also be provided by the leaching catch basins dedicated to each structure.

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.

   The proposed stormwater management system has been designed such that for each study point, the 80% TSS removal standard has been met. Standard #4 is met when structural stormwater best management practices are sized to capture and treat the required water quality volume and pretreatment is provided in accordance with the Massachusetts Stormwater Handbook. Standard #4 also requires that suitable source control measures are identified in the Long-Term Pollution Prevention Plan.

   The water quality volume (WQV) for the proposed development is captured and treating using deep sump catch basins, proprietary separation devices, and detention/infiltration basins. The TSS removal efficiencies are based on the values assigned in the TSS Removal Efficiencies for Best Management Practices table provided in the Massachusetts Stormwater Handbook. TSS removal calculations are provided in the Appendix of this Report.

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.*

The site is not considered a source of 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.*

   The project site does not discharge stormwater within a Zone II or Interim Wellhead Protection Area or near a critical area. Critical Areas are Outstanding Resource Waters as designated in 314 CMR 4.00, Special Resource Waters as designated in 314 CMR 4.00, recharge areas for public water supplies as defined in 310 CMR 22.02, bathing beaches as defined in 105 CMR 445.000, cold-water fisheries as defined in 314 CMR 9.02 and 310 CMR 10.04, and shellfish growing areas as defined in 314 CMR 9.02 and 310 CMR 10.04.

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.*

   The proposed project is not considered a re-development project under the Stormwater Management Handbook guidelines as there is an increase in the amount of total impervious area.

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.*

   A plan to control construction-related impacts, including erosion, sedimentation and other pollutant sources during construction and land disturbance activities has been developed. A detailed Erosion and Sedimentation Control Plan is included in the Permit Drawings. The proponent will prepare and submit a Stormwater Pollution Prevention Plan (SWPPP) prior to commencement of construction activities that will result in the disturbance of one acre of land or more.

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 (O&M) Plan has been developed for the proposed stormwater management system and can be found within this drainage report.

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

There are no expected illicit discharges to the stormwater management system. The applicant will submit the Illicit Discharge Compliance Statement prior to the discharge of stormwater runoff to the post-construction stormwater best management practices and prior to the issuance of a Certificate of Compliance.

SECTION 2.0

OPERATION & MAINTENANCE PLAN

Section 2.0 Operation & Maintenance Plan

Table of Contents

SECTION 2.0 OPERATION & MAINTENANCE PLAN 2-1

TABLE OF CONTENTS 2-1

- INTRODUCTION 2-2
- NOTIFICATION PROCEDURES FOR CHANGE OF RESPONSIBILITY FOR O&M 2-2
- CONTACT INFORMATION 2-2
- CONSTRUCTION PERIOD 2-3
- LONG TERM POLLUTION PREVENTION PLAN 2-4
  - HOUSEKEEPING 2-4
  - STORING OF MATERIALS AND WASTE PRODUCTS 2-4
  - VEHICLE WASHING 2-4
  - SPILL PREVENTION AND RESPONSE 2-4
  - MAINTENANCE OF LAWNS, GARDENS, AND OTHER LANDSCAPED AREAS 2-5
  - STORAGE AND USE OF HERBICIDES AND PESTICIDES 2-6
  - PET WASTE MANAGEMENT 2-8
  - OPERATIONS AND MANAGEMENT OF SEPTIC SYSTEMS 2-8
  - MANAGEMENT OF DEICING CHEMICALS AND SNOW 2-8
- LONG TERM MAINTENANCE PLAN – FACILITIES DESCRIPTION 2-8
- INSPECTION AND MAINTENANCE FREQUENCY AND CORRECTIVE MEASURES 2-10
- SUPPLEMENTAL INFORMATION 2-10

- **INTRODUCTION**

In accordance with the standards set forth by the Stormwater Management Policy issued by the Department of Environmental Protection (DEP), Allen & Major Associates, Inc. has prepared the following Operation and Maintenance Plan for the new development of Apple Hill Estates, 31 Hunting Lane in Sherborn, MA.

The plan is broken down into three major sections. The first section describes construction-related erosion and sedimentation controls (Construction Period). The second section describes the long-term pollution prevention measures (Long Term Pollution Prevention Plan). The third section is a post-construction operation and maintenance plan designed to address the long-term maintenance needs of the stormwater management system (Long Term Maintenance Plan).

- **NOTIFICATION PROCEDURES FOR CHANGE OF RESPONSIBILITY FOR O&M**

The Stormwater Management System (SMS) for this project is owned by **Barsky Estate Realty Trust** (owner). The owner shall be legally responsible for the long-term operation and maintenance of this SMS as outlined in this Operation and Maintenance (O&M) Plan.

Should ownership of the SMS change, the owner will continue to be responsible until the succeeding owner shall notify the Commission that the succeeding owner has assumed such responsibility. Upon subsequent transfers, the responsibility shall continue to be that of transferring owner until the transferee owner notifies the Commission of its assumption of responsibility.

In the event the SMS will serve multiple lots/owners, such as the subdivision of the existing parcel or creation of lease areas, the owner(s) shall establish an association on other legally enforceable arrangements under which the association or a single party shall have legal responsibility for the operation and maintenance of the entire SMS. The legal instrument creating such responsibility shall be recorded with the Registry of Deeds and promptly following its recording, a copy thereof shall be furnished to the Commission.

- **CONTACT INFORMATION**

Stormwater Management System Owner: Barsky Estate Realty Trust
23 Hunting Lane
Sherborn, MA 01770
Phone: (617) 794-0001

Emergency Contact Information:

- Barsky Estate Realty Trust (owner/operator) Phone (617) 794-0001
- Allen & Major Associates, Inc. (Site Civil Engineer) Phone (781) 935-6889
- Sherborn Public Works Phone (508) 651-7878
- Sherborn Conservation Commission Phone (508) 651-7863
- Sherborn Fire Department (non-emergency line) Phone (508) 653-3270
- DEP Emergency Response (Mass DEP) Phone (888) 304-1133
- Clean Harbors Inc (24-Hour Line) Phone (800) 645-8265

- **CONSTRUCTION PERIOD**

1. Contact the Sherborn Engineering Division at least fourteen (14) days prior to start of construction to schedule a pre-construction meeting.

2. Install the tubular barriers and construction fencing as shown on the Site Preparation Plan.

3. Install the construction entrance at the location shown on the Site Preparation Plan.

4. Site access shall be achieved only from the designated construction entrances.

5. Stockpiles shall be stabilized with erosion control matting or temporary seeding whenever practicable.

6. Install silt sacks and/or tubular barriers around each drain inlet prior to any demotion and or construction activities.

7. All erosion control measures shall be inspected weekly and after every rainfall event of 0.5” or more. Records of these inspections shall be kept on site for review.

8. All erosion control measures shall be maintained, repaired or replaced as required or at the direction of the owner’s engineer, the Town Engineer, or the Conservation Agent.

9. Sediment accumulation up-gradient of the tubular barriers and stone check dams greater than 6” in depth shall be removed and disposed of in accordance with all applicable regulations.

10. If it appears that sediment is exiting the site, silt sacks shall be installed in all catch basins adjacent to the site. Sediment accumulation on all adjacent catch basin inlets shall be removed and the silt sack replaced if torn or damaged.

11. Install stone check damns on site during construction as needed. Temporary sediment basins combined with stone check dams shall be installed on site during construction to control and collect runoff from upland areas of this site during demolition and construction activities.

12. The contractor shall comply with the General and Erosion Control Notes as shown on the Site Development Plans and Specifications.

13. The stabilized construction entrances shall be inspected weekly by the contractor. The entrances shall be maintained by adding additional clean, angular, durable stone to remove the soil from the construction vehicle’s tires when exiting the site. If soil is still leaving the site via the construction vehicle tires, adjacent roadways shall be kept clean by street sweeping.

14. Dust pollution shall be controlled using on-site water trucks and or an approved soil stabilization product.

- **LONG TERM POLLUTION PREVENTION PLAN**

Standard #4 from the MA DEP Stormwater Management Handbook requires that a Long-Term Pollution Prevention Plan (LTPPP) be prepared and incorporated as part of the Operation and Maintenance of the Stormwater Management System. The purpose of the LTPPP is to identify potential sources of pollution that may affect the quality of stormwater discharges, and to describe the implementation of practices to reduce the pollutants in stormwater discharges. The following items describe the source control and proper procedures for the LTPPP.

- HOUSEKEEPING

The proposed site development will be designed to maintain a high level of water quality treatment for all stormwater discharge to the resource areas. An Operation and Maintenance (O&M) plan has been prepared and is included in this section of the report. The owner (or its designee) is responsible for adherence to the O&M plan is a strict and complete manner.

- STORING OF MATERIALS AND WASTE PRODUCTS

Trash and waste will be stored inside each individual house and duplex. A trash contractor will be employed to pick up the waste on a regular basis. The stormwater drainage system has water quality inlets designed to capture trash and debris.

- VEHICLE WASHING

Outdoor vehicle washing has the potential to result in high loads of nutrients, metals, and hydrocarbons during dry weather conditions, as the detergent-rich water used to wash the grime off the vehicle enters the stormwater drainage system. The proposed project does not include any designated vehicle washing areas.

- SPILL PREVENTION AND RESPONSE

Sources of potential spill hazards include vehicle fluids, liquid fuels, pesticides, paints, solvents, and liquid cleaning products. The majority of the spill hazards would likely occur within the building and would not enter the stormwater drainage system. However, there are spill hazards from vehicle fluids or liquid fuels located outside of the buildings. These exterior spill hazards have the potential to enter the stormwater drainage system and are to be addressed as follows:

1. Spill Hazards of pesticides, paints, and solvents shall be remediated using the Manufacturers' recommended spill cleanup protocol.
2. Vehicle fluids and liquid fuel spill shall be remediated according to the local and state regulations governing fuel spills.
3. The owner shall have the following equipment and materials on hand to address a spill clean-up: brooms, dust pans, mops, rags, gloves, absorptive material, sand, sawdust, plastic and metal trash containers.
4. All spills shall be cleaned up immediately after discovery
5. Spills of toxic or hazardous material shall be reported, regardless of size, to the Massachusetts Department of Environmental Protection at 888-304-1133.
6. Should a spill occur, the pollution prevention plan will be adjusted to include measures to prevent another spill of a similar nature. A description of the spill, along with the causes and cleanup measures will be included in the updated pollution prevention plan.

- MAINTENANCE OF LAWNS, GARDENS, AND OTHER LANDSCAPED AREAS

It should be recognized that this is a general guideline towards achieving high quality and well-groomed landscaped areas. The grounds staff / landscape contractor must recognize the shortcomings of a general maintenance plan such as this, and modify and/or augment it based on weekly, monthly, and yearly observations. In order to assure the highest quality conditions, the staff must also recognize and appreciate the need to be aware of the constantly changing conditions of the landscaping and be able to respond to them on a proactive basis. No trees shall be planted over the drain lines or infiltration trenches, and that only shallow rooted plants and shrubs will be allowed.

- **Fertilizer**

Maintenance practices should be aimed at reducing environmental, mechanical and pest stresses to promote healthy and vigorous growth. When necessary, pest outbreaks should be treated with the most sensitive control measure available. Synthetic chemical controls should be used only as a last resort to organic and biological control methods. Fertilizer, synthetic chemical controls and pest management applications (when necessary) shall be performed only by licensed applicators in accordance with the manufacturer's label instructions when environmental conditions are conducive to controlled product application.

Only slow-release organic fertilizers shall be used in the planting and mulch areas to limit the amount of nutrients that could enter downstream resource areas. Fertilization of the planting and mulch areas will be performed within manufacturers labeling instructions and shall not exceed an NPK ration of 1:1:1 (i.e. Triple 10 fertilizer mix), considered a low nitrogen mixture. Fertilizers approved for the use under this O&M Plan are as follows:

Type:	LESCO® 28-0-12 (Lawn Fertilizer)
	MERIT® 0.2 Plus Turf Fertilizer
	MOMENTUM™ Force Weed & Feed

- **Suggested Aeration Program**

In-season aeration of lawn areas is good cultural practice, and is recommended whenever feasible. It should be accomplished with a solid thin tine aeration method to reduce disruption to the use of the area. The depth of solid tine aeration is similar to core type, but should be performed when the soil is somewhat drier for a greater overall effect.

Depending on the intensity of use, it can be expected that all landscaped lawn areas will need aeration to reduce compaction at least once per year. The first operation should occur in late May following the spring season. Methods of reducing compaction will vary based on the nature of the compaction. Compaction on newly established landscaped areas is generally limited to the top 2-3" and can be alleviated using hollow core or thin tine aeration methods.

The spring aeration should consist of two passes at opposite directions with 1/4" hollow core tines penetrating 3-5" into the soil profile. Aeration should occur when the soil is moist but not saturated. The soil cores should be shattered in place and dragged or swept back into the turf to control thatch. If desired the cores may also be removed and the area top-dressed with sand or sandy loam. If the area drains on average too slowly, the topdressing should contain a higher percentage of sand. If it is draining on average too quickly, the top dressing should contain a higher percentage of soil and organic matter.

- **Landscape Maintenance Program Practices:**
  - **Lawn**
    1. Mow a minimum of once a week in spring, to a height of 2” to 2 1/2” high. Mowing should be frequent enough so that no more than 1/3 of grass blade is removed at each mowing. The top growth supports the roots; the shorter the grass is cut, the less the roots will grow. Short cutting also dries out the soil and encourages weeds to germinate.
    2. Mow approximately once every two weeks from July 1st to August 15th depending on lawn growth.
    3. Mow on a ten-day cycle in fall, when growth is stimulated by cooler nights and increased moisture.
    4. Do not remove grass clippings after mowing.
    5. Keep mower blades sharp to prevent ragged cuts on grass leaves, which cause a brownish appearance and increase the chance for disease to enter a leaf.
  - **Shrubs**
    1. Mulch not more than 3” depth with shredded pine or fir bark.
    2. Hand prune annually, immediately after blooming, to remove 1/3 of the above-ground biomass (older stems). Stem removals to occur within 6” of the ground to open up shrub and maintain two-year wood (the blooming wood).
    3. Hand prune evergreen shrubs only as needed to remove dead and damaged wood and to maintain the naturalistic form of the shrub. Never mechanically shear evergreen shrubs.
  - **Trees**
    1. Provide aftercare for new tree plantings for the first three years.
    2. Do not fertilize trees, it artificially stimulates them (unless tree health warrants).
    3. Water once a week for the first year; twice a month the second, once a month the third year.
    4. Prune trees on a four-year cycle.
  - **Invasive Species**
    1. Inform the Conservation Commission Agent prior to the removal of invasive species proposed either through hand work or through chemical removal.

o STORAGE AND USE OF HERBICIDES AND PESTICIDES

Integrated Pest Management is the combination of all methods (of pest control) which may prevent, reduce, suppress, eliminate, or repel an insect population. The main requirements necessary to support any pest population are food, shelter and water, and any upset of the balance of these will assist in controlling a pest population. Scientific pest management is the knowledgeable use of all pest control methods (sanitation, mechanical, chemical) to benefit mankind's health, welfare, comfort, property and food. A Pest Management Professional (PMP) will be retained who is licensed with the Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs, Department of Agricultural Resources

The site manager will be provided with approved bulletin before entering into or renewing an agreement to apply pesticides for the control of indoor household or structural pests. 333 CMR 13.08.

Before beginning each application, the applicator must post a Department approved notice on all of the entrances to the treated room or area. The applicator must leave such notices posted after the application. The notice will be posted at conspicuous point(s) of access to the area treated. The location and number of signs will be determined by the configuration of the area to be treated based on the applicator's best judgment. It is intended to give sufficient notice that no one comes into an area being treated unaware that the applicator is working and pesticides are being applied. However, if the contracting entity does not want the signs posted, he/she may sign a Department approved waiver indicating this.

The applicator or employer will provide to any person upon their request the following information on previously conducted applications:

1. Name and phone number of pest control company
2. Date and time of the application;
3. Name and license number of the applicator
4. Target pests
5. Name and EPA Registration Number of pesticide products applied

Public Buildings - Applicators or their employers will provide pre-notification to any person upon their request. Pre-notification will include:

1. Name and phone number of the company making the application
2. Proposed date of application
3. Locations to be treated; and
4. Name, EPA Registration Number, and active ingredients of the products being used.

The applicator or their employers shall pre-notify the occupants of residential units between seven (7) days and forty-eight (48) hours prior to any application. The notification must include the following:

1. Name and phone number of company making the application
2. Proposed date and time of application
3. Locations to be treated
4. Product names, EPA Registration Numbers, and active ingredients for the pesticide products that may be used
5. Purpose of application
6. Preparation procedures required by the pesticide label to protect items such as food, utensils, and pests; and
7. Department approved Consumer Information Bulletin

The notification must be made in writing. The intent is so that individuals, who wish to avoid exposure or want to avoid encountering the applicator, can make necessary arrangements. Applicators are required by law to follow all directions on the pesticide label and must take all steps necessary to avoid applications with people present in a room or area to be treated. Individuals occupying a room or area to be treated at the time of application shall be informed of the procedure. Whenever possible, the applicator should not apply pesticides with anyone present. That may mean treating other areas and returning when occupants have left, asking people to leave the area while the work is being done, or treating before or after people occupy the room. If people do not leave, the applicator must make it clear that he is there to apply pesticides. The applicator will be prepared to provide whatever information possible about the pesticides and techniques used.

- Pet Waste Management

The Town of Sherborn has a dog control ordinance and anti-littering ordinance that requires all persons to remove waste material from within any way within the Town. The owner's landscape crew (or designee) shall remove any obvious pet waste that has been left behind by pet owners within the project area. The pet waste shall be disposed of in accordance with local and state regulations.

- Operations and Management of Septic Systems

The existing septic system will be removed. A new wastewater treatment facility (WWTF) is proposed as part of the project. Information regarding operations and maintenance of this facility will be provided by the WWTF designer.

- Management of Deicing Chemicals and Snow

Snow will be stockpiled on site until the accumulated snow becomes a hazard to the daily operations of the site. It will be the responsibility of the snow removal contractor to properly dispose of transported snow according to Massachusetts DEP, Bureau of Resource Protection – Snow Disposal Guideline #BWR G2019-01, governing the proper disposal of snow. It will be the responsibility of the snow removal contractor to follow these guidelines and all applicable laws and regulations.

The owner's maintenance staff (or its designee) will be responsible for the clearing of the sidewalk and building entrances. The owner may be required to use a de-icing agent such as potassium chloride to maintain a safe walking surface. The de-icing agent for the walkways and building entrances will be kept within the storage rooms located within the building. De-icing agents will not be stored outside. The owner's maintenance staff will limit the application of sand and de-icing agents. Sodium chloride as a de-icing agent should not be utilized.

- **Long Term Maintenance Plan – Facilities Description**

The SMS shall be inspected immediately after construction. A maintenance log will be kept (i.e. report) summarizing inspections, maintenance, and any corrective actions taken. The log will include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. If a maintenance task requires the clean-out of any sediments or debris, the location where the sediment and debris was disposed after removal will be indicated. The log will be made accessible to department staff and a copy provided to the department upon request.

The following is a description of the stormwater management system for the project site.

Stormwater Collection System – On Site:

The stormwater collection system consists of a series of gutter line inlets within the limits of the paved area. Peak flows will be attenuated in a series of detention and infiltration basins. All of the proposed on-site catch basins incorporate a deep sump and hooded outlet. The catch basins are connected by a closed gravity pipe network that pass through proprietary separators prior to entering the detention and infiltration basins. Stormwater overflow from the basins will be directed towards Hunting Lane and the easterly property line so as to mimic flows in the existing conditions. Stormwater from roofs will be collected with gutters and discharge to drywells.

Structural Pretreatment BMPs:

Regular maintenance of these BMPs is especially critical because they typically receive the highest concentration of suspended solids during the first flush of a storm event.

Deep Sump Catch Basins:
Inspect catch basins 4 times per year (specifically after foliage and snow season) to ensure that the catch basins are working in their intended fashion and that they are free of debris. Structures will be skimmed of floatable debris at each inspection and sediment will be removed when or before sump is determined to be 50% full. If the basin outlet is designed with a hood to trap floatable materials (i.e. Snout), check to ensure watertight seal is working.

Proprietary Separators:
Inspect all proprietary separators with the same frequency as catch basins. Remove sediment when the isolated sump has reached 75% of its capacity. Refer to manufacturer's Maintenance Guide for additional information. Sediments and debris removed should be disposed of in accordance with all applicable local, state and federal laws and regulations including M.G.L.c. 21C and 310 CMR 30.00.

JellyFish® Filter
Inspect the filters post construction before putting into service. Remove all construction related sediment and debris. Inspect a minimum of two times during first year of operation and a minimum of once per year thereafter. Inspection is recommended after major storm events.

Other BMPs and Accessories:

Surface Basins
The bioretention areas shall be inspected within the first three months after construction to ensure proper vegetation is established; thereafter, they shall be inspected two (2) times per year (preferably in Spring and Fall) to ensure they are working in their intended fashion and that they are free of sediment and debris. Vegetated basin areas and buffers will be mowed at least semi-annually and organic matter will be removed. Observed trash and debris will removed at each inspection. Sediment will be removed as necessary.

Infiltration System:
The infiltration structures will be inspected within 72 hours of each half-inch storm event to ensure it is draining properly, for the first three months following construction. Trash, debris, and visible sediment should be removed. Inspection can be accomplished by using the inspection ports and/or access structure for underground systems.

Culverts:
Inspect culverts 2 times per year (preferably in Spring and Fall) to ensure that the culverts are working in their intended fashion and that they are free of debris. Remove any obstructions to flow; remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit and to repair any erosion damage at the culvert's inlet and outlet.

Vegetated Areas:
Inspect slopes and embankments early in the growing season to identify active or potential erosion problems. Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

Roadways and Parking Surfaces:
Clear accumulations of debris and sand in driveways and along roadways monthly using a high-efficiency regenerative air-vacuum.

Level Spreaders, Check Dams, Rip-Rap:
These accessories will be inspected twice per year for erosion, debris accumulation, and unwanted vegetation. Erosion will be stabilized and sediment, debris, and woody vegetation will be removed.

Mosquito Control Plan:

MA Stormwater Handbook; Volume 2, Chapter 5 (Attached)
Both aboveground and underground stormwater BMPs have the potential to serve as mosquito breeding areas. Good design, proper operation and maintenance, and treatment with larvicides can minimize this potential.

The 2008 technical specifications for BMPs set forth in Volume 2, Chapter 2 of the Massachusetts Stormwater Handbook also concur with this practice by requiring that all stormwater practices designed to drain do so within 72 hours.

- **INSPECTION AND MAINTENANCE FREQUENCY AND CORRECTIVE MEASURES**

In accordance with MA DEP Stormwater Handbook: Volume 2, Chapter 2; the following areas, facilities, and measures will be inspected and the identified deficiencies will be corrected. Clean-out must include the removal and legal disposal of any accumulated sediments, trash, and debris. In any and all cases, operations, inspections, and maintenance activities shall utilize best practical measures to avoid and minimize impacts to wetland resource areas outside the foot print of the SMS.

- **SUPPLEMENTAL INFORMATION**

  - Operation & Maintenance Plan Schedule
  - Massachusetts Stormwater Handbook, Chapter 5, Miscellaneous Stormwater Topics, Mosquito Control in Stormwater Management Practices.
  - CDS Inspection and Maintenance Guide
  - CMP Detention and Infiltration Inspection and Maintenance Guide
  - JellyFish® Filter Maintenance Guide

OPERATION & MAINTENANCE PLAN SCHEDULE

Project: Apple Hill Estates
Address: 31 Hunting Lane
Sherborn, MA

Date:
Party Responsible for O & M Plan: Barsky Estate Realty Trust
Address: 23 Hunting Lane
Sherborn, MA 01770

Structure or Task	Maintenance Activity	Schedule/Notes	Maintenance Cost/Unit	Estimated Maintenance	Estimated Annual Maintenance Cost	Inspection Performed Date:	Inspection Performed By:
Street Sweeping	Sweep driveways and roadways with high-efficiency regenerative air-vacuum	Perform roadway sweeping following the spring thaw to remove any traction sand applied during the winter months. Perform roadway sweeping monthly Maintain information that confirms that all street sweepings have been disposed in accordance with state and local requirements	$1,500/Sweeping	Monthly	$18,000		
Surface Basins	Trash and debris removal, vegetation management	Inspect within first three months after construction and twice per year thereafter. Ensure proper vegetation cover and remove dead or wood vegetation. Mow twice per year Remove trash and sediment as required	$1,000	Semi-annually (Spring & Fall)	$2,000		
Deep Sump CB's	Inspect frames and grates. Empty sumps using a vacuum-truck.	Inspected and cleaned 4 times per year. Sediment and debris shall be removed by a vacuum truck. Disposal of the accumulated sediment and hydrocarbons must be in accordance with applicable local, state, and federal guidelines and regulations	$500/CB	CBs - quarterly			
Hydrodynamic Separators (CDS)	Inspect frames and covers. Empty sediment storage chamber using a vacuum truck. Refer to Manufacturers maintenance Procedures.	Inspected and cleaned 4 times per year. Sediment should be removed when accumulated to 75% of sump capacity. Sediment and debris shall be removed by a vacuum truck. Disposal of the accumulated sediment and hydrocarbons must be in accordance with applicable local, state, and federal guidelines and regulations	$500/unit	Semi-annually (Spring & Fall)			
JellyFish Filter	Sediment and debris removal	Sediment should be removed when inspection reveals that accumulated sediment reaches 12" in depth. Filter cartridges should be rinsed and reinstalled. Cartridges should be replaced every 5 years.	$500	Annually	$500		
Infiltration System	Sediment and debris removal	Sediment should be removed when inspection reveals that accumulated sediment is clogging the discharge	$500	Annually	$500		
Outfall locations	Inspect for sign of erosion or displaced stone. Replace outlet protection stone if needed.	Inspect twice a year for the first three years of construction and once per year thereafter Check sediment build-up on a yearly basis and clean as needed using hand methods	$500 allowance	Annually			
Mosquito Control	CB management targeted larvicide treatment to CB's and all storm drains including proprietary separators to control mosquitoes in their aquatic stages.	Surveillance is a non chemical inspection method that involves classification of mosquito breeding sites, larval presence, and survey. Apply larvicide if larva growth is detected.	$500 allowance	CBs - quarterly			
Snow Storage	Debris from melted snow shall be cleared from the site and properly disposed of at the end of the snow season, but shall be cleared no later than May 15.	Avoid dumping snow removal over catch basins. Use areas designated on the approved layout plan for snow storage.	$500 allowance	Annually			

Chapter 5
Miscellaneous Stormwater Topics

Mosquito Control in Stormwater Management Practices

Both aboveground and underground stormwater BMPs have the potential to serve as mosquito breeding areas. Good design, proper operation and maintenance and treatment with larvicides can minimize this potential.

EPA recommends that stormwater treatment practices dewater within 3 days (72 hours) to reduce the number of mosquitoes that mature to adults, since the aquatic stage of many mosquito species is 7 to 10 days. Massachusetts has had a 72-hour dewatering rule in its Stormwater Management Standards since 1996. The 2008 technical specifications for BMPs set forth in Volume 2, Chapter 2 of the Massachusetts Stormwater Handbook also concur with this practice by requiring that all stormwater practices designed to drain do so within 72 hours.

Some stormwater practices are designed to include permanent wet pools. These practices – if maintained properly – can limit mosquito breeding by providing habitat for mosquito predators. Additional measures that can be taken to reduce mosquito populations include increasing water circulation, attracting mosquito predators by adding suitable habitat, and applying larvicides.

The Massachusetts State Reclamation and Mosquito Control Board (SRMCB), through the Massachusetts Mosquito Control Districts, can undertake further mosquito control actions specifically for the purpose of mosquito control pursuant to Massachusetts General Law Chapter 252. The Mosquito Control Board, http://www.mass.gov/agr/mosquito/, describes mosquito control methods and is in the process of developing guidance documents that describe Best Management Practices for mosquito control projects.

The SRMCB and Mosquito Control Districts are not responsible for operating and maintaining stormwater BMPs to reduce mosquito populations. The owners of property that construct the stormwater BMPs or municipalities that "accept" them through local subdivision approval are responsible for their maintenance.[1] The SRMCB is composed of officials from MassDEP, Department of Agricultural Resources, and Department of Conservation and Recreation. The nine (9) Mosquito Control Districts overseen by the SRMCB are located throughout Massachusetts, covering 176 municipalities.

Construction Period Best Management Practices for Mosquito Control

To minimize mosquito breeding during construction, it is essential that the following actions be taken to minimize the creation of standing pools by taking the following actions:

- ***Minimize Land Disturbance:*** Minimizing land disturbance reduces the likelihood of mosquito breeding by reducing silt in runoff that will cause construction period controls to clog and retain standing pools of water for more than 72 hours.
- ***Catch Basin inlets:*** Inspect and refresh filter fabric, hay bales, filter socks or stone dams on a regular basis to ensure that any stormwater ponded at the inlet drains within 8 hours after precipitation stops. Shorter periods may be necessary to avoid hydroplaning in roads

[1] MassDEP and MassHighway understand that the numerous stormwater BMPs along state highways pose a unique challenge. To address this challenge, the 2004 MassHighway Stormwater Handbook will provide additional information on appropriate operation and maintenance practices for mosquito control when the Handbook is revised to reflect the 2008 changes to the Stormwater Management Standards..

caused by water ponded at the catch basin inlet. Treat catch basin sumps with larvicides such as *Bacillus sphaericus* (*Bs*) using a licensed pesticide applicator.

- ***Check Dams:*** If temporary check dams are used during the construction period to lag peak rate of runoff or pond runoff for exfiltration, inspect and repair the check dams on a regular basis to ensure that any stormwater ponded behind the check dam drains within 72 hours.
- ***Design construction period sediment traps*** to dewater within 72 hours after precipitation. Because these traps are subject to high silt loads and tend to clog, treat them with the larvicide *Bs* after it rains from June through October, until the first frost occurs.
- ***Construction period open conveyances:*** When temporary manmade ditches are used for channelizing construction period runoff, inspect them on a regular basis to remove any accumulated sediment to restore flow capacity to the temporary ditch.
- ***Revegetating Disturbed Surfaces:*** Revegetating disturbed surfaces reduces sediment in runoff that will cause construction period controls to clog and retain standing pools of water for greater than 72 hours.
- ***Sediment fences/hay bale barriers:*** When inspections find standing pools of water beyond the 24-hour period after a storm, take action to restore barrier to its normal function.

<u>Post-Construction Stormwater Treatment Practices</u>

- Mosquito control begins with the environmentally sensitive site design. Environmentally sensitive site design that minimizes impervious surfaces reduces the amount of stormwater runoff. Disconnecting runoff using the LID Site Design credits outlined in the Massachusetts Stormwater Handbook reduces the amount of stormwater that must be conveyed to a treatment practice. Utilizing green roofs minimizes runoff from smaller storms. Storage media must be designed to dewater within 72 hours after precipitation.
- Mosquito control continues with the selection of structural stormwater BMPs that are unlikely to become breeding grounds for mosquitoes, such as:
  - ***Bioretention Areas/Rain Gardens/Sand Filter:*** These practices tend not to result in mosquito breeding. If any level spreaders, weirs or sediment forebays are used as part of the design, inspect them and correct them as necessary to prevent standing pools of water for more than 72 hours.
  - ***Infiltration Trenches:*** This practice tends not to result in mosquito breeding. If any level spreaders, weirs, or sediment forebays are used as part of the design, inspect them and correct them as necessary to prevent standing pools of water for more than 72 hours.
- Another mosquito control strategy is to select BMPs that can become habitats for mosquito predators, such as:
  - ***Constructed Stormwater Wetlands:*** Habitat features can be incorporated in constructed stormwater wetlands to attract dragonflies, amphibians, turtles, birds, bats, and other natural predators of mosquitoes.
  - ***Wet Basins:*** Wet basins can be designed to incorporate fish habitat features, such as deep pools. Introduce fish in consultation with Massachusetts Division of Fisheries and Wildlife. Vegetation within wet basins designed as fish habitat must be properly managed to ensure that vegetation does not overtake the habitat. Proper design to ensure that no low circulation or “dead” zones are created may reduce the potential for mosquito breeding. Introducing bubblers may increase water circulation in the wet basin.

Effective mosquito controls require proponents to design structural BMPs to prevent ponding and facilitate maintenance and, if necessary, the application of larvicides. Examples of such design practices include the following:

- ***Basins:*** Provide perimeter access around wet basins, extended dry detention basins and dry detention basins for both larviciding and routine maintenance. Control vegetation to ensure that access pathways stay open.
- ***BMPs without a permanent pool of water:*** All structural BMPs that do not rely on a permanent pool of water must drain and completely dewater within 72 hours after precipitation. This includes dry detention basins, extended dry detention basins, infiltration basins, and dry water quality swales. Use underdrains at extended dry detention basins to drain the small pools that form due to accumulation of silts. Wallace indicates that extended dry extended detention basins may breed more mosquitoes than wet basins. It is, therefore, imperative to design outlets from extended dry detention basins to completely dewater within the 72-hour period.
- ***Energy Dissipators and Flow Spreaders:*** Currier and Moeller, 2000 indicate that shallow recesses in energy dissipators and flow spreaders trap water where mosquitoes breed. Set the riprap in grout to reduce the shallow recesses and minimize mosquito breeding.
- ***Outlet control structures:*** Debris trapped in small orifices or on trash racks of outlet control structures such as multiple stage outlet risers may clog the orifices or the trash rack, causing a standing pool of water. Optimize the orifice size or trash rack mesh size to provide required peak rate attenuation/water quality detention/retention time while minimizing clogging.
- ***Rain Barrels and Cisterns:*** Seal lids to reduce the likelihood of mosquitoes laying eggs in standing water. Install mosquito netting over inlets. The cistern system should be designed to ensure that all collected water is drained into it within 72 hours.
- ***Subsurface Structures, Deep Sump Catch Basins, Oil Grit Separators, and Leaching Catch Basins:*** Seal all manhole covers to reduce likelihood of mosquitoes laying eggs in standing water. Install mosquito netting over the outlet (CALTRANS 2004).

The Operation and Maintenance Plan should provide for mosquito prevention and control.

- ***Check dams:*** Inspect permanent check dams on the schedule set forth in the O&M Plan. Inspect check dams 72 hours after storms for standing water ponding behind the dam. Take corrective action if standing water is found.
- ***Cisterns:*** Apply *Bs* larvicide in the cistern if any evidence of mosquitoes is found. The Operation and Maintenance Plan shall specify how often larvicides should be applied to waters in the cistern.
- ***Water quality swales:*** Remove and properly dispose of any accumulated sediment as scheduled in the Operation and Maintenance Plan.
- ***Larvicide Treatment:*** The Operation and Maintenance Plan must include measures to minimize mosquito breeding, including larviciding.
- The party identified in the Operation and Maintenance Plan as responsible for maintenance shall see that larvicides are applied as necessary to the following stormwater treatment practices: catch basins, oil/grit separators, wet basins, wet water quality swales, dry extended detention basins, infiltration basins, and constructed stormwater wetlands. The Operation and Maintenance Plan must ensure that all larvicides are applied by a licensed pesticide applicator and in compliance with all pesticide label requirements.
- The Operation and Maintenance Plan should identify the appropriate larvicide and the time and method of application. For example, *Bacillus sphaericus (Bs*), the preferred

larvicide for stormwater BMPs, should be hand-broadcast.[2] Alternatively, Altosid, a Methopren product, may be used. Because some practices are designed to dewater between storms, such as dry extended detention and infiltration basins, the Operation and Maintenance Plan should provide that larviciding must be conducted during or immediately after wet weather, when the detention or infiltration basin has a standing pool of water, unless a product is used that can withstand extended dry periods.

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[2] *Bacillus thuringienis israelensis* or *Bti* is usually applied by helicopter to wetlands and floodplains

Roads and Stormwater BMPs

In general, the stormwater BMPs used for land development projects can also be used for new roadways and roadway improvement projects. However, for improvement of existing roads, there are often constraints that limit the choice of BMP. These constraints derive from the linear configuration of the road, the limited area within the existing right-of-way, the structural and safety requirements attendant to good roadway design, and the long-term maintainability of the roadway drainage systems. The MassHighway Handbook provides strategies for dealing with the constraints associated with providing stormwater BMPs for roadway redevelopment projects.

Roadway design can minimize impacts caused by stormwater. Reducing roadway width reduces the total and peak volume of runoff. Designing a road with country drainage (no road shoulders or curbs) disconnects roadway runoff. Disconnection of roadway runoff is eligible for the Low Impact Site Design Credit provided the drainage is disconnected in accordance with specifications outlined in Volume 3.

Like other parties, municipalities that work within wetlands jurisdictional areas and adjacent buffer zones must design and implement structural stormwater best management practices in accordance with the Stormwater Management Standards and the Stormwater Management Handbook. In addition, in municipalities and areas where state agencies operate stormwater systems, the DPWs (or other town or state agencies) must meet the "good housekeeping" requirement of the municipality's or agency's MS4 permit.

MassHighway has taken stormwater management one step further by working with MassDEP to develop the MassHighway Storm Water Handbook for Highways and Bridges. The purpose of the MassHighway Handbook is to provide guidance for persons involved in the design, permitting, review and implementation of state highway projects, especially those involving existing roadways where physical constraints often limit the stormwater management options available. These constraints, like those common to redevelopment sites, may make it difficult to comply precisely with the requirements of the Stormwater Management Standards and the Massachusetts Stormwater Handbook.[3] In response to these constraints, MassDEP and MHD developed specific design, permitting, review and implementation practices that meet the unique challenges of providing environmental protection for existing state roads. The information in the MassHighway Handbook may also aid in the planning and design of projects to build new highways and to add lanes to existing highways, since they may face similar difficulties in meeting the requirements of the Stormwater Management Standards.

Although it is very useful, the MassHighway Handbook does not allow MassHighway projects to proceed without individual review and approval by the issuing authority when subject to the Wetlands Protection Act Regulations, 310 CMR 10.00, or the 401 Water Quality Certification Regulations, 314 CMR 9.00. For example, MassHighway must provide a Conservation Commission with a project-specific Operation and Maintenance Plan in accordance with Standard 9 that documents how the project's post-construction BMPs will be operated and maintained.[4]

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[3] The 2004 MassHighway Handbook outlines standardized methods for dealing with these constraints as they apply to highway redevelopment projects. MassDEP and MassHighway intend to work together to provide guidance for add a lane projects when the 2004 Handbook is revised to reflect the 2008 changes to the Stormwater Management Standards.

[4] The general permit for municipal separate storm sewer systems (the MS4 Permit) requires MassHighway to develop and implement procedures for the proper operation and maintenance of stormwater BMPs. To

Some municipalities have asked if the MassHighway Handbook governs municipal road projects. The answer is no.[5] The MassHighway Handbook was developed in response to the unique problems and challenges arising out of the management of the state highway system. Like other project proponents, cities and towns planning road or other projects in areas subject to jurisdiction under the Wetlands Protection Act must design and implement LID, non-structural and structural best management practices in accordance with the Stormwater Management Standards and the Massachusetts Stormwater Handbook.

avoid duplication of effort, MassHighway may be able rely on the same procedures to fulfill the operation and maintenance requirements of Standard 9 and the MS 4 Permit.

[5] Although the MassHighway Handbook does not govern municipal road projects, cities and towns may find some of the information presented in the Handbook useful.

CDS® Inspection and Maintenance Guide

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.

CDS Model	Diameter ft	Diameter m	Distance from Water Surface to Top of Sediment Pile ft	Distance from Water Surface to Top of Sediment Pile m	Sediment Storage Capacity yd3	Sediment Storage Capacity m3
CDS2015-4	4	1.2	3.0	0.9	0.5	0.4
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

CONTECH Construction Products Inc. provides site solutions for the civil engineering industry. CONTECH's portfolio includes bridges, drainage, sanitary sewer, stormwater and earth stabilization products. For information on other CONTECH division offerings, visit contech-cpi.com or call 800.338.1122

The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266; 7,517,450 related foreign patents or other patents pending.

CONTECH CONSTRUCTION PRODUCTS INC.
800.925.5240
contechstormwater.com

CDS Inspection & Maintenance Log

CDS Model: ______________________ Location: ______________________

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than eighteen inches the system should be cleaned out. **Note: To avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

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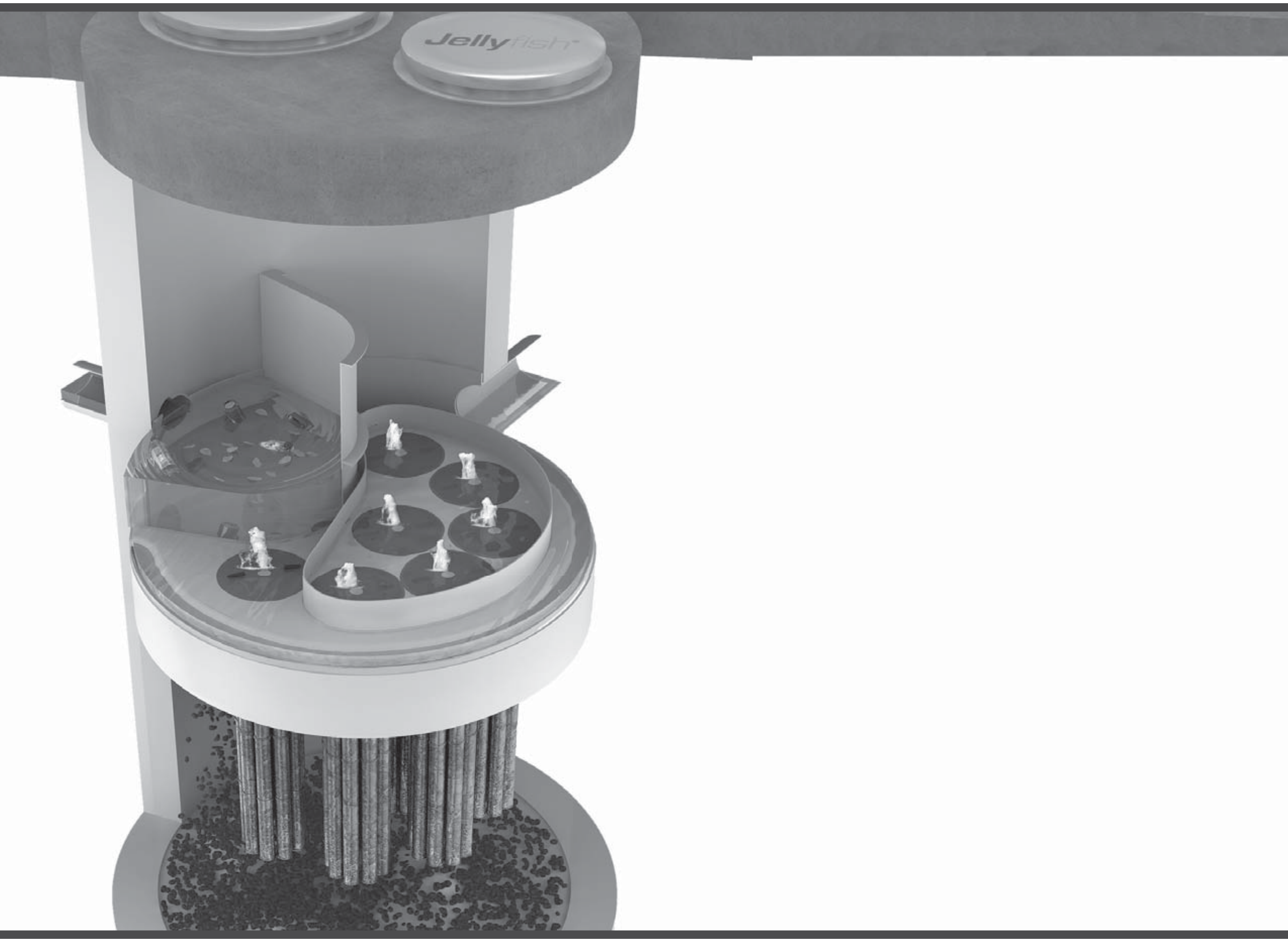
JellyFish® Filter Maintenance Guide



Jellyfish®

Jellyfish®

JELLYFISH® FILTER MANHOLE CONFIGURATIONS
INSPECTION & MAINTENANCE GUIDE

TABLE OF CONTENTS

Inspection and Maintenance Overview 3

Inspection Procedure....................4

Maintenance Procedure....................4

Cartridge Assembly & Cleaning....................5

Jellyfish Filter & Components....................6

Inspection Process 7

1.0 Inspection and Maintenance Overview

The primary purpose of the Jellyfish® Filter is to capture and remove pollutants from stormwater runoff. As with any filtration system, these pollutants must be removed to maintain the filter's maximum treatment performance. Regular inspection and maintenance are required to insure proper functioning of the system.

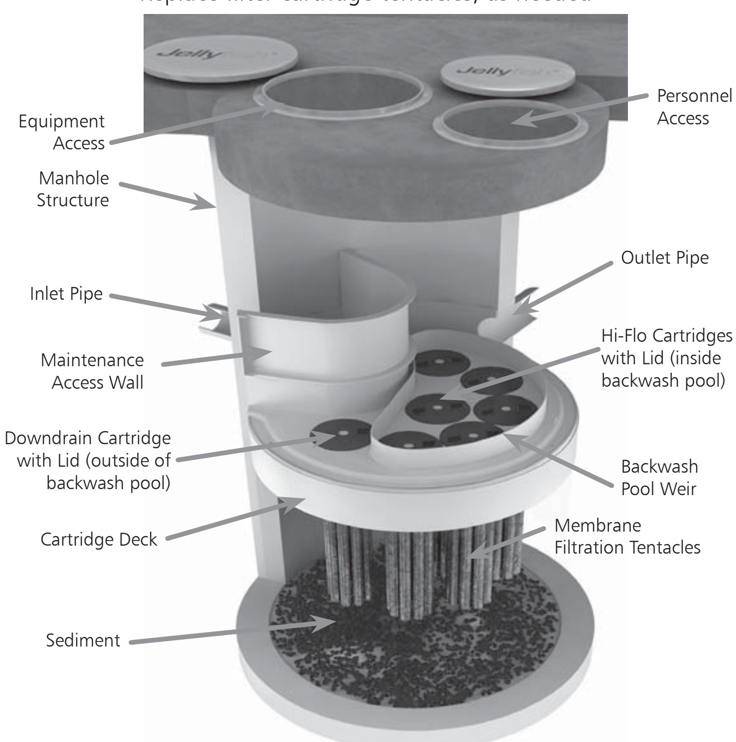
Maintenance frequencies and requirements are site specific and vary depending on pollutant loading. Additional maintenance activities may be required in the event of non-storm event runoff, such as base-flow or seasonal flow, an upstream chemical spill or due to excessive sediment loading from site erosion or extreme runoff events. It is a good practice to inspect the system after major storm events.

Inspection activities are typically conducted from surface observations and include:

- Observe if standing water is present
- Observe if there is any physical damage to the deck or cartridge lids
- Observe the amount of debris in the Maintenance Access Wall (MAW)

Maintenance activities typically include:

- Removal of oil, floatable trash and debris
- Removal of collected sediments
- Rinsing and re-installing the filter cartridges
- Replace filter cartridge tentacles, as needed



Note: Separator Skirt not shown

2.0 Inspection Timing

Inspection of the Jellyfish Filter is key in determining the maintenance requirements for, and to develop a history of the site's pollutant loading characteristics. In general, inspections should be performed at the times indicated below; *or per the approved project stormwater quality documents (if applicable), whichever is more frequent*.

1. Post-construction inspection is required prior to putting the Jellyfish Filter into service. All construction debris or construction-related sediment within the device must be removed, and any damage to system components repaired, before installing the filter cartridges.
2. A minimum of two inspections during the first year of operation to assess the sediment and floatable pollutant accumulation, and to ensure proper functioning of the system.
3. Inspection frequency in subsequent years is based on the inspection and maintenance plan developed in the first year of operation. Minimum frequency should be once per year.
4. Inspection is recommended after each major storm event.
5. Inspection is required immediately after an upstream oil, fuel or other chemical spill.

3.0 Inspection Procedure

The following procedure is recommended when performing inspections:

1. Provide traffic control measures as necessary.
2. Inspect the MAW for floatable pollutants such as trash, debris, and oil sheen.
3. Measure oil and sediment depth in several locations, by lowering a sediment probe through the MAW opening until contact is made with the floor of the structure. Record sediment depth, and presences of any oil layers.
4. Inspect cartridge lids. Missing or damaged cartridge lids to be replaced.
5. Inspect the MAW, cartridge deck, and backwash pool weir, for cracks or broken components. If damaged, repair is required.

3.1 Dry weather inspections

- Inspect the cartridge deck for standing water, and/or sediment on the deck.
- No standing water under normal operating conditions.
- Standing water inside the backwash pool, but not outside the backwash pool indicates that the filter cartridges need to be rinsed.

Inspection Utilitzing Sediment Probe

- Standing water outside the backwash pool may indicate a backwater condition caused by high water elevation in the receiving water body, or possibly a blockage in downstream infrastructure.
- Any appreciable sediment (≥1/16”) accumulated on the deck surface should be removed.

3.2 Wet weather inspections

- Observe the rate and movement of water in the unit. Note the depth of water above deck elevation within the MAW.
- Less than 6 inches, flow should be exiting the cartridge lids of each of the draindown cartridges (i.e. cartridges located outside the backwash pool).
- Greater than 6 inches, flow should be exiting the cartridge lids of each of the draindown cartridges and each of the hi-flo cartridges (i.e. cartridges located inside the backwash pool), and water should be overflowing the backwash pool weir.
- 18 inches or greater and relatively little flow is exiting the cartridge lids and outlet pipe, this condition indicates that the filter cartridges are occluded with sediment and need to be rinsed

4.0 Maintenance Requirements

Required maintenance for the Jellyfish Filter is based upon results of the most recent inspection, historical maintenance records, or the site specific water quality management plan; whichever is more frequent. In general, maintenance requires some combination of the following:

1. Sediment removal for depths reaching 12 inches or greater, or within 3 years of the most recent sediment cleaning, whichever occurs sooner.
2. Floatable trash, debris, and oil removal.
3. Deck cleaned and free from sediment.
4. Filter cartridges rinsed and re-installed as required by the most recent inspection results, or within 12 months of the most recent filter rinsing, whichever occurs sooner.
5. Replace tentacles if rinsing does not restore adequate hydraulic capacity, remove accumulated sediment, or if damaged or missing. It is recommended that tentacles should remain in service no longer than 5 years before replacement.
6. Damaged or missing cartridge deck components must be repaired or replaced as indicated by results of the most recent inspection.
7. The unit must be cleaned out and filter cartridges inspected immediately after an upstream oil, fuel, or chemical spill. Filter cartridge tentacles should be replaced if damaged or compromised by the spill.

5.0 Maintenance Procedure

The following procedures are recommended when maintaining the Jellyfish Filter:

1. Provide traffic control measures as necessary.
2. Open all covers and hatches. Use ventilation equipment as required, according to confined space entry procedures.
3. Caution: Dropping objects onto the cartridge deck may cause damage.
4. Perform Inspection Procedure prior to maintenance activity.
5. To access the cartridge deck for filter cartridge service, descend the ladder and step directly onto the deck. Caution: Do not step onto the maintenance access wall (MAW) or backwash pool weir, as damage may result. Note that the cartridge deck may be slippery.
6. Maximum weight of maintenance crew and equipment on the cartridge deck not to exceed 450 lbs.

5.1 Filter Cartridge Removal

1. Remove a cartridge lid.
2. Remove cartridges from the deck using the lifting loops in the cartridge head plate.   Rope or a lifting device (available from Contech) should be used. Caution: Should a snag occur, do not force the cartridge upward as damage to the tentacles may result. Wet cartridges typically weigh between 100 and 125 lbs.
3. Replace and secure the cartridge lid on the exposed empty receptacle as a safety precaution. Contech does not recommend exposing more than one empty cartridge receptacle at a time.

5.2 Filter Cartridge Rinsing

1. Remove all 11 tentacles from the cartridge head plate. Take care not to damage or break the plastic threaded nut or connector.
2. Position tentacles in a container (or over the MAW), with the threaded connector (open end) facing down, so rinse water is flushed through the membrane and captured in the container.

Cartridge Removal & Lifting Device

3. Using the Jellyfish rinse tool (available from Contech) or a low-pressure garden hose sprayer, direct water spray onto the tentacle membrane, sweeping from top to bottom along the length of the tentacle. Rinse until all sediment is removed from the membrane. Caution: Do not use a high pressure sprayer or focused stream of water on the membrane. Excessive water pressure may damage the membrane.

4. Collected rinse water is typically removed by vacuum hose.
5. Reattach tentacles to cartridge head plate. Reuse O-rings and nuts, ensuring proper placement on each tentacle.

5.3 Cleaning Procedure

1. Perform vacuum cleaning of the Jellyfish Filter only after filter cartridges have been removed from the system. Access the lower chamber for vacuum cleaning only through the maintenance access wall (MAW) opening, being careful not to damage the flexible plastic separator skirt that is attached to the underside of the deck. The separator skirt surrounds the filter cartridge zone, and could be torn if contacted by the wand. Do not lower the vacuum wand through a cartridge receptacle, as damage to the receptacle will result.
2. Vacuum floatable trash, debris, and oil, from the MAW opening. Alternatively, floatable solids may be removed by a net or skimmer.

Tentacle Rinse Using Jellyfish Rinse Tool

3. Pressure wash cartridge deck and receptacles to remove all sediment and debris. Sediment should be rinsed into the sump area. Take care not to flush rinse water into the outlet pipe.
4. Remove water from the sump area. Vacuum or pump equipment should only be introduced through the MAW.
5. Remove the sediment from the bottom of the unit through the MAW opening.

Vacuuming Sump Through MAW

6. For larger diameter Jellyfish Filter manholes (≥8-ft) and vaults without an MAW opening, complete sediment removal may be facilitated by removing a cartridge lid from an empty receptacle and inserting a jetting wand (not a vacuum wand) through the receptacle. Use the sprayer to rinse loosened sediment toward the vacuum hose in the MAW opening, being careful not to damage the receptacle.
7. After the unit is clean, re-fill the lower chamber with water if required by the local jurisdiction, and re-install filter cartridges.
8. Dispose of sediment, floatable trash and debris, oil, spent tentacles, and water according to local regulatory requirements.

5.4 Filter Cartridge Replacement

1. Cartridges should be installed after the deck has been cleaned. It is important that the receptacle surfaces be free from grit and debris.
2. If rinsing is ineffective in removing sediment from the tentacles, or if tentacles are damaged, provisions must be made to replace the spent or damaged tentacles with new tentacles. Contact Contech to order replacement tentacles.
3. Lower filter cartridge to the cartridge deck. Remove cartridge lid from deck and carefully lower the filter cartridge into the receptacle until head plate gasket is seated squarely in receptacle. Caution: Should a snag occur when lowering the cartridge into the receptacle, do not force the cartridge downward; damage may occur.
4. Replace the cartridge lid and check fit before completing rotation to a firm hand-tight attachment.

5.5 Chemical Spills

Caution: If a chemical spill has been captured, do not attempt maintenance. Immediately contact the local hazard response agency and contact Contech.

6.0 Related Maintenance Activities

Jellyfish units are often just one of many structures in a more comprehensive stormwater drainage and treatment system.

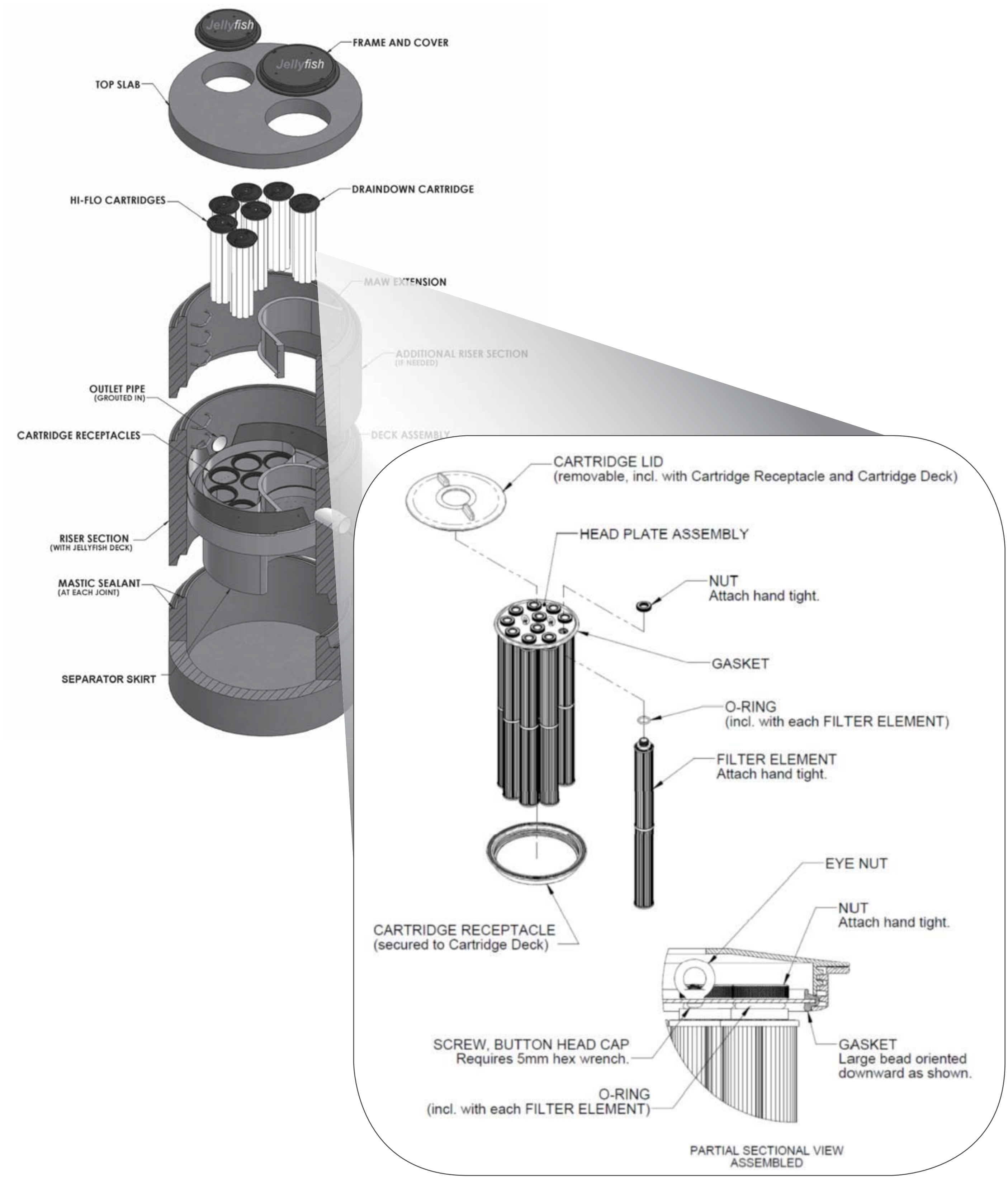
In order for maintenance of the Jellyfish filter to be successful, it is imperative that all other components be properly maintained. The maintenance and repair of upstream facilities should be carried out prior to Jellyfish maintenance activities.

In addition to considering upstream facilities, it is also important to correct any problems identified in the drainage area. Drainage area concerns may include: erosion problems, heavy oil loading, and discharges of inappropriate materials.

7.0 Material Disposal

The accumulated sediment found in stormwater treatment and conveyance systems must be handled and disposed of in accordance with regulatory protocols. It is possible for sediments to contain measurable concentrations of heavy metals and organic chemicals (such as pesticides and petroleum products). Areas with the greatest potential for high pollutant loading include industrial areas and heavily traveled roads. Sediments and water must be disposed of in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. This typically requires coordination with a local landfill for solid waste disposal. For liquid waste disposal a number of options are available including a municipal vacuum truck decant facility, local waste water treatment plant or on-site treatment and discharge.

Jellyfish Filter Components & Filter Cartridge



Jellyfish Filter Inspection and Maintenance Log						
Owner:				Jellyfish Model No:		
Location:				GPS Coordinates:		
Lande Use:	Commercial:		Industrial:		Service Station:	
	Roadway/Highway:		Airport:		Residential:	

Date/Time:						
Inspector:						
Maintenance Contractor:						
Visible Oil Present: (Y/N)						
Oil Quantity Removed:						
Floatable Debris Present: (Y/N)						
Floatable Debris Removed: (Y/N)						
Water Depth in Backwash Pool						
Draindown Cartridges externally rinsed and recommissioned: (Y/N)						
New tentacles put on Cartridges: (Y/N)						
Hi-Flo Cartridges externally rinsed and recommissioned: (Y/N)						
New tentacles put on Hi-Flo Cartridges: (Y/N)						
Sediment Depth Measured: (Y/N)						
Sediment Depth (inches or mm):						
Sediment Removed: (Y/N)						
Cartridge Lids intact: (Y/N)						
Observed Damage:						
Comments:						

Jellyfish®

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Support

- Drawings and specifications are available at ContechES.com/jellyfish.
- Site-specific design support is available from Contech Engineered Solutions.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, wastewater treatment and earth stabilization products. For information on other Contech segment offerings, visit ContechES.com or call 800.338.1122

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CONTECH®
ENGINEERED SOLUTIONS

Stormceptor® STC
Owner's Manual

Stormceptor® STC

Table of Contents

TITLE .... SECTION

Stormceptor Overview 1

Stormceptor Operation and Components 2

Stormceptor Identification 3

Stormceptor Inspection and Maintenance 4

Recommended Stormceptor Inspection Procedure

Recommended Stormceptor Maintenance Procedure

Contact Information 5

For patent information, go to www.ContechES.com/ip.

Your selection of a Stormceptor® means that you have chosen the most recognized and efficient stormwater oil/sediment separator available for protecting the environment. Stormceptor is a pollution control device often referred to as a "Hydrodynamic Separator (HDS)" or an "Oil Grit Separator (OGS)", engineered to remove and retain pollutants from stormwater runoff to protect our lakes, rivers and streams from the harmful effects of non-point source pollution.

1 – Stormceptor Overview

Stormceptor is a patented stormwater quality structure most often utilized as a treatment component of the underground storm drain network for stormwater pollution prevention. Stormceptor is designed to remove sediment, total suspended solids (TSS), other pollutants attached to sediment, hydrocarbons and free oil from stormwater runoff. Collectively the Stormceptor provides spill protection and prevents non-point source pollution from entering downstream waterways.

Key benefits of Stormceptor include:

- Removes sediment, suspended solids, debris, nutrients, heavy metals, and hydrocarbons (oil and grease) from runoff and snowmelt.
- Will not scour or re-suspend trapped pollutants.
- Provides sediment and oil storage.
- Provides spill control for accidents, commercial and industrial developments.
- Easy to inspect and maintain (vacuum truck).
- "STORMCEPTOR" is clearly marked on the access cover (excluding inlet designs).
- Relatively small footprint.
- 3rd Party tested and independently verified.
- Dedicated team of experts available to provide support.

Model Types:

- STC (Standard)
- EOS (Extended Oil Storage)
- OSR (Oil and Sand Removal)
- MAX (Custom designed unit, specific to site)

Configuration Types:

- Inlet unit (accommodates inlet flow entry, and multi-pipe entry)
- In-Line (accommodates multi-pipe entry)
- Submerged Unit (accommodates the site's tailwater conditions)
- Series Unit (combines treatment in two systems)

PLEASE MAINTAIN YOUR STORMCEPTOR

To ensure long-term environmental protection through continued performance as originally designed for your site, Stormceptor must be maintained, as any stormwater treatment practice does. The need for maintenance is determined through inspection of the Stormceptor. Procedures for inspection are provided within this document. Maintenance of the Stormceptor is performed from the surface via vacuum truck.

If you require information about Stormceptor, or assistance in finding resources to facilitate inspections or maintenance of your Stormceptor please call Contech at 1-800-338-1122.

2 – Stormceptor Operation and Components

Stormceptor is a flexibly designed underground stormwater quality treatment device that is unparalleled in its effectiveness for pollutant capture and retention using patented flow separation technology. Stormceptor creates a non-turbulent treatment environment below the insert platform within the system. The insert diverts water into the lower chamber, allowing free oils and debris to rise, and sediment to settle under relatively low velocity conditions. These pollutants are trapped and stored below the insert and protected from large runoff events for later removal during the maintenance procedure.

With thousands of units operating worldwide, Stormceptor delivers reliable protection every day, in every storm. The patented Stormceptor design prohibits the scour and release of captured pollutants, ensuring superior water quality treatment and protection during even the most extreme storm events. Stormceptor's proven performance is backed by the longest record of lab and field verification in the industry.

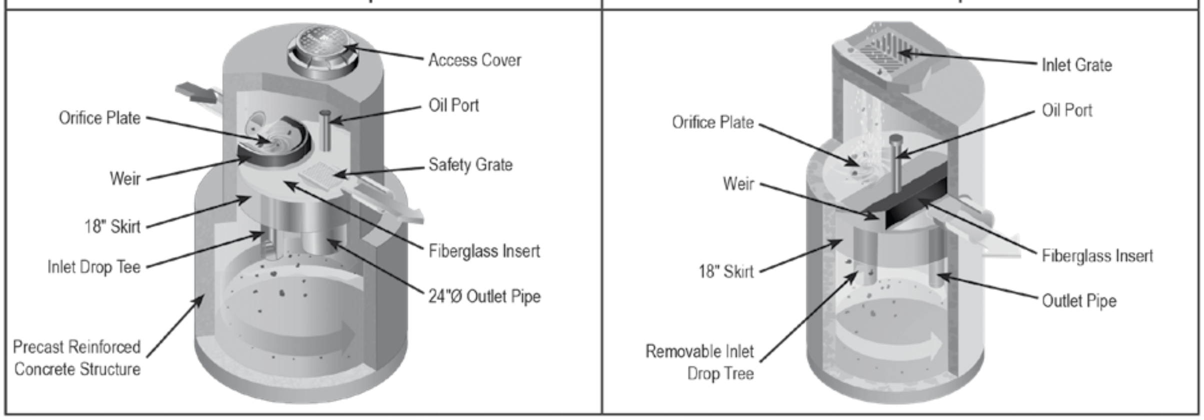
Stormceptor Schematic and Component Functions

Below are schematics of two common Stormceptor configurations with key components identified and their functions briefly described.

- **Manhole access cover** – provides access to the subsurface components
- **Precast reinforced concrete structure** – provides the vessel's watertight structural support
- **Fiberglass insert** – separates vessel into upper and lower chambers
- **Weir** – directs incoming stormwater and oil spills into the lower chamber
- **Orifice plate** – prevents scour of accumulated pollutants
- **Inlet drop tee** – conveys stormwater into the lower chamber
- **Fiberglass skirt** – provides double-wall containment of hydrocarbons
- **Outlet riser pipe** – conveys treated water to the upper chamber; primary vacuum line access port for sediment removal
- **Oil inspection port** – primary access for measuring oil depth and oil removal
- **Safety grate** – safety measure to cover riser pipe in the event of manned entry into vessel

Figure 1. Inline Stormceptor

Figure 2. Inlet Stormceptor



3 – Stormceptor Identification

Stormceptor is available in both precast concrete and fiberglass vessels, with precast concrete often being the dominant material of construction.

In the Stormceptor, a patented, engineered fiberglass insert separates the structure into an upper chamber and lower chamber. The lower chamber will remain full of water, as this is where the pollutants are sequestered for later removal. Multiple Stormceptor model (STC, OSR, EOS and MAX) configurations exist, each to be inspected and maintained in a similar fashion.

Each unit is easily identifiable as a Stormceptor by the trade name "Stormceptor" embossed on each access cover at the surface. To determine the location of "inlet" Stormceptor units with horizontal catch basin inlet, look down into the grate as the Stormceptor insert will be visible. The name "Stormceptor" is not embossed on inlet models due to the variability of inlet grates used/approved across North America.

Once the location of the Stormceptor is determined, the model number may be identified by comparing the measured depth from the fiberglass insert level at the outlet pipe's invert (water level) to the bottom of the tank using Table 1.

In addition, starting in 1996 a metal serial number tag containing the model number has been affixed to the inside of the unit, on the fiberglass insert. If the unit does not have a serial number, or if there is any uncertainty regarding the size of the unit using depth measurements, please contact your local Contech Representative for assistance.

Sizes/Models

Typical general dimensions and capacities of the standard precast STC, EOS and OSR Stormceptor models are provided in Tables 1 and 2. Typical rim to invert measurements are provided later in this document. The total depth for cleaning will be the sum of the depth from outlet pipe invert (generally the water level) to rim (grade) and the depth from outlet pipe invert to the precast bottom of the unit. Note that depths and capacities may vary slightly between regions.

Table 1. Stormceptor Dimensions - Insert to Base of Structure

STC Model	Insert to Base (in.)
450	60
900	55
1200	71
1800	105
2400	94
3600	134
4800	128
6000	150
7200	134
11000*	128
13000*	150
16000*	134

Notes:
1. Depth Below Pipe Inlet Invert to the Inside Top Base Slab can vary slightly by manufacturing facility, and can be modified to accommodate specific site designs, pollutant loads or site conditions. Contact your local representative for assistance.
**Consist of two chamber structures in series.*

Table 2. Storage Capacities

STC Model	Hydrocarbon Storage Capacity (gal)	Sediment Capacity (ft^3)
450	86	46
900	251	89
1200	251	127
1800	251	207
2400	840	205
3600	840	373
4800	909	543
6000	909	687
7200	1059	839
11000*	2797	1089
13000*	2797	1374
16000*	3055	1677

Notes:
1. Hydrocarbon and Sediment capacities can be modified to accommodate specific site design requirements, contact your local representative for assistance.
**Consist of two chamber structures in series*

4 – Stormceptor Inspection and Maintenance

Regular inspection and maintenance is a proven, cost-effective way to maximize water resource protection for all stormwater pollution control practices, and is required to insure proper functioning of the Stormceptor. Both inspection and maintenance of the Stormceptor is easily performed from the surface. Stormceptor's patented technology has no moving parts, simplifying the inspection and maintenance process.

Please refer to the following information and guidelines before conducting inspection and maintenance activities.

When is inspection needed?

- Post-construction inspection is required prior to putting the Stormceptor into service.
- Routine inspections are recommended during the first year of operation to accurately assess the sediment accumulation.
- Inspection frequency in subsequent years is based on the maintenance plan developed in the first year.
- Inspections should also be performed immediately after oil, fuel, or other chemical spills.

When is maintenance cleaning needed?

- For optimum performance, the unit should be cleaned out once the sediment depth reaches the recommended maintenance sediment depth, which is approximately 15% of the unit's total storage capacity (see Table 3). The frequency should be adjusted based on historical inspection results due to variable site pollutant loading.
- Sediment removal is easier when removed on a regular basis at or prior to the recommended maintenance sediment depths, as sediment build-up can compact making removal more difficult.
- The unit should be cleaned out immediately after an oil, fuel or chemical spill.

What conditions can compromise Stormceptor performance?

- If construction sediment and debris is not removed prior to activating the Stormceptor unit, maintenance frequency may be reduced.
- If the system is not maintained regularly and fills with sediment and debris beyond the capacity as indicated in Table 2, pollutant removal efficiency may be reduced.
- If an oil spill(s) exceeds the oil capacity of the system, subsequent spills may not be captured.
- If debris clogs the inlet of the system, removal efficiency of sediment and hydrocarbons may be reduced.
- If a downstream blockage occurs, a backwater condition may occur for the Stormceptor and removal efficiency of sediment and hydrocarbons may be reduced.

What training is required?

The Stormceptor is to be inspected and maintained by professional vacuum cleaning service providers with experience in the maintenance of underground tanks, sewers and catch basins.

For typical inspection and maintenance activities, no specific supplemental training is required

Recommended Stormceptor Inspection Procedure:

- Stormceptor is to be inspected from grade through a standard surface manhole access cover.
- Sediment and oil depth inspections are performed with a sediment probe and oil dipstick.
- Oil depth is measured through the oil inspection port, either a 4-inch or 6-inch diameter port.
- Sediment depth can be measured through the oil inspection port or the 24-inch diameter outlet riser pipe.
- Inspections also involve a visual inspection of the internal components of the system.

What equipment is typically required for maintenance?

- Vacuum truck equipped with water hose and jet nozzle
- Small pump and tubing for oil removal
- Manhole access cover lifting tool
- Oil dipstick / Sediment probe with ball valve (typically ¾-inch to 1-inch diameter)
- Flashlight
- Camera
- Data log / Inspection Report
- Safety cones
- Hard hats, safety shoes, safety glasses, chemical-resistant gloves, and hearing protection for service providers
- Gas analyzer, respiratory gear, hoist and safety harness for specially trained personnel if confined space entry is required

Figure 3.

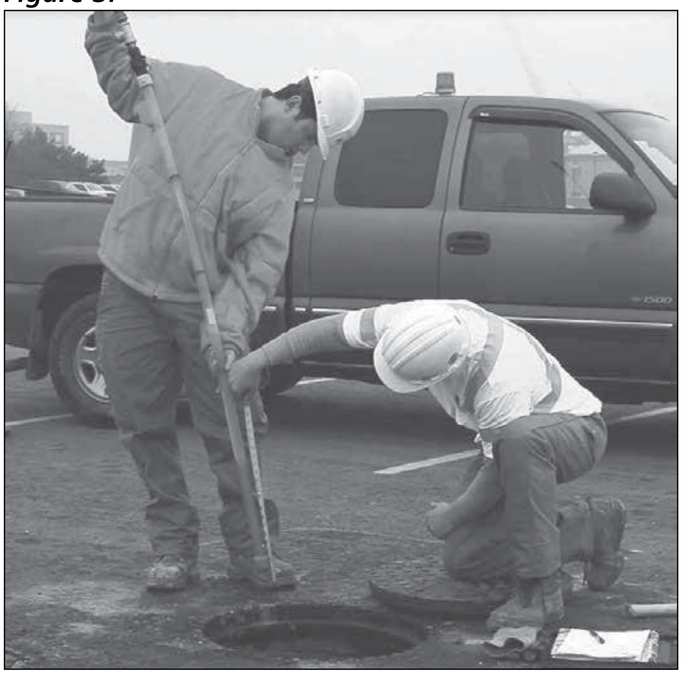
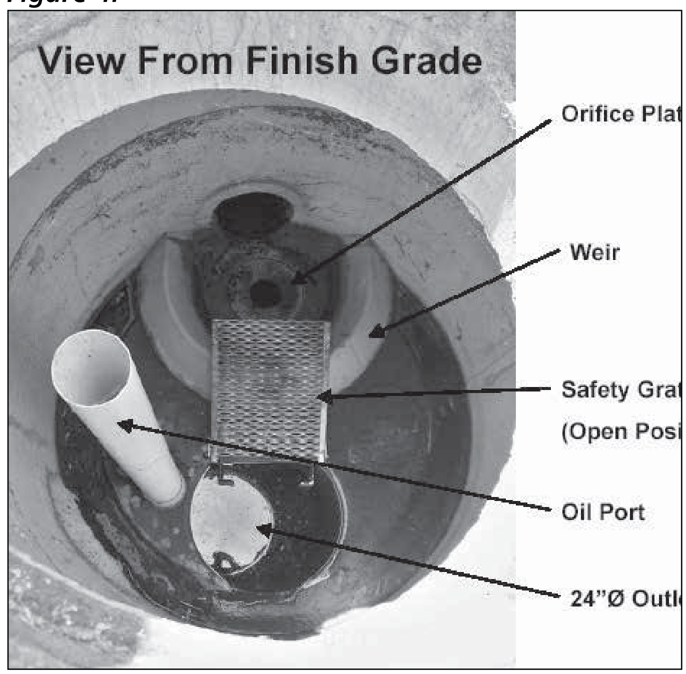


Figure 4.



Recommended Stormceptor Maintenance Procedure

Maintenance of Stormceptor is performed using a vacuum truck. No entry into the unit is required for maintenance. DO NOT ENTER THE STORMCEPTOR CHAMBER unless you have the proper personal safety equipment, have been trained and are qualified to enter a confined space, as identified by local Occupational Safety and Health Regulations (e.g. 29 CFR 1910.146). Without the proper equipment, training and permit, entry into confined spaces can result in serious bodily harm and potentially death. Consult local and/or state regulations to determine the requirements for confined space entry. Be aware, and take precaution that the Stormceptor fiberglass insert may be slippery. In addition, be aware that some units do not have a safety grate to cover the outlet riser pipe that leads to the submerged, lower chamber.

- Ideally maintenance should be conducted during dry weather conditions when no flow is entering the unit.
- Stormceptor is to be maintained through a standard surface manhole access cover.
- Insert the oil dipstick into the oil inspection port. If oil is present, pump off the oil layer into separate containment using a small pump and tubing.
- Maintenance cleaning of accumulated sediment is performed with a vacuum truck.
  - » For 6-ft diameter models and larger, the vacuum hose is inserted into the lower chamber via the 24-inch outlet riser pipe (See Fig. 5).
  - » For 4-ft diameter model, the removable drop tee is lifted out, and the vacuum hose is inserted into the lower chamber via the 12-inch drop tee hole (See Fig. 6).

Figure 5.

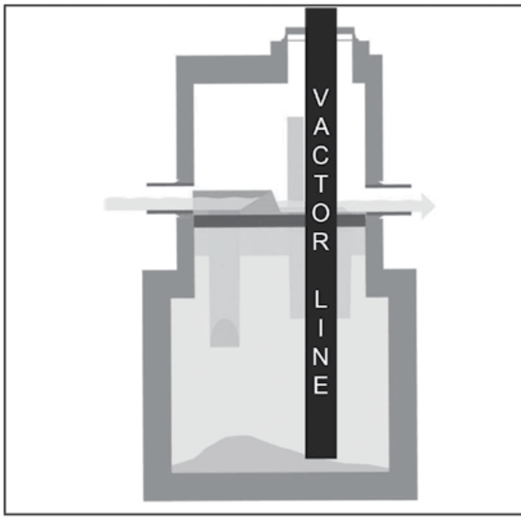
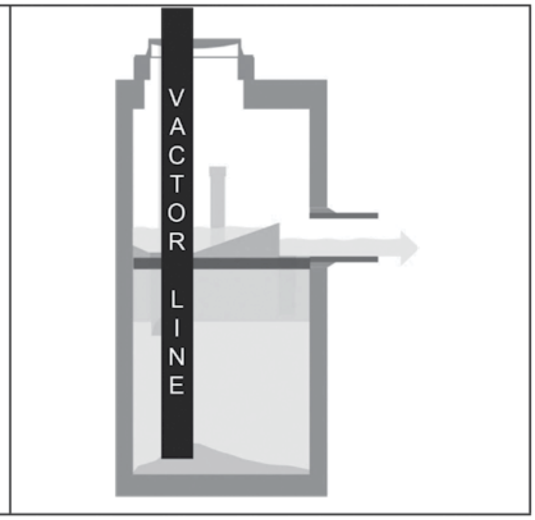


Figure 6.



- Using the vacuum hose, decant the water from the lower chamber into a separate containment tank or to the sanitary sewer, if permitted by the local regulating authority.
- Remove the sediment sludge from the bottom of the unit using the vacuum hose. For large Stormceptor units, a flexible hose is often connected to the primary vacuum line for ease of movement in the lower chamber.
- Units that have not been maintained regularly, have surpassed the maximum recommended sediment capacity, or contain damaged components may require manned entry by trained personnel using safe and proper confined space entry procedures.

What is required for proper disposal?

The requirements for the disposal of material removed from Stormceptor units are similar to that of any other stormwater treatment Best Management Practices (BMP). Local guidelines should be consulted prior to disposal of the separator contents. In most areas the sediment, once dewatered, can be disposed of in a sanitary landfill. It is not anticipated that the sediment would be classified as hazardous waste. This could be site and pollutant dependent. In some cases, approval from the disposal facility operator/agency may be required.

What about oil spills?

Stormceptor is often implemented in areas where there is high potential for oil, fuel or other hydrocarbon or chemical spills. Stormceptor units should be cleaned immediately after a spill occurs by a licensed liquid waste hauler. You should also notify the appropriate regulatory agencies as required in the event of a spill.

What if I see an oil rainbow or sheen at the Stormceptor outlet?

With a steady influx of water with high concentrations of oil, a sheen may be noticeable at the Stormceptor outlet. This may occur because a hydrocarbon rainbow or sheen can be seen at very small oil concentrations (< 10 ppm). Stormceptor is effective at removing 95% of free oil, and the appearance of a sheen at the outlet with high influent oil concentrations does not mean unit is not working to this level of removal. In addition, if the influent oil is emulsified, the Stormceptor will not be able to remove it. The Stormceptor is designed for free oil removal and not emulsified or dissolved oil conditions.

What factors affect the costs involved with inspection/maintenance?

The Vacuum Service Industry for stormwater drainage and sewer systems is a well-established sector of the service industry that cleans underground tanks, sewers and catch basins. Costs to clean Stormceptor units will vary. Inspection and maintenance costs are most often based on unit size, the number of units on a site, sediment/oil/hazardous material loads, transportation distances, tipping fees, disposal requirements and other local regulations.

What factors predict maintenance frequency?

Maintenance frequency will vary with the amount of pollution on your site (number of hydrocarbon spills, amount of sediment, site activity and use, etc.). It is recommended that the frequency of maintenance be increased or reduced based on local conditions. If the sediment load is high from an unstable site or sediment loads transported from upstream catchments, maintenance may be required semi-annually. Conversely once a site has stabilized, maintenance may be required less frequently (for example: two to seven year, site and situation dependent). Maintenance should be performed immediately after an oil spill or once the sediment depth in Stormceptor reaches the value specified in Table 3 based on the unit size.

Table 3. Recommended Sediment Depths Indicating Maintenance

STC Model	Maintenance Sediment Depth (in)
450	8
900	8
1200	10
1800	15
2400	12
3600	17
4800	15
6000	18
7200	15
11000*	17
13000*	20
16000*	17

Notes:
1. The values above are for typical standard units.
** Per structure.*

Replacement parts

Since there are no moving parts during operation in a Stormceptor, broken, damaged, or worn parts are not typically encountered. Therefore, inspection and maintenance activities are generally focused on pollutant removal. However, if replacements parts are necessary, they may be purchased by contacting your local Contech Representative or call 800-338-1122.

The benefits of regular inspection and maintenance are many – from ensuring maximum operation efficiency, to keeping maintenance costs low, to the continued protection of natural waterways – and provide the key to Stormceptor's long and effective service life.

Stormceptor Inspection and Maintenance Log

Stormceptor Model No: ______________________________

Allowable Sediment Depth: ______________________________

Serial Number: ______________________________

Installation Date: ______________________________

Location Description of Unit: ______________________________

Other Comments: ______________________________

5 – Contact Information

Questions regarding the Stormceptor can be addressed by contacting your local Contech representative or by calling 800-338-1122.

SUPPORT

- Drawings and specifications are available at www.ContechES.com.
- Site-specific design support is available from our engineers.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, and earth stabilization products. For information, visit www.ContechES.com or call 800.338.1122

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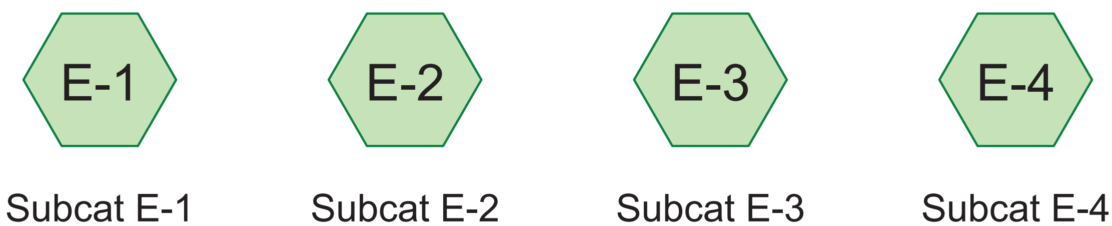
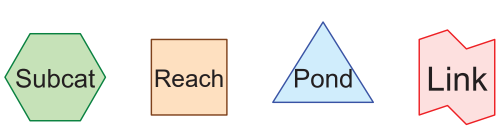
SECTION 3.0

HYROCAD WORKSHEETS……………….EXISTING CONDITIONS





Routing Diagram for 2513-02 - Existing HydroCAD
Prepared by Allen & Major Associates, Inc., Printed 11/13/2020
HydroCAD® 10.00-26 s/n 02947 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
54,887	61	>75% Grass cover, Good, HSG B (E-1, E-3, E-4)
32,088	74	>75% Grass cover, Good, HSG C (E-1, E-2, E-3, E-4)
620	80	>75% Grass cover, Good, HSG D (E-1)
19,809	98	Paved parking, HSG B (E-1, E-3, E-4)
12,339	98	Paved parking, HSG C (E-3, E-4)
482	98	Paved parking, HSG D (E-1)
5,312	98	Roofs, HSG B (E-1, E-3)
104,070	55	Woods, Good, HSG B (E-1, E-3, E-4)
444,292	70	Woods, Good, HSG C (E-1, E-2, E-3, E-4)
155,494	77	Woods, Good, HSG D (E-1, E-4)
829,392	**70**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
184,078	HSG B	E-1, E-3, E-4
488,719	HSG C	E-1, E-2, E-3, E-4
156,595	HSG D	E-1, E-4
0	Other	
829,392		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
0	54,887	32,088	620	0	87,595	>75% Grass cover, Good	
0	19,809	12,339	482	0	32,630	Paved parking	
0	5,312	0	0	0	5,312	Roofs	
0	104,070	444,292	155,494	0	703,856	Woods, Good	
0	**184,078**	**488,719**	**156,595**	**0**	**829,392**	**TOTAL AREA**	

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 E-1: Subcat E-1 Runoff Area=319,884 sf 4.40% Impervious Runoff Depth=0.82"
Flow Length=844' Tc=16.3 min CN=70 Runoff=4.57 cfs 21,919 cf

Subcatchment E-2: Subcat E-2 Runoff Area=19,655 sf 0.00% Impervious Runoff Depth=0.82"
Flow Length=138' Tc=11.8 min CN=70 Runoff=0.31 cfs 1,347 cf

Subcatchment E-3: Subcat E-3 Runoff Area=206,021 sf 9.02% Impervious Runoff Depth=0.87"
Flow Length=1,516' Tc=23.2 min CN=71 Runoff=2.77 cfs 14,972 cf

Subcatchment E-4: Subcat E-4 Runoff Area=283,833 sf 1.86% Impervious Runoff Depth=0.82"
Flow Length=845' Tc=20.1 min CN=70 Runoff=3.74 cfs 19,449 cf

Total Runoff Area = 829,392 sf Runoff Volume = 57,687 cf Average Runoff Depth = 0.83"
95.43% Pervious = 791,450 sf 4.57% Impervious = 37,942 sf

Summary for Subcatchment E-1: Subcat E-1

Runoff = 4.57 cfs @ 12.26 hrs, Volume= 21,919 cf, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
4,296	98	Roofs, HSG B
9,307	98	Paved parking, HSG B
32,039	61	>75% Grass cover, Good, HSG B
76,085	55	Woods, Good, HSG B
482	98	Paved parking, HSG D
620	80	>75% Grass cover, Good, HSG D
155,338	77	Woods, Good, HSG D
38,171	70	Woods, Good, HSG C
3,545	74	>75% Grass cover, Good, HSG C
319,884	70	Weighted Average
305,799		95.60% Pervious Area
14,085		4.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0625	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
8.4	794	0.1000	1.58		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
16.3	844	Total			

Summary for Subcatchment E-2: Subcat E-2

Runoff = 0.31 cfs @ 12.19 hrs, Volume= 1,347 cf, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
548	74	>75% Grass cover, Good, HSG C
19,107	70	Woods, Good, HSG C
19,655	70	Weighted Average
19,655		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	50	0.0330	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
1.5	88	0.0400	1.00		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
11.8	138	Total			

Summary for Subcatchment E-3: Subcat E-3

Runoff = 2.77 cfs @ 12.36 hrs, Volume= 14,972 cf, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,016	98	Roofs, HSG B
9,435	98	Paved parking, HSG B
21,519	61	>75% Grass cover, Good, HSG B
18,762	55	Woods, Good, HSG B
8,128	98	Paved parking, HSG C
125,472	70	Woods, Good, HSG C
21,689	74	>75% Grass cover, Good, HSG C
206,021	71	Weighted Average
187,442		90.98% Pervious Area
18,579		9.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.10"
1.1	119	0.0670	1.81		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.8	99	0.1600	2.00		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.8	177	0.0560	1.66		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
13.8	1,071	0.0670	1.29		**Shallow Concentrated Flow, E-F** Woodland Kv= 5.0 fps
23.2	1,516	Total			

Summary for Subcatchment E-4: Subcat E-4

Runoff = 3.74 cfs @ 12.32 hrs, Volume= 19,449 cf, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
156	77	Woods, Good, HSG D
1,067	98	Paved parking, HSG B
1,328	61	>75% Grass cover, Good, HSG B
9,223	55	Woods, Good, HSG B
261,542	70	Woods, Good, HSG C
4,210	98	Paved parking, HSG C
6,306	74	>75% Grass cover, Good, HSG C
283,833	70	Weighted Average
278,555		98.14% Pervious Area
5,278		1.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
7.6	795	0.1200	1.73		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
20.1	845	Total			

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 E-1: Subcat E-1 Runoff Area=319,884 sf 4.40% Impervious Runoff Depth=1.87"
Flow Length=844' Tc=16.3 min CN=70 Runoff=11.43 cfs 49,974 cf

Subcatchment E-2: Subcat E-2 Runoff Area=19,655 sf 0.00% Impervious Runoff Depth=1.87"
Flow Length=138' Tc=11.8 min CN=70 Runoff=0.79 cfs 3,071 cf

Subcatchment E-3: Subcat E-3 Runoff Area=206,021 sf 9.02% Impervious Runoff Depth=1.95"
Flow Length=1,516' Tc=23.2 min CN=71 Runoff=6.69 cfs 33,507 cf

Subcatchment E-4: Subcat E-4 Runoff Area=283,833 sf 1.86% Impervious Runoff Depth=1.87"
Flow Length=845' Tc=20.1 min CN=70 Runoff=9.34 cfs 44,342 cf

Total Runoff Area = 829,392 sf Runoff Volume = 130,894 cf Average Runoff Depth = 1.89"
95.43% Pervious = 791,450 sf 4.57% Impervious = 37,942 sf

Summary for Subcatchment E-1: Subcat E-1

Runoff = 11.43 cfs @ 12.24 hrs, Volume= 49,974 cf, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
4,296	98	Roofs, HSG B
9,307	98	Paved parking, HSG B
32,039	61	>75% Grass cover, Good, HSG B
76,085	55	Woods, Good, HSG B
482	98	Paved parking, HSG D
620	80	>75% Grass cover, Good, HSG D
155,338	77	Woods, Good, HSG D
38,171	70	Woods, Good, HSG C
3,545	74	>75% Grass cover, Good, HSG C
319,884	70	Weighted Average
305,799		95.60% Pervious Area
14,085		4.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0625	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
8.4	794	0.1000	1.58		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
16.3	844	Total			

Summary for Subcatchment E-2: Subcat E-2

Runoff = 0.79 cfs @ 12.17 hrs, Volume= 3,071 cf, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
548	74	>75% Grass cover, Good, HSG C
19,107	70	Woods, Good, HSG C
19,655	70	Weighted Average
19,655		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	50	0.0330	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
1.5	88	0.0400	1.00		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
11.8	138	Total			

Summary for Subcatchment E-3: Subcat E-3

Runoff = 6.69 cfs @ 12.34 hrs, Volume= 33,507 cf, Depth= 1.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,016	98	Roofs, HSG B
9,435	98	Paved parking, HSG B
21,519	61	>75% Grass cover, Good, HSG B
18,762	55	Woods, Good, HSG B
8,128	98	Paved parking, HSG C
125,472	70	Woods, Good, HSG C
21,689	74	>75% Grass cover, Good, HSG C
206,021	71	Weighted Average
187,442		90.98% Pervious Area
18,579		9.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.10"
1.1	119	0.0670	1.81		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.8	99	0.1600	2.00		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.8	177	0.0560	1.66		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
13.8	1,071	0.0670	1.29		**Shallow Concentrated Flow, E-F** Woodland Kv= 5.0 fps
23.2	1,516	Total			

Summary for Subcatchment E-4: Subcat E-4

Runoff = 9.34 cfs @ 12.29 hrs, Volume= 44,342 cf, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
156	77	Woods, Good, HSG D
1,067	98	Paved parking, HSG B
1,328	61	>75% Grass cover, Good, HSG B
9,223	55	Woods, Good, HSG B
261,542	70	Woods, Good, HSG C
4,210	98	Paved parking, HSG C
6,306	74	>75% Grass cover, Good, HSG C
283,833	70	Weighted Average
278,555		98.14% Pervious Area
5,278		1.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
7.6	795	0.1200	1.73		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
20.1	845	Total			

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 E-1: Subcat E-1 Runoff Area=319,884 sf 4.40% Impervious Runoff Depth=2.81"
Flow Length=844' Tc=16.3 min CN=70 Runoff=17.48 cfs 74,990 cf

Subcatchment E-2: Subcat E-2 Runoff Area=19,655 sf 0.00% Impervious Runoff Depth=2.81"
Flow Length=138' Tc=11.8 min CN=70 Runoff=1.21 cfs 4,608 cf

Subcatchment E-3: Subcat E-3 Runoff Area=206,021 sf 9.02% Impervious Runoff Depth=2.91"
Flow Length=1,516' Tc=23.2 min CN=71 Runoff=10.12 cfs 49,905 cf

Subcatchment E-4: Subcat E-4 Runoff Area=283,833 sf 1.86% Impervious Runoff Depth=2.81"
Flow Length=845' Tc=20.1 min CN=70 Runoff=14.28 cfs 66,538 cf

Total Runoff Area = 829,392 sf Runoff Volume = 196,041 cf Average Runoff Depth = 2.84"
95.43% Pervious = 791,450 sf 4.57% Impervious = 37,942 sf

Summary for Subcatchment E-1: Subcat E-1

Runoff = 17.48 cfs @ 12.23 hrs, Volume= 74,990 cf, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
4,296	98	Roofs, HSG B
9,307	98	Paved parking, HSG B
32,039	61	>75% Grass cover, Good, HSG B
76,085	55	Woods, Good, HSG B
482	98	Paved parking, HSG D
620	80	>75% Grass cover, Good, HSG D
155,338	77	Woods, Good, HSG D
38,171	70	Woods, Good, HSG C
3,545	74	>75% Grass cover, Good, HSG C
319,884	70	Weighted Average
305,799		95.60% Pervious Area
14,085		4.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0625	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
8.4	794	0.1000	1.58		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
16.3	844	Total			

Summary for Subcatchment E-2: Subcat E-2

Runoff = 1.21 cfs @ 12.17 hrs, Volume= 4,608 cf, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
548	74	>75% Grass cover, Good, HSG C
19,107	70	Woods, Good, HSG C
19,655	70	Weighted Average
19,655		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	50	0.0330	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
1.5	88	0.0400	1.00		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
11.8	138	Total			

Summary for Subcatchment E-3: Subcat E-3

Runoff = 10.12 cfs @ 12.33 hrs, Volume= 49,905 cf, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,016	98	Roofs, HSG B
9,435	98	Paved parking, HSG B
21,519	61	>75% Grass cover, Good, HSG B
18,762	55	Woods, Good, HSG B
8,128	98	Paved parking, HSG C
125,472	70	Woods, Good, HSG C
21,689	74	>75% Grass cover, Good, HSG C
206,021	71	Weighted Average
187,442		90.98% Pervious Area
18,579		9.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.10"
1.1	119	0.0670	1.81		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.8	99	0.1600	2.00		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.8	177	0.0560	1.66		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
13.8	1,071	0.0670	1.29		**Shallow Concentrated Flow, E-F** Woodland Kv= 5.0 fps
23.2	1,516	Total			

Summary for Subcatchment E-4: Subcat E-4

Runoff = 14.28 cfs @ 12.29 hrs, Volume= 66,538 cf, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
156	77	Woods, Good, HSG D
1,067	98	Paved parking, HSG B
1,328	61	>75% Grass cover, Good, HSG B
9,223	55	Woods, Good, HSG B
261,542	70	Woods, Good, HSG C
4,210	98	Paved parking, HSG C
6,306	74	>75% Grass cover, Good, HSG C
283,833	70	Weighted Average
278,555		98.14% Pervious Area
5,278		1.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
7.6	795	0.1200	1.73		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
20.1	845	Total			

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 E-1: Subcat E-1 Runoff Area=319,884 sf 4.40% Impervious Runoff Depth=4.92"
Flow Length=844' Tc=16.3 min CN=70 Runoff=30.96 cfs 131,234 cf

Subcatchment E-2: Subcat E-2 Runoff Area=19,655 sf 0.00% Impervious Runoff Depth=4.92"
Flow Length=138' Tc=11.8 min CN=70 Runoff=2.14 cfs 8,063 cf

Subcatchment E-3: Subcat E-3 Runoff Area=206,021 sf 9.02% Impervious Runoff Depth=5.04"
Flow Length=1,516' Tc=23.2 min CN=71 Runoff=17.68 cfs 86,575 cf

Subcatchment E-4: Subcat E-4 Runoff Area=283,833 sf 1.86% Impervious Runoff Depth=4.92"
Flow Length=845' Tc=20.1 min CN=70 Runoff=25.20 cfs 116,444 cf

Total Runoff Area = 829,392 sf Runoff Volume = 342,316 cf Average Runoff Depth = 4.95"
95.43% Pervious = 791,450 sf 4.57% Impervious = 37,942 sf

Summary for Subcatchment E-1: Subcat E-1

Runoff = 30.96 cfs @ 12.22 hrs, Volume= 131,234 cf, Depth= 4.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
4,296	98	Roofs, HSG B
9,307	98	Paved parking, HSG B
32,039	61	>75% Grass cover, Good, HSG B
76,085	55	Woods, Good, HSG B
482	98	Paved parking, HSG D
620	80	>75% Grass cover, Good, HSG D
155,338	77	Woods, Good, HSG D
38,171	70	Woods, Good, HSG C
3,545	74	>75% Grass cover, Good, HSG C
319,884	70	Weighted Average
305,799		95.60% Pervious Area
14,085		4.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0625	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
8.4	794	0.1000	1.58		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
16.3	844	Total			

Summary for Subcatchment E-2: Subcat E-2

Runoff = 2.14 cfs @ 12.17 hrs, Volume= 8,063 cf, Depth= 4.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
548	74	>75% Grass cover, Good, HSG C
19,107	70	Woods, Good, HSG C
19,655	70	Weighted Average
19,655		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	50	0.0330	0.08		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
1.5	88	0.0400	1.00		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
11.8	138	Total			

Summary for Subcatchment E-3: Subcat E-3

Runoff = 17.68 cfs @ 12.32 hrs, Volume= 86,575 cf, Depth= 5.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,016	98	Roofs, HSG B
9,435	98	Paved parking, HSG B
21,519	61	>75% Grass cover, Good, HSG B
18,762	55	Woods, Good, HSG B
8,128	98	Paved parking, HSG C
125,472	70	Woods, Good, HSG C
21,689	74	>75% Grass cover, Good, HSG C
206,021	71	Weighted Average
187,442		90.98% Pervious Area
18,579		9.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.10"
1.1	119	0.0670	1.81		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.8	99	0.1600	2.00		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.8	177	0.0560	1.66		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
13.8	1,071	0.0670	1.29		**Shallow Concentrated Flow, E-F** Woodland Kv= 5.0 fps
23.2	1,516	Total			

Summary for Subcatchment E-4: Subcat E-4

Runoff = 25.20 cfs @ 12.28 hrs, Volume= 116,444 cf, Depth= 4.92"

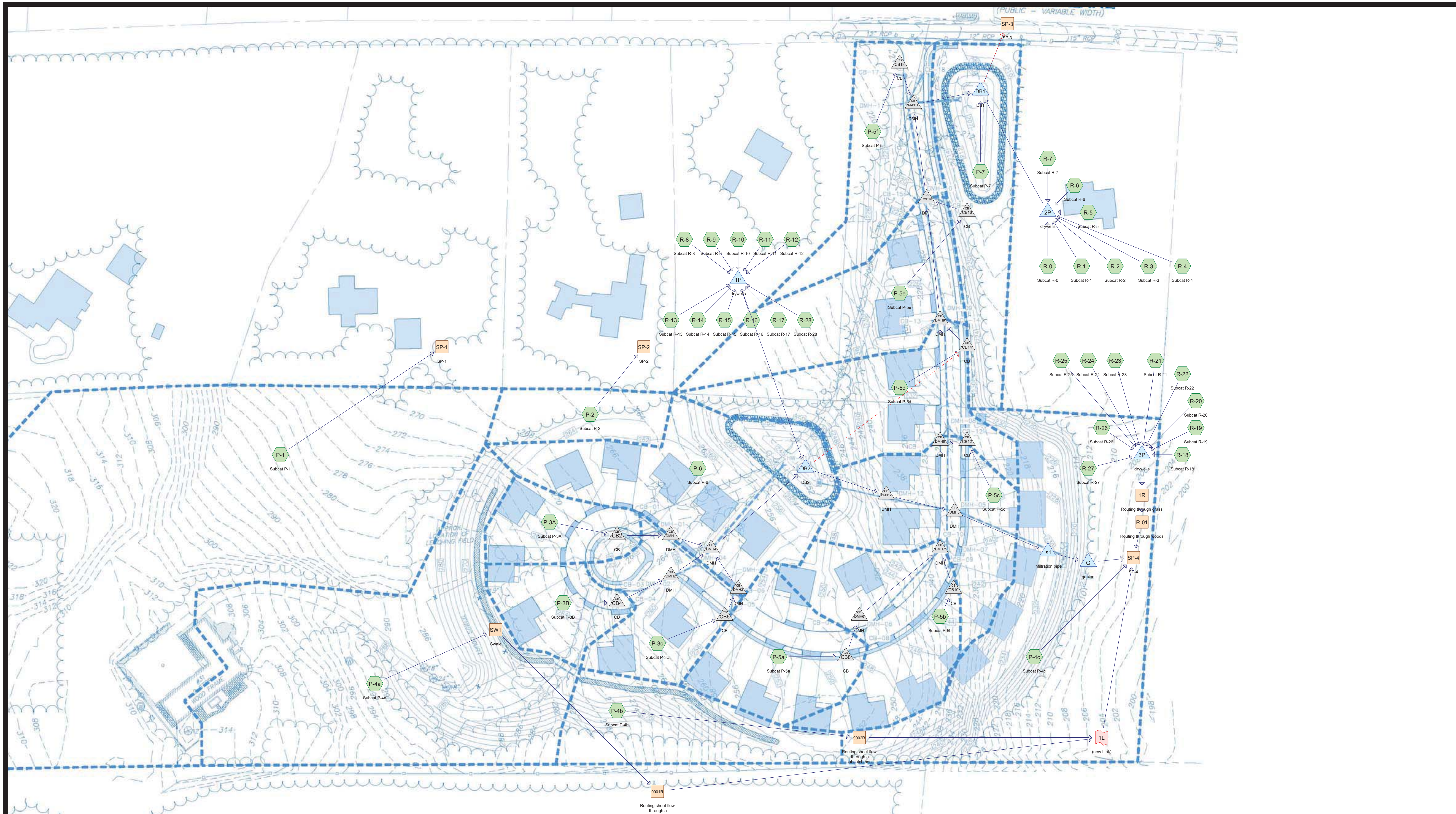
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

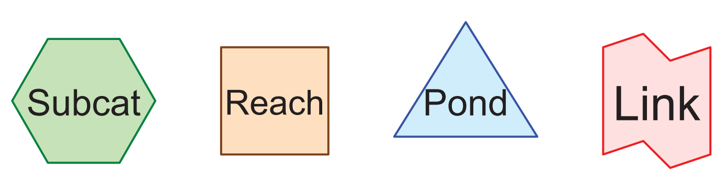
Area (sf)	CN	Description
156	77	Woods, Good, HSG D
1,067	98	Paved parking, HSG B
1,328	61	>75% Grass cover, Good, HSG B
9,223	55	Woods, Good, HSG B
261,542	70	Woods, Good, HSG C
4,210	98	Paved parking, HSG C
6,306	74	>75% Grass cover, Good, HSG C
283,833	70	Weighted Average
278,555		98.14% Pervious Area
5,278		1.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
7.6	795	0.1200	1.73		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
20.1	845	Total			

SECTION 4.0

HYROCAD WORKSHEETS……………….PROPOSED CONDITIONS





Routing Diagram for 2513-02 - Proposed HydroCAD

Prepared by Allen & Major Associates, Inc., Printed 4/9/2021

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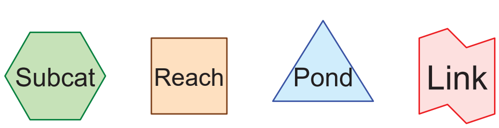

Routing Diagram for 2513-02 - Proposed HydroCAD
Prepared by Allen & Major Associates, Inc., Printed 4/9/2021
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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year	Type III 24-hr		Default	24.00	1	3.19	2
2	10-year	Type III 24-hr		Default	24.00	1	4.78	2
3	25-year	Type III 24-hr		Default	24.00	1	6.01	2
4	100-year	Type III 24-hr		Default	24.00	1	8.53	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
68,265	61	>75% Grass cover, Good, HSG B (P-1, P-3B, P-4a, P-4b)
245,217	74	>75% Grass cover, Good, HSG C (P-1, P-2, P-3A, P-3B, P-3c, P-4a, P-4b, P-4c, P-5a, P-5b, P-5c, P-5d, P-5e, P-5f, P-6, P-7)
24,002	80	>75% Grass cover, Good, HSG D (P-1)
12,616	98	Paved parking, HSG B (P-1, P-4a)
64,674	98	Paved parking, HSG C (P-3A, P-3B, P-3c, P-4a, P-5a, P-5b, P-5c, P-5d, P-5e, P-5f, P-6, P-7)
482	98	Paved parking, HSG D (P-1)
5,867	98	Roofs, HSG B (R-14, R-15, R-28)
46,502	98	Roofs, HSG C (R-0, R-1, R-10, R-11, R-12, R-13, R-14, R-15, R-16, R-17, R-18, R-19, R-2, R-20, R-21, R-22, R-23, R-24, R-25, R-26, R-27, R-3, R-4, R-5, R-6, R-7, R-8, R-9)
97,332	55	Woods, Good, HSG B (P-1, P-4a, P-4b)
132,206	70	Woods, Good, HSG C (P-1, P-2, P-4a, P-4b, P-4c, P-5d, P-5e, P-5f, P-6, P-7)
132,231	77	Woods, Good, HSG D (P-1, P-4c)
829,393	**74**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
184,080	HSG B	P-1, P-3B, P-4a, P-4b, R-14, R-15, R-28
488,598	HSG C	P-1, P-2, P-3A, P-3B, P-3c, P-4a, P-4b, P-4c, P-5a, P-5b, P-5c, P-5d, P-5e, P-5f, P-6, P-7, R-0, R-1, R-10, R-11, R-12, R-13, R-14, R-15, R-16, R-17, R-18, R-19, R-2, R-20, R-21, R-22, R-23, R-24, R-25, R-26, R-27, R-3, R-4, R-5, R-6, R-7, R-8, R-9
156,715	HSG D	P-1, P-4c
0	Other	
829,393		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
0	68,265	245,217	24,002	0	337,484	>75% Grass cover, Good	
0	12,616	64,674	482	0	77,772	Paved parking	
0	5,867	46,502	0	0	52,369	Roofs	
0	97,332	132,206	132,231	0	361,769	Woods, Good	
0	**184,080**	**488,598**	**156,715**	**0**	**829,393**	**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	CB10	234.69	234.60	9.0	0.0100	0.013	0.0	12.0	0.0
2	CB12	229.29	229.10	19.0	0.0100	0.013	0.0	12.0	0.0
3	CB14	223.98	223.35	21.0	0.0300	0.013	0.0	12.0	0.0
4	CB16	217.40	217.06	15.0	0.0227	0.013	0.0	12.0	0.0
5	CB18	210.30	209.93	37.0	0.0100	0.013	0.0	12.0	0.0
6	CB2	255.50	255.10	22.0	0.0182	0.013	0.0	12.0	0.0
7	CB4	257.46	256.80	22.0	0.0300	0.013	0.0	12.0	0.0
8	CB6	250.61	250.50	11.0	0.0100	0.013	0.0	12.0	0.0
9	CB8	243.40	243.06	17.0	0.0200	0.013	0.0	12.0	0.0
10	DB1	205.50	205.21	28.0	0.0104	0.013	0.0	12.0	0.0
11	DB2	239.55	234.80	95.0	0.0500	0.013	0.0	12.0	0.0
12	DMH1	251.51	249.59	64.0	0.0300	0.013	0.0	15.0	0.0
13	DMH10	210.40	208.93	113.0	0.0130	0.013	0.0	24.0	0.0
14	DMH11	208.83	208.00	62.0	0.0134	0.013	0.0	24.0	0.0
15	DMH12	232.63	229.33	76.0	0.0434	0.013	0.0	15.0	0.0
16	DMH2	251.84	249.59	75.0	0.0300	0.013	0.0	15.0	0.0
17	DMH3	250.40	249.85	55.0	0.0100	0.013	0.0	15.0	0.0
18	DMH4	248.85	246.00	159.0	0.0179	0.013	0.0	18.0	0.0
19	DMH5	229.23	226.75	124.0	0.0200	0.013	0.0	15.0	0.0
20	DMH6	242.96	234.60	146.0	0.0573	0.013	0.0	15.0	0.0
21	DMH7	234.35	228.85	140.0	0.0393	0.013	0.0	18.0	0.0
22	DMH8	227.21	223.10	137.0	0.0300	0.013	0.0	24.0	0.0
23	DMH9	219.49	216.55	147.0	0.0200	0.013	0.0	24.0	0.0
24	is1	222.50	222.00	13.0	0.0385	0.013	0.0	12.0	0.0

Notes Listing (all nodes)

Line#	Node Number	Notes
1	Project	Rainfall events imported from "2513-02 - Existing HydroCAD.hcp"
2	1R	A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.
3		This reach demonstrates a procedure for performing a shallow concetrated flow routing through woods. In this case, the "reach" is defined as a channel with very low side slopes. The Manning's value of 0.40 is selected from the table of sheet flow roughness coefficients, which is comparable to the Manning's value for "woods with light underbrush".
4	9001R	A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.
5		This reach demonstrates a procedure for performing a sheet-flow routing through a subcatchment area. In this case, the "reach" is defined as a wide channel with very low side slopes. The Manning's value of 0.15 is selected from the table of sheet flow roughness coefficients, which are much higher than normal Manning's values, in order to allow for the greater frictional losses of shallow flow. This value is comparable to the Manning's value for "very weedy reaches".
6		This example assumes that sheet flow occurs evenly over the entire 100' channel width, and that the flow depth is therefore very small. If the flow is concentrated or forms channels, the description and Manning's value must be adjusted accordingly.
7	9002R	A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.
8		This reach demonstrates a procedure for performing a sheet-flow routing through a subcatchment area. In this case, the "reach" is defined as a wide channel with very low side slopes. The Manning's value of 0.15 is selected from the table of sheet flow roughness coefficients, which are much higher than normal Manning's values, in order to allow for the greater frictional losses of shallow flow. This value is comparable to the Manning's value for "very weedy reaches".
9		This example assumes that sheet flow occurs evenly over the entire 100' channel width, and that the flow depth is therefore very small. If the flow is concentrated or forms channels, the description and Manning's value must be adjusted accordingly.
10	R-01	A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.
11		This reach demonstrates a procedure for performing a shallow concetrated flow routing through woods. In this case, the "reach" is defined as a channel with very low side slopes. The Manning's value of 0.40 is selected from the table of sheet flow roughness coefficients, which is comparable to the Manning's value for "woods with light underbrush".

Notes Listing (all nodes) (continued)

Line#	Node Number	Notes
12	1P	Soil type 307C (sandy loam) Rawls infiltration rate = 1.02 inches per hour
13	2P	Soil type 307C (sandy loam) Rawls infiltration rate = 1.02 inches per hour
14	3P	Soil type 307C (sandy loam) Rawls infiltration rate = 1.02 inches per hour
15	DB1	Groundwater must be verified with test pit

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P-1: Subcat P-1 Runoff Area=283,622 sf 1.89% Impervious Runoff Depth=0.87"
Flow Length=844' Tc=16.3 min CN=71 Runoff=4.37 cfs 20,612 cf

Subcatchment P-2: Subcat P-2 Runoff Area=13,434 sf 0.00% Impervious Runoff Depth=0.92"
Flow Length=81' Tc=13.0 min CN=72 Runoff=0.24 cfs 1,034 cf

Subcatchment P-3A: Subcat P-3A Runoff Area=11,725 sf 46.58% Impervious Runoff Depth=1.75"
Tc=6.0 min CN=85 Runoff=0.54 cfs 1,709 cf

Subcatchment P-3B: Subcat P-3B Runoff Area=12,241 sf 37.68% Impervious Runoff Depth=1.53"
Tc=6.0 min CN=82 Runoff=0.49 cfs 1,561 cf

Subcatchment P-3c: Subcat P-3c Runoff Area=18,468 sf 39.10% Impervious Runoff Depth=1.60"
Tc=6.0 min CN=83 Runoff=0.78 cfs 2,464 cf

Subcatchment P-4a: Subcat P-4a Runoff Area=95,645 sf 8.45% Impervious Runoff Depth=0.55"
Flow Length=350' Tc=11.5 min CN=64 Runoff=0.87 cfs 4,420 cf

Subcatchment P-4b: Subcat P-4b Runoff Area=25,711 sf 0.00% Impervious Runoff Depth=0.92"
Flow Length=422' Tc=9.1 min CN=72 Runoff=0.52 cfs 1,979 cf

Subcatchment P-4c: Subcat P-4c Runoff Area=82,620 sf 0.00% Impervious Runoff Depth=0.92"
Flow Length=415' Tc=16.2 min CN=72 Runoff=1.37 cfs 6,358 cf

Subcatchment P-5a: Subcat P-5a Runoff Area=20,384 sf 45.51% Impervious Runoff Depth=1.75"
Tc=6.0 min CN=85 Runoff=0.94 cfs 2,971 cf

Subcatchment P-5b: Subcat P-5b Runoff Area=25,195 sf 32.63% Impervious Runoff Depth=1.53"
Tc=6.0 min CN=82 Runoff=1.01 cfs 3,213 cf

Subcatchment P-5c: Subcat P-5c Runoff Area=26,935 sf 33.06% Impervious Runoff Depth=1.53"
Tc=6.0 min CN=82 Runoff=1.08 cfs 3,434 cf

Subcatchment P-5d: Subcat P-5d Runoff Area=29,781 sf 18.57% Impervious Runoff Depth=1.27"
Tc=6.0 min CN=78 Runoff=0.98 cfs 3,142 cf

Subcatchment P-5e: Subcat P-5e Runoff Area=30,879 sf 17.23% Impervious Runoff Depth=1.15"
Tc=6.0 min CN=76 Runoff=0.90 cfs 2,947 cf

Subcatchment P-5f: Subcat P-5f Runoff Area=27,195 sf 21.01% Impervious Runoff Depth=1.20"
Tc=6.0 min CN=77 Runoff=0.84 cfs 2,730 cf

Subcatchment P-6: Subcat P-6 Runoff Area=40,896 sf 9.30% Impervious Runoff Depth=1.15"
Tc=6.0 min CN=76 Runoff=1.20 cfs 3,902 cf

Subcatchment P-7: Subcat P-7 Runoff Area=32,294 sf 0.82% Impervious Runoff Depth=0.98"
Tc=6.0 min CN=73 Runoff=0.78 cfs 2,628 cf

Subcatchment R-0: Subcat R-0 Runoff Area=1,268 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.09 cfs 312 cf

Subcatchment R-1: Subcat R-1 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-10: Subcat R-10 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-11: Subcat R-11 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-12: Subcat R-12 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-13: Subcat R-13 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-14: Subcat R-14 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-15: Subcat R-15 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-16: Subcat R-16 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-17: Subcat R-17 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-18: Subcat R-18 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-19: Subcat R-19 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-2: Subcat R-2 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-20: Subcat R-20 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-21: Subcat R-21 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-22: Subcat R-22 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-23: Subcat R-23 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-24: Subcat R-24 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-25: Subcat R-25 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-26: Subcat R-26 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-27: Subcat R-27 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-28: Subcat R-28 Runoff Area=5,312 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.37 cfs 1,309 cf

Subcatchment R-3: Subcat R-3 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-4: Subcat R-4 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-5: Subcat R-5 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-6: Subcat R-6 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-7: Subcat R-7 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-8: Subcat R-8 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Subcatchment R-9: Subcat R-9 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=2.96"
Tc=6.0 min CN=98 Runoff=0.12 cfs 418 cf

Reach 1R: Routing through grass Avg. Flow Depth=0.12' Max Vel=0.86 fps Inflow=1.81 cfs 795 cf
n=0.150 L=58.0' S=0.2414 '/' Capacity=173.93 cfs Outflow=1.11 cfs 795 cf

Reach 9001R: Routing sheet flow Avg. Flow Depth=0.01' Max Vel=0.19 fps Inflow=0.70 cfs 4,420 cf
n=0.150 L=680.0' S=0.0941 '/' Capacity=463.86 cfs Outflow=0.27 cfs 4,420 cf

Reach 9002R: Routing sheet flow Avg. Flow Depth=0.01' Max Vel=0.21 fps Inflow=0.52 cfs 1,979 cf
n=0.150 L=345.0' S=0.1420 '/' Capacity=569.83 cfs Outflow=0.25 cfs 1,979 cf

Reach R-01: Routing through woods Avg. Flow Depth=0.17' Max Vel=0.27 fps Inflow=1.11 cfs 795 cf
n=0.400 L=82.0' S=0.1098 '/' Capacity=43.98 cfs Outflow=0.63 cfs 795 cf

Reach SP-1: SP-1 Inflow=4.37 cfs 20,612 cf
Outflow=4.37 cfs 20,612 cf

Reach SP-2: SP-2 Inflow=0.24 cfs 1,034 cf
Outflow=0.24 cfs 1,034 cf

Reach SP-3: SP-3 Inflow=2.41 cfs 21,632 cf
Outflow=2.41 cfs 21,632 cf

Reach SP-4: SP-4 Inflow=3.38 cfs 18,344 cf
Outflow=3.38 cfs 18,344 cf

Reach SW1: Swale Avg. Flow Depth=0.23' Max Vel=0.46 fps Inflow=0.87 cfs 4,420 cf
n=0.080 L=267.0' S=0.0050 '/' Capacity=37.23 cfs Outflow=0.70 cfs 4,420 cf

Pond 1P: drywells Peak Elev=255.92' Storage=1,563 cf Inflow=1.55 cfs 5,489 cf
Discarded=0.08 cfs 3,930 cf Primary=1.75 cfs 1,559 cf Outflow=1.83 cfs 5,489 cf

Pond 2P: drywells Peak Elev=223.79' Storage=1,136 cf Inflow=0.91 cfs 3,238 cf
Discarded=0.06 cfs 2,669 cf Primary=0.96 cfs 569 cf Outflow=1.02 cfs 3,238 cf

Pond 3P: drywells Peak Elev=226.14' Storage=1,421 cf Inflow=1.18 cfs 4,180 cf
Discarded=0.08 cfs 3,385 cf Primary=1.81 cfs 795 cf Outflow=1.89 cfs 4,180 cf

Pond CB10: CB Peak Elev=235.13' Inflow=1.01 cfs 3,213 cf
12.0" Round Culvert x 2.00 n=0.013 L=9.0' S=0.0100 '/' Outflow=1.01 cfs 3,213 cf

Pond CB12: CB Peak Elev=229.69' Inflow=1.08 cfs 3,434 cf
12.0" Round Culvert x 2.00 n=0.013 L=19.0' S=0.0100 '/' Outflow=1.08 cfs 3,434 cf

Pond CB14: CB Peak Elev=224.33' Inflow=0.98 cfs 3,142 cf
12.0" Round Culvert x 2.00 n=0.013 L=21.0' S=0.0300 '/' Outflow=0.98 cfs 3,142 cf

Pond CB16: CB Peak Elev=217.73' Inflow=0.90 cfs 2,947 cf
12.0" Round Culvert x 2.00 n=0.013 L=15.0' S=0.0227 '/' Outflow=0.90 cfs 2,947 cf

Pond CB18: CB Peak Elev=210.63' Inflow=0.84 cfs 2,730 cf
12.0" Round Culvert x 2.00 n=0.013 L=37.0' S=0.0100 '/' Outflow=0.84 cfs 2,730 cf

Pond CB2: CB Peak Elev=255.75' Inflow=0.54 cfs 1,709 cf
12.0" Round Culvert x 2.00 n=0.013 L=22.0' S=0.0182 '/' Outflow=0.54 cfs 1,709 cf

Pond CB4: CB Peak Elev=257.70' Inflow=0.49 cfs 1,561 cf
12.0" Round Culvert x 2.00 n=0.013 L=22.0' S=0.0300 '/' Outflow=0.49 cfs 1,561 cf

Pond CB6: CB Peak Elev=250.98' Inflow=0.78 cfs 2,464 cf
12.0" Round Culvert x 2.00 n=0.013 L=11.0' S=0.0100 '/' Outflow=0.78 cfs 2,464 cf

Pond CB8: CB Peak Elev=243.75' Inflow=0.94 cfs 2,971 cf
12.0" Round Culvert x 2.00 n=0.013 L=17.0' S=0.0200 '/' Outflow=0.94 cfs 2,971 cf

Pond DB1: DB1 Peak Elev=207.73' Storage=4,327 cf Inflow=6.60 cfs 21,634 cf
Primary=2.41 cfs 21,632 cf Secondary=0.00 cfs 0 cf Outflow=2.41 cfs 21,632 cf

Pond DB2: DB2 Peak Elev=245.24' Storage=1,486 cf Inflow=4.76 cfs 11,195 cf
Primary=2.20 cfs 11,195 cf Secondary=0.00 cfs 0 cf Outflow=2.20 cfs 11,195 cf

Pond DMH1: DMH Peak Elev=251.85' Inflow=0.54 cfs 1,709 cf
15.0" Round Culvert n=0.013 L=64.0' S=0.0300 '/' Outflow=0.54 cfs 1,709 cf

Pond DMH10: DMH Peak Elev=211.35' Inflow=4.92 cfs 15,706 cf
24.0" Round Culvert n=0.013 L=113.0' S=0.0130 '/' Outflow=4.92 cfs 15,707 cf

Pond DMH11: DMH Peak Elev=209.87' Inflow=5.76 cfs 18,437 cf
24.0" Round Culvert n=0.013 L=62.0' S=0.0134 '/' Outflow=5.76 cfs 18,437 cf

Pond DMH12: DMH Peak Elev=233.37' Inflow=2.20 cfs 11,195 cf
15.0" Round Culvert n=0.013 L=76.0' S=0.0434 '/' Outflow=2.20 cfs 11,195 cf

Pond DMH2: DMH Peak Elev=252.17' Inflow=0.49 cfs 1,561 cf
15.0" Round Culvert n=0.013 L=75.0' S=0.0300 '/' Outflow=0.49 cfs 1,561 cf

Pond DMH3: DMH Peak Elev=250.82' Inflow=0.78 cfs 2,464 cf
15.0" Round Culvert n=0.013 L=55.0' S=0.0100 '/' Outflow=0.78 cfs 2,464 cf

Pond DMH4: DMH Peak Elev=249.46' Inflow=1.81 cfs 5,734 cf
18.0" Round Culvert n=0.013 L=159.0' S=0.0179 '/' Outflow=1.81 cfs 5,734 cf

Pond DMH5: DMH Peak Elev=229.97' Inflow=2.20 cfs 11,195 cf
15.0" Round Culvert n=0.013 L=124.0' S=0.0200 '/' Outflow=2.20 cfs 11,195 cf

Pond DMH6: DMH Peak Elev=243.42' Inflow=0.94 cfs 2,971 cf
15.0" Round Culvert n=0.013 L=146.0' S=0.0573 '/' Outflow=0.94 cfs 2,971 cf

Pond DMH7: DMH Peak Elev=234.99' Inflow=1.96 cfs 6,184 cf
18.0" Round Culvert n=0.013 L=140.0' S=0.0393 '/' Outflow=1.96 cfs 6,184 cf

Pond DMH8: DMH Peak Elev=227.94' Inflow=3.04 cfs 9,618 cf
24.0" Round Culvert n=0.013 L=137.0' S=0.0300 '/' Outflow=3.04 cfs 9,618 cf

Pond DMH9: DMH Peak Elev=220.34' Inflow=4.02 cfs 12,760 cf
24.0" Round Culvert n=0.013 L=147.0' S=0.0200 '/' Outflow=4.02 cfs 12,760 cf

Pond G: gabion Peak Elev=222.28' Storage=6 cf Inflow=1.89 cfs 4,793 cf
Outflow=1.89 cfs 4,793 cf

Pond is1: infiltration pipe Peak Elev=223.26' Storage=3,757 cf Inflow=2.20 cfs 11,195 cf
Discarded=0.10 cfs 6,402 cf Primary=1.89 cfs 4,793 cf Outflow=1.99 cfs 11,195 cf

Link 1L: (new Link) Inflow=0.44 cfs 6,398 cf
Primary=0.44 cfs 6,398 cf

Total Runoff Area = 829,393 sf Runoff Volume = 78,009 cf Average Runoff Depth = 1.13"
84.31% Pervious = 699,253 sf 15.69% Impervious = 130,141 sf

Summary for Subcatchment P-1: Subcat P-1

Runoff = 4.37 cfs @ 12.25 hrs, Volume= 20,612 cf, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
4,874	98	Paved parking, HSG B
10,508	61	>75% Grass cover, Good, HSG B
72,656	55	Woods, Good, HSG B
482	98	Paved parking, HSG D
132,075	77	Woods, Good, HSG D
24,002	80	>75% Grass cover, Good, HSG D
34,297	70	Woods, Good, HSG C
4,728	74	>75% Grass cover, Good, HSG C
283,622	71	Weighted Average
278,266		98.11% Pervious Area
5,356		1.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0625	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
8.4	794	0.1000	1.58		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
16.3	844	Total			

Summary for Subcatchment P-2: Subcat P-2

Runoff = 0.24 cfs @ 12.20 hrs, Volume= 1,034 cf, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
6,580	74	>75% Grass cover, Good, HSG C
6,854	70	Woods, Good, HSG C
13,434	72	Weighted Average
13,434		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	31	0.0465	1.08		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
13.0	81	Total			

Summary for Subcatchment P-3A: Subcat P-3A

Runoff = 0.54 cfs @ 12.09 hrs, Volume= 1,709 cf, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
5,462	98	Paved parking, HSG C
6,263	74	>75% Grass cover, Good, HSG C
11,725	85	Weighted Average
6,263		53.42% Pervious Area
5,462		46.58% Impervious Area

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

Summary for Subcatchment P-3B: Subcat P-3B

Runoff = 0.49 cfs @ 12.09 hrs, Volume= 1,561 cf, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
533	61	>75% Grass cover, Good, HSG B
4,612	98	Paved parking, HSG C
7,096	74	>75% Grass cover, Good, HSG C
12,241	82	Weighted Average
7,629		62.32% Pervious Area
4,612		37.68% Impervious Area

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

Summary for Subcatchment P-3c: Subcat P-3c

Runoff = 0.78 cfs @ 12.09 hrs, Volume= 2,464 cf, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
7,221	98	Paved parking, HSG C
11,247	74	>75% Grass cover, Good, HSG C
18,468	83	Weighted Average
11,247		60.90% Pervious Area
7,221		39.10% Impervious Area

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

Summary for Subcatchment P-4a: Subcat P-4a

Runoff = 0.87 cfs @ 12.21 hrs, Volume= 4,420 cf, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
7,742	98	Paved parking, HSG B
56,628	61	>75% Grass cover, Good, HSG B
23,518	55	Woods, Good, HSG B
343	98	Paved parking, HSG C
16	70	Woods, Good, HSG C
7,398	74	>75% Grass cover, Good, HSG C
95,645	64	Weighted Average
87,560		91.55% Pervious Area
8,085		8.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
2.8	300	0.1300	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.5	350	Total			

Summary for Subcatchment P-4b: Subcat P-4b

Runoff = 0.52 cfs @ 12.15 hrs, Volume= 1,979 cf, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
596	61	>75% Grass cover, Good, HSG B
1,158	55	Woods, Good, HSG B
17,524	74	>75% Grass cover, Good, HSG C
6,433	70	Woods, Good, HSG C
25,711	72	Weighted Average
25,711		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	30	0.0500	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
3.3	392	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.1	422	Total			

Summary for Subcatchment P-4c: Subcat P-4c

Runoff = 1.37 cfs @ 12.25 hrs, Volume= 6,358 cf, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
156	77	Woods, Good, HSG D
36,333	74	>75% Grass cover, Good, HSG C
0	98	Paved parking, HSG C
46,131	70	Woods, Good, HSG C
82,620	72	Weighted Average
82,620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
3.7	365	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.2	415	Total			

Summary for Subcatchment P-5a: Subcat P-5a

Runoff = 0.94 cfs @ 12.09 hrs, Volume= 2,971 cf, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
9,276	98	Paved parking, HSG C
11,108	74	>75% Grass cover, Good, HSG C
20,384	85	Weighted Average
11,108		54.49% Pervious Area
9,276		45.51% Impervious Area

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

Summary for Subcatchment P-5b: Subcat P-5b

Runoff = 1.01 cfs @ 12.09 hrs, Volume= 3,213 cf, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
8,220	98	Paved parking, HSG C
16,975	74	>75% Grass cover, Good, HSG C
25,195	82	Weighted Average
16,975		67.37% Pervious Area
8,220		32.63% Impervious Area

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

Summary for Subcatchment P-5c: Subcat P-5c

Runoff = 1.08 cfs @ 12.09 hrs, Volume= 3,434 cf, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
8,906	98	Paved parking, HSG C
18,029	74	>75% Grass cover, Good, HSG C
26,935	82	Weighted Average
18,029		66.94% Pervious Area
8,906		33.06% Impervious Area

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

Summary for Subcatchment P-5d: Subcat P-5d

Runoff = 0.98 cfs @ 12.10 hrs, Volume= 3,142 cf, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
5,640	70	Woods, Good, HSG C
18,610	74	>75% Grass cover, Good, HSG C
5,531	98	Paved parking, HSG C
29,781	78	Weighted Average
24,250		81.43% Pervious Area
5,531		18.57% Impervious Area

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

Summary for Subcatchment P-5e: Subcat P-5e

Runoff = 0.90 cfs @ 12.10 hrs, Volume= 2,947 cf, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
10,965	74	>75% Grass cover, Good, HSG C
5,320	98	Paved parking, HSG C
14,594	70	Woods, Good, HSG C
30,879	76	Weighted Average
25,559		82.77% Pervious Area
5,320		17.23% Impervious Area

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

Summary for Subcatchment P-5f: Subcat P-5f

Runoff = 0.84 cfs @ 12.10 hrs, Volume= 2,730 cf, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
5,715	98	Paved parking, HSG C
10,921	74	>75% Grass cover, Good, HSG C
10,559	70	Woods, Good, HSG C
27,195	77	Weighted Average
21,480		78.99% Pervious Area
5,715		21.01% Impervious Area

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

Summary for Subcatchment P-6: Subcat P-6

Runoff = 1.20 cfs @ 12.10 hrs, Volume= 3,902 cf, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
37,052	74	>75% Grass cover, Good, HSG C
3,802	98	Paved parking, HSG C
42	70	Woods, Good, HSG C
40,896	76	Weighted Average
37,094		90.70% Pervious Area
3,802		9.30% Impervious Area

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

Summary for Subcatchment P-7: Subcat P-7

Runoff = 0.78 cfs @ 12.10 hrs, Volume= 2,628 cf, Depth= 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
24,388	74	>75% Grass cover, Good, HSG C
266	98	Paved parking, HSG C
7,640	70	Woods, Good, HSG C
32,294	73	Weighted Average
32,028		99.18% Pervious Area
266		0.82% Impervious Area

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

Summary for Subcatchment R-0: Subcat R-0

Runoff = 0.09 cfs @ 12.09 hrs, Volume= 312 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,268	98	Roofs, HSG C
1,268		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-1: Subcat R-1

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-10: Subcat R-10

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-11: Subcat R-11

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-12: Subcat R-12

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-13: Subcat R-13

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-14: Subcat R-14

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
0	98	Roofs, HSG B
1,696	98	Roofs, HSG C
1,696	98	Weighted Average
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-15: Subcat R-15

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
555	98	Roofs, HSG B
1,141	98	Roofs, HSG C
1,696	98	Weighted Average
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-16: Subcat R-16

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-17: Subcat R-17

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-18: Subcat R-18

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-19: Subcat R-19

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-2: Subcat R-2

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-20: Subcat R-20

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-21: Subcat R-21

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-22: Subcat R-22

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-23: Subcat R-23

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-24: Subcat R-24

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-25: Subcat R-25

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-26: Subcat R-26

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-27: Subcat R-27

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-28: Subcat R-28

Runoff = 0.37 cfs @ 12.09 hrs, Volume= 1,309 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
5,312	98	Roofs, HSG B
5,312		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-3: Subcat R-3

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-4: Subcat R-4

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-5: Subcat R-5

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-6: Subcat R-6

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-7: Subcat R-7

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-8: Subcat R-8

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-9: Subcat R-9

Runoff = 0.12 cfs @ 12.09 hrs, Volume= 418 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.19"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Reach 1R: Routing through grass

A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.

This reach demonstrates a procedure for performing a shallow concetrated flow routing through woods. In this case, the "reach" is defined as a channel with very low side slopes. The Manning's value of 0.40 is selected from the table of sheet flow roughness coefficients, which is comparable to the Manning's value for "woods with light underbrush".

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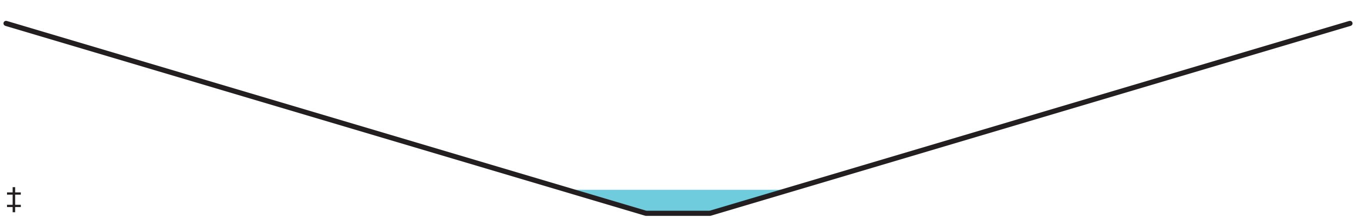
[80] Warning: Exceeded Pond 3P by 1.48' @ 15.35 hrs (0.00 cfs 724 cf)

Inflow Area = 16,959 sf,100.00% Impervious, Inflow Depth = 0.56" for 2-year event
Inflow = 1.81 cfs @ 12.15 hrs, Volume= 795 cf
Outflow = 1.11 cfs @ 12.17 hrs, Volume= 795 cf, Atten= 39%, Lag= 1.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.86 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 0.36 fps, Avg. Travel Time= 2.7 min

Peak Storage= 76 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.12' , Surface Width= 17.41'
Bank-Full Depth= 1.00' Flow Area= 55.0 sf, Capacity= 173.93 cfs

5.00' x 1.00' deep channel, n= 0.150 Sheet flow over Short Grass
Side Slope Z-value= 50.0 '/' Top Width= 105.00'
Length= 58.0' Slope= 0.2414 '/'
Inlet Invert= 226.00', Outlet Invert= 212.00'



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Summary for Reach 9001R: Routing sheet flow through a subcatchment

A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.

This reach demonstrates a procedure for performing a sheet-flow routing through a subcatchment area. In this case, the "reach" is defined as a wide channel with very low side slopes. The Manning's value of 0.15 is selected from the table of sheet flow roughness coefficients, which are much higher than normal Manning's values, in order to allow for the greater frictional losses of shallow flow. This value is comparable to the Manning's value for "very weedy reaches".

This example assumes that sheet flow occurs evenly over the entire 100' channel width, and that the flow depth is therefore very small. If the flow is concentrated or forms channels, the description and Manning's value must be adjusted accordingly.

Inflow Area = 95,645 sf, 8.45% Impervious, Inflow Depth = 0.55" for 2-year event
Inflow = 0.70 cfs @ 12.37 hrs, Volume= 4,420 cf
Outflow = 0.27 cfs @ 12.92 hrs, Volume= 4,420 cf, Atten= 60%, Lag= 33.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.19 fps, Min. Travel Time= 60.0 min
Avg. Velocity = 0.14 fps, Avg. Travel Time= 79.3 min

Peak Storage= 988 cf @ 12.92 hrs
Average Depth at Peak Storage= 0.01' , Surface Width= 102.86'
Bank-Full Depth= 1.00' Flow Area= 200.0 sf, Capacity= 463.86 cfs

100.00' x 1.00' deep channel, n= 0.150
Side Slope Z-value= 100.0 '/' Top Width= 300.00'
Length= 680.0' Slope= 0.0941 '/'
Inlet Invert= 264.00', Outlet Invert= 200.00'

‡

Summary for Reach 9002R: Routing sheet flow through a subcatchment

A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.

This reach demonstrates a procedure for performing a sheet-flow routing through a subcatchment area. In this case, the "reach" is defined as a wide channel with very low side slopes. The Manning's value of 0.15 is selected from the table of sheet flow roughness coefficients, which are much higher than normal Manning's values, in order to allow for the greater frictional losses of shallow flow. This value is comparable to the Manning's value for "very weedy reaches".

This example assumes that sheet flow occurs evenly over the entire 100' channel width, and that the flow depth is therefore very small. If the flow is concentrated or forms channels, the description and Manning's value must be adjusted accordingly.

Inflow Area = 25,711 sf, 0.00% Impervious, Inflow Depth = 0.92" for 2-year event
Inflow = 0.52 cfs @ 12.15 hrs, Volume= 1,979 cf
Outflow = 0.25 cfs @ 12.43 hrs, Volume= 1,979 cf, Atten= 51%, Lag= 17.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.21 fps, Min. Travel Time= 27.8 min
Avg. Velocity = 0.17 fps, Avg. Travel Time= 33.3 min

Peak Storage= 423 cf @ 12.43 hrs
Average Depth at Peak Storage= 0.01' , Surface Width= 102.42'
Bank-Full Depth= 1.00' Flow Area= 200.0 sf, Capacity= 569.83 cfs

100.00' x 1.00' deep channel, n= 0.150
Side Slope Z-value= 100.0 '/' Top Width= 300.00'
Length= 345.0' Slope= 0.1420 '/'
Inlet Invert= 249.00', Outlet Invert= 200.00'

‡

Summary for Reach R-01: Routing through woods

A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.

This reach demonstrates a procedure for performing a shallow concetrated flow routing through woods. In this case, the "reach" is defined as a channel with very low side slopes. The Manning's value of 0.40 is selected from the table of sheet flow roughness coefficients, which is comparable to the Manning's value for "woods with light underbrush".

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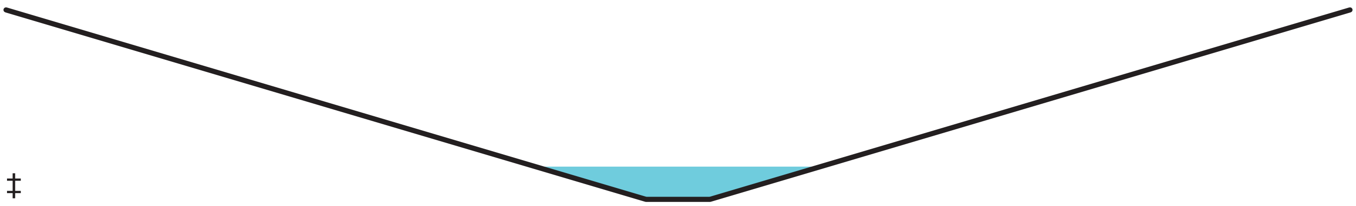
[62] Hint: Exceeded Reach 1R OUTLET depth by 0.11' @ 12.25 hrs

Inflow Area = 16,959 sf,100.00% Impervious, Inflow Depth = 0.56" for 2-year event
Inflow = 1.11 cfs @ 12.17 hrs, Volume= 795 cf
Outflow = 0.63 cfs @ 12.22 hrs, Volume= 795 cf, Atten= 44%, Lag= 3.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.27 fps, Min. Travel Time= 5.1 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 15.2 min

Peak Storage= 190 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.17' , Surface Width= 22.25'
Bank-Full Depth= 1.00' Flow Area= 55.0 sf, Capacity= 43.98 cfs

5.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 50.0 '/' Top Width= 105.00'
Length= 82.0' Slope= 0.1098 '/'
Inlet Invert= 212.00', Outlet Invert= 203.00'



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Summary for Reach SP-1: SP-1

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

Inflow Area = 283,622 sf, 1.89% Impervious, Inflow Depth = 0.87" for 2-year event
Inflow = 4.37 cfs @ 12.25 hrs, Volume= 20,612 cf
Outflow = 4.37 cfs @ 12.25 hrs, Volume= 20,612 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach SP-2: SP-2

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

Inflow Area = 13,434 sf, 0.00% Impervious, Inflow Depth = 0.92" for 2-year event
Inflow = 0.24 cfs @ 12.20 hrs, Volume= 1,034 cf
Outflow = 0.24 cfs @ 12.20 hrs, Volume= 1,034 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach SP-3: SP-3

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

Inflow Area = 205,802 sf, 27.39% Impervious, Inflow Depth = 1.26" for 2-year event
Inflow = 2.41 cfs @ 12.43 hrs, Volume= 21,632 cf
Outflow = 2.41 cfs @ 12.43 hrs, Volume= 21,632 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach SP-4: SP-4

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

Inflow Area = 326,536 sf, 20.95% Impervious, Inflow Depth = 0.67" for 2-year event
Inflow = 3.38 cfs @ 12.50 hrs, Volume= 18,344 cf
Outflow = 3.38 cfs @ 12.50 hrs, Volume= 18,344 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

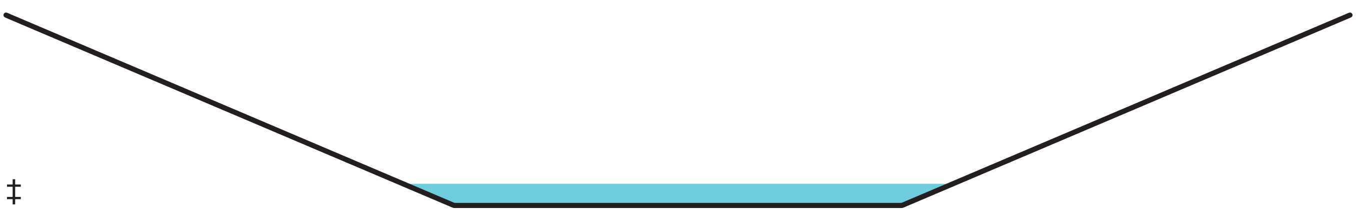
Summary for Reach SW1: Swale

Inflow Area = 95,645 sf, 8.45% Impervious, Inflow Depth = 0.55" for 2-year event
Inflow = 0.87 cfs @ 12.21 hrs, Volume= 4,420 cf
Outflow = 0.70 cfs @ 12.37 hrs, Volume= 4,420 cf, Atten= 20%, Lag= 9.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.46 fps, Min. Travel Time= 9.8 min
Avg. Velocity = 0.17 fps, Avg. Travel Time= 26.6 min

Peak Storage= 407 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 7.37'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 37.23 cfs

6.00' x 2.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 18.00'
Length= 267.0' Slope= 0.0050 '/'
Inlet Invert= 267.33', Outlet Invert= 266.00'



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Summary for Pond 1P: drywells

Soil type 307C (sandy loam) Rawls infiltration rate = 1.02 inches per hour

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[92] Warning: Device #1 is above defined storage
[92] Warning: Device #3 is above defined storage
[93] Warning: Storage range exceeded by 0.92'
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=17)

Inflow Area = 22,271 sf,100.00% Impervious, Inflow Depth = 2.96" for 2-year event
Inflow = 1.55 cfs @ 12.09 hrs, Volume= 5,489 cf
Outflow = 1.83 cfs @ 12.10 hrs, Volume= 5,489 cf, Atten= 0%, Lag= 0.6 min
Discarded = 0.08 cfs @ 12.10 hrs, Volume= 3,930 cf
Primary = 1.75 cfs @ 12.10 hrs, Volume= 1,559 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 255.92' @ 12.10 hrs Surf.Area= 539 sf Storage= 1,563 cf

Plug-Flow detention time= 203.9 min calculated for 5,489 cf (100% of inflow)
Center-of-Mass det. time= 203.9 min (960.4 - 756.5)

Volume	Invert	Avail.Storage	Storage Description
#1	250.50'	982 cf	**5.33'D x 4.00'H Drywell structure** x 11 Inside #2 1,243 cf Overall - 4.0" Wall Thickness = 982 cf
#2	250.00'	581 cf	**7.00'W x 7.00'L x 5.00'H Stone** x 11 2,695 cf Overall - 1,243 cf Embedded = 1,452 cf x 40.0% Voids
		1,563 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	256.00'	**4.0" Vert. Roof drain overflow X 11.00** C= 0.600 Limited to weir flow at low heads
#2	Discarded	250.00'	**1.020 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 245.00' Phase-In= 0.01'
#3	Primary	255.50'	**2.5' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.08 cfs @ 12.10 hrs HW=255.91' (Free Discharge)
└─**2=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=1.69 cfs @ 12.10 hrs HW=255.92' TW=244.56' (Dynamic Tailwater)
├─**1=Roof drain overflow** (Controls 0.00 cfs)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 1.69 cfs @ 1.62 fps)

Summary for Pond 2P: drywells

Soil type 307C (sandy loam) Rawls infiltration rate = 1.02 inches per hour

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[92] Warning: Device #1 is above defined storage
[92] Warning: Device #3 is above defined storage
[93] Warning: Storage range exceeded by 0.79'
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=3)

Inflow Area = 13,139 sf,100.00% Impervious, Inflow Depth = 2.96" for 2-year event
Inflow = 0.91 cfs @ 12.09 hrs, Volume= 3,238 cf
Outflow = 1.02 cfs @ 12.15 hrs, Volume= 3,238 cf, Atten= 0%, Lag= 3.9 min
Discarded = 0.06 cfs @ 12.15 hrs, Volume= 2,669 cf
Primary = 0.96 cfs @ 12.15 hrs, Volume= 569 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 223.79' @ 12.15 hrs Surf.Area= 392 sf Storage= 1,136 cf

Plug-Flow detention time= 216.2 min calculated for 3,238 cf (100% of inflow)
Center-of-Mass det. time= 216.1 min (972.6 - 756.5)

Volume	Invert	Avail.Storage	Storage Description
#1	218.50'	714 cf	**5.33'D x 4.00'H Drywell structure** x 8 Inside #2 904 cf Overall - 4.0" Wall Thickness = 714 cf
#2	218.00'	422 cf	**7.00'W x 7.00'L x 5.00'H Stone** x 8 1,960 cf Overall - 904 cf Embedded = 1,056 cf x 40.0% Voids
		1,136 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	224.00'	**4.0" Vert. Roof drain overflow X 8.00** C= 0.600 Limited to weir flow at low heads
#2	Discarded	218.00'	**1.020 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 214.00' Phase-In= 0.01'
#3	Primary	223.50'	**2.5' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.06 cfs @ 12.15 hrs HW=223.79' (Free Discharge)
└─**2=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.91 cfs @ 12.15 hrs HW=223.78' TW=207.33' (Dynamic Tailwater)
├─**1=Roof drain overflow** (Controls 0.00 cfs)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 0.91 cfs @ 1.28 fps)

Summary for Pond 3P: drywells

Soil type 307C (sandy loam) Rawls infiltration rate = 1.02 inches per hour

[92] Warning: Device #1 is above defined storage
[92] Warning: Device #3 is above defined storage
[93] Warning: Storage range exceeded by 1.14'
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=11)

Inflow Area = 16,959 sf,100.00% Impervious, Inflow Depth = 2.96" for 2-year event
Inflow = 1.18 cfs @ 12.09 hrs, Volume= 4,180 cf
Outflow = 1.89 cfs @ 12.15 hrs, Volume= 4,180 cf, Atten= 0%, Lag= 3.8 min
Discarded = 0.08 cfs @ 12.15 hrs, Volume= 3,385 cf
Primary = 1.81 cfs @ 12.15 hrs, Volume= 795 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 226.14' @ 12.15 hrs Surf.Area= 490 sf Storage= 1,421 cf

Plug-Flow detention time= 212.4 min calculated for 4,174 cf (100% of inflow)
Center-of-Mass det. time= 212.7 min (969.1 - 756.5)

Volume	Invert	Avail.Storage	Storage Description
#1	220.50'	892 cf	**5.33'D x 4.00'H Drywell structure** x 10 Inside #2 1,130 cf Overall - 4.0" Wall Thickness = 892 cf
#2	220.00'	528 cf	**7.00'W x 7.00'L x 5.00'H Stone** x 10 2,450 cf Overall - 1,130 cf Embedded = 1,320 cf x 40.0% Voids
		1,421 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	226.50'	**4.0" Vert. Roof drain overflow X 10.00** C= 0.600 Limited to weir flow at low heads
#2	Discarded	220.00'	**1.020 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 216.00' Phase-In= 0.01'
#3	Primary	226.00'	**2.5' long x 5.0' breadth Broad-Crested Rectangular Weir X 10.00** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.08 cfs @ 12.15 hrs HW=226.14' (Free Discharge)
└─**2=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=1.81 cfs @ 12.15 hrs HW=226.14' TW=226.11' (Dynamic Tailwater)
├─**1=Roof drain overflow** (Controls 0.00 cfs)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 1.81 cfs @ 0.52 fps)

Summary for Pond CB10: CB

Inflow Area = 25,195 sf, 32.63% Impervious, Inflow Depth = 1.53" for 2-year event
Inflow = 1.01 cfs @ 12.09 hrs, Volume= 3,213 cf
Outflow = 1.01 cfs @ 12.09 hrs, Volume= 3,213 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.01 cfs @ 12.09 hrs, Volume= 3,213 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 235.13' @ 12.09 hrs
Flood Elev= 239.42'

Device	Routing	Invert	Outlet Devices
#1	Primary	234.69'	**12.0" Round Culvert X 2.00** L= 9.0' Ke= 0.500 Inlet / Outlet Invert= 234.69' / 234.60' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.00 cfs @ 12.09 hrs HW=235.13' TW=234.98' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.00 cfs @ 2.21 fps)

Summary for Pond CB12: CB

Inflow Area = 26,935 sf, 33.06% Impervious, Inflow Depth = 1.53" for 2-year event
Inflow = 1.08 cfs @ 12.09 hrs, Volume= 3,434 cf
Outflow = 1.08 cfs @ 12.09 hrs, Volume= 3,434 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.08 cfs @ 12.09 hrs, Volume= 3,434 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 229.69' @ 12.09 hrs
Flood Elev= 233.72'

Device	Routing	Invert	Outlet Devices
#1	Primary	229.29'	**12.0" Round Culvert X 2.00** L= 19.0' Ke= 0.500 Inlet / Outlet Invert= 229.29' / 229.10' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.07 cfs @ 12.09 hrs HW=229.69' TW=227.94' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 1.07 cfs @ 2.73 fps)

Summary for Pond CB14: CB

Inflow Area =	29,781 sf, 18.57% Impervious,	Inflow Depth = 1.27"	for 2-year event
Inflow =	0.98 cfs @ 12.10 hrs, Volume=	3,142 cf	
Outflow =	0.98 cfs @ 12.10 hrs, Volume=	3,142 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.98 cfs @ 12.10 hrs, Volume=	3,142 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 224.33' @ 12.10 hrs
Flood Elev= 227.69'

Device	Routing	Invert	Outlet Devices
#1	Primary	223.98'	**12.0" Round Culvert X 2.00** L= 21.0' Ke= 0.500 Inlet / Outlet Invert= 223.98' / 223.35' S= 0.0300 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.97 cfs @ 12.10 hrs HW=224.33' TW=220.34' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.97 cfs @ 2.00 fps)

Summary for Pond CB16: CB

Inflow Area =	30,879 sf, 17.23% Impervious,	Inflow Depth = 1.15"	for 2-year event
Inflow =	0.90 cfs @ 12.10 hrs, Volume=	2,947 cf	
Outflow =	0.90 cfs @ 12.10 hrs, Volume=	2,947 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.90 cfs @ 12.10 hrs, Volume=	2,947 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 217.73' @ 12.10 hrs
Flood Elev= 220.61'

Device	Routing	Invert	Outlet Devices
#1	Primary	217.40'	**12.0" Round Culvert X 2.00** L= 15.0' Ke= 0.500 Inlet / Outlet Invert= 217.40' / 217.06' S= 0.0227 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.90 cfs @ 12.10 hrs HW=217.73' TW=211.35' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.90 cfs @ 1.97 fps)

Summary for Pond CB18: CB

Inflow Area = 27,195 sf, 21.01% Impervious, Inflow Depth = 1.20" for 2-year event
Inflow = 0.84 cfs @ 12.10 hrs, Volume= 2,730 cf
Outflow = 0.84 cfs @ 12.10 hrs, Volume= 2,730 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.84 cfs @ 12.10 hrs, Volume= 2,730 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 210.63' @ 12.10 hrs
Flood Elev= 213.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	210.30'	**12.0" Round Culvert X 2.00** L= 37.0' Ke= 0.500 Inlet / Outlet Invert= 210.30' / 209.93' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.84 cfs @ 12.10 hrs HW=210.63' TW=209.87' (Dynamic Tailwater)
└—**1=Culvert** (Barrel Controls 0.84 cfs @ 2.74 fps)

Summary for Pond CB2: CB

Inflow Area = 11,725 sf, 46.58% Impervious, Inflow Depth = 1.75" for 2-year event
Inflow = 0.54 cfs @ 12.09 hrs, Volume= 1,709 cf
Outflow = 0.54 cfs @ 12.09 hrs, Volume= 1,709 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.54 cfs @ 12.09 hrs, Volume= 1,709 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 255.75' @ 12.09 hrs
Flood Elev= 258.73'

Device	Routing	Invert	Outlet Devices
#1	Primary	255.50'	**12.0" Round Culvert X 2.00** L= 22.0' Ke= 0.500 Inlet / Outlet Invert= 255.50' / 255.10' S= 0.0182 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.53 cfs @ 12.09 hrs HW=255.75' TW=251.85' (Dynamic Tailwater)
└—**1=Culvert** (Inlet Controls 0.53 cfs @ 1.71 fps)

Summary for Pond CB4: CB

Inflow Area = 12,241 sf, 37.68% Impervious, Inflow Depth = 1.53" for 2-year event
Inflow = 0.49 cfs @ 12.09 hrs, Volume= 1,561 cf
Outflow = 0.49 cfs @ 12.09 hrs, Volume= 1,561 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.49 cfs @ 12.09 hrs, Volume= 1,561 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 257.70' @ 12.09 hrs
Flood Elev= 261.26'

Device	Routing	Invert	Outlet Devices
#1	Primary	257.46'	**12.0" Round Culvert X 2.00** L= 22.0' Ke= 0.500

Inlet / Outlet Invert= 257.46' / 256.80' S= 0.0300 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.49 cfs @ 12.09 hrs HW=257.70' TW=252.16' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.49 cfs @ 1.67 fps)

Summary for Pond CB6: CB

Inflow Area =	18,468 sf,	39.10% Impervious,	Inflow Depth = 1.60"	for 2-year event	
Inflow =	0.78 cfs @	12.09 hrs,	Volume=	2,464 cf	
Outflow =	0.78 cfs @	12.09 hrs,	Volume=	2,464 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.78 cfs @	12.09 hrs,	Volume=	2,464 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 250.98' @ 12.09 hrs
Flood Elev= 254.22'

Device	Routing	Invert	Outlet Devices
#1	Primary	250.61'	**12.0" Round Culvert X 2.00** L= 11.0' Ke= 0.500 Inlet / Outlet Invert= 250.61' / 250.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.77 cfs @ 12.09 hrs HW=250.98' TW=250.82' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.77 cfs @ 2.19 fps)

Summary for Pond CB8: CB

Inflow Area =	20,384 sf,	45.51% Impervious,	Inflow Depth = 1.75"	for 2-year event	
Inflow =	0.94 cfs @	12.09 hrs,	Volume=	2,971 cf	
Outflow =	0.94 cfs @	12.09 hrs,	Volume=	2,971 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.94 cfs @	12.09 hrs,	Volume=	2,971 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 243.75' @ 12.09 hrs
Flood Elev= 246.68'

Device	Routing	Invert	Outlet Devices
#1	Primary	243.40'	**12.0" Round Culvert X 2.00** L= 17.0' Ke= 0.500 Inlet / Outlet Invert= 243.40' / 243.06' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.92 cfs @ 12.09 hrs HW=243.74' TW=243.41' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.92 cfs @ 2.88 fps)

Summary for Pond DB1: DB1

Groundwater must be verified with test pit

Inflow Area = 205,802 sf, 27.39% Impervious, Inflow Depth = 1.26" for 2-year event
Inflow = 6.60 cfs @ 12.12 hrs, Volume= 21,634 cf
Outflow = 2.41 cfs @ 12.43 hrs, Volume= 21,632 cf, Atten= 63%, Lag= 18.5 min
Primary = 2.41 cfs @ 12.43 hrs, Volume= 21,632 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 207.73' @ 12.43 hrs Surf.Area= 6,244 sf Storage= 4,327 cf
Flood Elev= 212.20' Surf.Area= 13,749 sf Storage= 33,060 cf

Plug-Flow detention time= 15.0 min calculated for 21,602 cf (100% of inflow)
Center-of-Mass det. time= 15.1 min (857.7 - 842.6)

Volume	Invert	Avail.Storage	Storage Description
#1	206.50'	32,544 cf	**Surface Storage (Irregular)** Listed below (Recalc)
#2	205.50'	516 cf	**Filter Media (Irregular)** Listed below (Recalc) 2,580 cf Overall x 20.0% Voids
		33,060 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
206.50	2,580	292.7	0	0	2,580
208.00	3,931	343.8	4,848	4,848	5,212
210.00	6,340	407.4	10,175	15,023	9,087
212.00	9,234	471.0	15,484	30,507	13,619
212.20	11,169	496.1	2,037	32,544	15,553

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
205.50	2,580	292.7	0	0	2,580
206.50	2,580	292.7	2,580	2,580	2,873

Device	Routing	Invert	Outlet Devices
#1	Primary	205.50'	**12.0" Round Culvert** L= 28.0' Ke= 0.500 Inlet / Outlet Invert= 205.50' / 205.21' S= 0.0104 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	205.50'	**4.0" Vert. Perf Pipe Outlet X 4.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	208.90'	**24.0" x 24.0" Horiz. Horizonal Orifice** C= 0.600 Limited to weir flow at low heads
#4	Secondary	210.75'	**10.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=2.41 cfs @ 12.43 hrs HW=207.72' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.41 cfs of 4.97 cfs potential flow)
  ├─**2=Perf Pipe Outlet** (Orifice Controls 2.41 cfs @ 6.91 fps)
  └─**3=Horizonal Orifice** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=205.50' TW=0.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DB2: DB2

Inflow Area = 105,601 sf, 41.07% Impervious, Inflow Depth = 1.27" for 2-year event
Inflow = 4.76 cfs @ 12.10 hrs, Volume= 11,195 cf
Outflow = 2.20 cfs @ 12.26 hrs, Volume= 11,195 cf, Atten= 54%, Lag= 9.9 min
Primary = 2.20 cfs @ 12.26 hrs, Volume= 11,195 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 245.24' @ 12.26 hrs Surf.Area= 2,003 sf Storage= 1,486 cf
Flood Elev= 250.00' Surf.Area= 7,238 sf Storage= 18,626 cf

Plug-Flow detention time= 6.1 min calculated for 11,180 cf (100% of inflow)
Center-of-Mass det. time= 6.1 min (833.5 - 827.4)

Volume	Invert	Avail.Storage	Storage Description
#1	244.50'	17,872 cf	**Surface Storage (Irregular)** Listed below (Recalc)
#2	239.55'	754 cf	**Filter Media (Irregular)** Listed below (Recalc) 3,772 cf Overall x 20.0% Voids
		18,626 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
244.50	762	148.0	0	0	762
245.00	1,072	161.0	456	456	1,091
246.00	1,868	209.0	1,452	1,908	2,516
247.00	2,807	247.0	2,322	4,230	3,914
248.00	3,902	286.0	3,340	7,569	5,589
249.00	5,141	321.0	4,507	12,076	7,307
250.00	6,476	346.0	5,796	17,872	8,675

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
239.55	762	148.0	0	0	762
244.50	762	148.0	3,772	3,772	1,495

Device	Routing	Invert	Outlet Devices
#1	Primary	239.55'	**12.0" Round Culvert** L= 95.0' Ke= 0.500 Inlet / Outlet Invert= 239.55' / 234.80' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	239.55'	**6.0" Vert. Perf Pipe Oulet** C= 0.600 Limited to weir flow at low heads
#3	Device 1	248.65'	**24.0" x 24.0" Horiz. Horizontal Orifice** C= 0.600

			Limited to weir flow at low heads
#4	Secondary	249.70'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=2.20 cfs @ 12.26 hrs HW=245.23' TW=233.37' (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.20 cfs of 8.61 cfs potential flow)
  ├─**2=Perf Pipe Oulet** (Orifice Controls 2.20 cfs @ 11.22 fps)
  └─**3=Horizontal Orifice** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=239.55' TW=223.98' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DMH1: DMH

Inflow Area = 11,725 sf, 46.58% Impervious, Inflow Depth = 1.75" for 2-year event
Inflow = 0.54 cfs @ 12.09 hrs, Volume= 1,709 cf
Outflow = 0.54 cfs @ 12.09 hrs, Volume= 1,709 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.54 cfs @ 12.09 hrs, Volume= 1,709 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 251.85' @ 12.09 hrs
Flood Elev= 258.52'

Device	Routing	Invert	Outlet Devices
#1	Primary	251.51'	**15.0" Round Culvert** L= 64.0' Ke= 0.500 Inlet / Outlet Invert= 251.51' / 249.59' S= 0.0300 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.53 cfs @ 12.09 hrs HW=251.85' TW=249.46' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.53 cfs @ 1.98 fps)

Summary for Pond DMH10: DMH

Inflow Area = 133,174 sf, 27.97% Impervious, Inflow Depth = 1.42" for 2-year event
Inflow = 4.92 cfs @ 12.10 hrs, Volume= 15,706 cf
Outflow = 4.92 cfs @ 12.10 hrs, Volume= 15,707 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.92 cfs @ 12.10 hrs, Volume= 15,707 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 211.35' @ 12.10 hrs
Flood Elev= 227.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	210.40'	**24.0" Round Culvert** L= 113.0' Ke= 0.500 Inlet / Outlet Invert= 210.40' / 208.93' S= 0.0130 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=4.86 cfs @ 12.10 hrs HW=211.35' TW=209.87' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 4.86 cfs @ 3.31 fps)

Summary for Pond DMH11: DMH

Inflow Area = 160,369 sf, 26.79% Impervious, Inflow Depth = 1.38" for 2-year event
Inflow = 5.76 cfs @ 12.10 hrs, Volume= 18,437 cf
Outflow = 5.76 cfs @ 12.10 hrs, Volume= 18,437 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.76 cfs @ 12.10 hrs, Volume= 18,437 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 209.87' @ 12.10 hrs
Flood Elev= 215.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	208.83'	**24.0" Round Culvert** L= 62.0' Ke= 0.500 Inlet / Outlet Invert= 208.83' / 208.00' S= 0.0134 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=5.70 cfs @ 12.10 hrs HW=209.87' TW=207.05' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 5.70 cfs @ 3.47 fps)

Summary for Pond DMH12: DMH

Inflow Area = 105,601 sf, 41.07% Impervious, Inflow Depth = 1.27" for 2-year event
Inflow = 2.20 cfs @ 12.26 hrs, Volume= 11,195 cf
Outflow = 2.20 cfs @ 12.26 hrs, Volume= 11,195 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.20 cfs @ 12.26 hrs, Volume= 11,195 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 233.37' @ 12.26 hrs
Flood Elev= 238.03'

Device	Routing	Invert	Outlet Devices
#1	Primary	232.63'	**15.0" Round Culvert** L= 76.0' Ke= 0.500 Inlet / Outlet Invert= 232.63' / 229.33' S= 0.0434 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.20 cfs @ 12.26 hrs HW=233.37' TW=229.97' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 2.20 cfs @ 2.92 fps)

Summary for Pond DMH2: DMH

Inflow Area = 12,241 sf, 37.68% Impervious, Inflow Depth = 1.53" for 2-year event
Inflow = 0.49 cfs @ 12.09 hrs, Volume= 1,561 cf
Outflow = 0.49 cfs @ 12.09 hrs, Volume= 1,561 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.49 cfs @ 12.09 hrs, Volume= 1,561 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 252.17' @ 12.09 hrs
Flood Elev= 260.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	251.84'	**15.0" Round Culvert** L= 75.0' Ke= 0.500

Inlet / Outlet Invert= 251.84' / 249.59' S= 0.0300 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.49 cfs @ 12.09 hrs HW=252.16' TW=249.46' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.49 cfs @ 1.93 fps)

Summary for Pond DMH3: DMH

Inflow Area = 18,468 sf, 39.10% Impervious, Inflow Depth = 1.60" for 2-year event
Inflow = 0.78 cfs @ 12.09 hrs, Volume= 2,464 cf
Outflow = 0.78 cfs @ 12.09 hrs, Volume= 2,464 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.78 cfs @ 12.09 hrs, Volume= 2,464 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 250.82' @ 12.09 hrs
Flood Elev= 254.76'

Device	Routing	Invert	Outlet Devices
#1	Primary	250.40'	**15.0" Round Culvert** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 250.40' / 249.85' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.77 cfs @ 12.09 hrs HW=250.82' TW=249.46' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.77 cfs @ 3.20 fps)

Summary for Pond DMH4: DMH

Inflow Area = 42,434 sf, 40.76% Impervious, Inflow Depth = 1.62" for 2-year event
Inflow = 1.81 cfs @ 12.09 hrs, Volume= 5,734 cf
Outflow = 1.81 cfs @ 12.09 hrs, Volume= 5,734 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.81 cfs @ 12.09 hrs, Volume= 5,734 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 249.46' @ 12.09 hrs
Flood Elev= 257.23'

Device	Routing	Invert	Outlet Devices
#1	Primary	248.85'	**18.0" Round Culvert** L= 159.0' Ke= 0.500 Inlet / Outlet Invert= 248.85' / 246.00' S= 0.0179 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.78 cfs @ 12.09 hrs HW=249.46' TW=244.46' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.78 cfs @ 2.66 fps)

Summary for Pond DMH5: DMH

Inflow Area = 105,601 sf, 41.07% Impervious, Inflow Depth = 1.27" for 2-year event
Inflow = 2.20 cfs @ 12.26 hrs, Volume= 11,195 cf
Outflow = 2.20 cfs @ 12.26 hrs, Volume= 11,195 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.20 cfs @ 12.26 hrs, Volume= 11,195 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 229.97' @ 12.26 hrs
Flood Elev= 237.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	229.23'	**15.0" Round Culvert** L= 124.0' Ke= 0.500 Inlet / Outlet Invert= 229.23' / 226.75' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.20 cfs @ 12.26 hrs HW=229.97' TW=222.43' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 2.20 cfs @ 2.92 fps)

Summary for Pond DMH6: DMH

Inflow Area = 20,384 sf, 45.51% Impervious, Inflow Depth = 1.75" for 2-year event
Inflow = 0.94 cfs @ 12.09 hrs, Volume= 2,971 cf
Outflow = 0.94 cfs @ 12.09 hrs, Volume= 2,971 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.94 cfs @ 12.09 hrs, Volume= 2,971 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 243.42' @ 12.09 hrs
Flood Elev= 246.62'

Device	Routing	Invert	Outlet Devices
#1	Primary	242.96'	**15.0" Round Culvert** L= 146.0' Ke= 0.500 Inlet / Outlet Invert= 242.96' / 234.60' S= 0.0573 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.92 cfs @ 12.09 hrs HW=243.41' TW=234.98' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.92 cfs @ 2.29 fps)

Summary for Pond DMH7: DMH

Inflow Area = 45,579 sf, 38.39% Impervious, Inflow Depth = 1.63" for 2-year event
Inflow = 1.96 cfs @ 12.09 hrs, Volume= 6,184 cf
Outflow = 1.96 cfs @ 12.09 hrs, Volume= 6,184 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.96 cfs @ 12.09 hrs, Volume= 6,184 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 234.99' @ 12.09 hrs
Flood Elev= 246.62'

Device	Routing	Invert	Outlet Devices
#1	Primary	234.35'	**18.0" Round Culvert** L= 140.0' Ke= 0.500 Inlet / Outlet Invert= 234.35' / 228.85' S= 0.0393 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.92 cfs @ 12.09 hrs HW=234.98' TW=227.94' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.92 cfs @ 2.71 fps)

Summary for Pond DMH8: DMH

Inflow Area = 72,514 sf, 36.41% Impervious, Inflow Depth = 1.59" for 2-year event
Inflow = 3.04 cfs @ 12.09 hrs, Volume= 9,618 cf
Outflow = 3.04 cfs @ 12.09 hrs, Volume= 9,618 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.04 cfs @ 12.09 hrs, Volume= 9,618 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 227.94' @ 12.09 hrs
Flood Elev= 233.28'

Device	Routing	Invert	Outlet Devices
#1	Primary	227.21'	**24.0" Round Culvert** L= 137.0' Ke= 0.500 Inlet / Outlet Invert= 227.21' / 223.10' S= 0.0300 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=2.99 cfs @ 12.09 hrs HW=227.94' TW=220.34' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 2.99 cfs @ 2.90 fps)

Summary for Pond DMH9: DMH

Inflow Area = 102,295 sf, 31.22% Impervious, Inflow Depth = 1.50" for 2-year event
Inflow = 4.02 cfs @ 12.09 hrs, Volume= 12,760 cf
Outflow = 4.02 cfs @ 12.09 hrs, Volume= 12,760 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.02 cfs @ 12.09 hrs, Volume= 12,760 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 220.34' @ 12.09 hrs
Flood Elev= 227.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	219.49'	**24.0" Round Culvert** L= 147.0' Ke= 0.500 Inlet / Outlet Invert= 219.49' / 216.55' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=3.96 cfs @ 12.09 hrs HW=220.34' TW=211.35' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.96 cfs @ 3.13 fps)

Summary for Pond G: gabion

Inflow Area = 105,601 sf, 41.07% Impervious, Inflow Depth = 0.54" for 2-year event
Inflow = 1.89 cfs @ 12.56 hrs, Volume= 4,793 cf
Outflow = 1.89 cfs @ 12.56 hrs, Volume= 4,793 cf, Atten= 0%, Lag= 0.2 min
Primary = 1.89 cfs @ 12.56 hrs, Volume= 4,793 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 222.28' @ 12.56 hrs Surf.Area= 31 sf Storage= 6 cf
Flood Elev= 223.25' Storage= 37 cf

Plug-Flow detention time= 0.0 min calculated for 4,786 cf (100% of inflow)
Center-of-Mass det. time= 0.0 min (793.7 - 793.7)

Volume	Invert	Avail.Storage	Storage Description
#1	222.00'	37 cf	**15.0" Round Pipe Storage** L= 30.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	222.63'	**3.0" Vert. outlet holes X 15.00** C= 0.600 Limited to weir flow at low heads
#2	Primary	222.00'	**3.0" Horiz. outlet holes X 15.00** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.88 cfs @ 12.56 hrs HW=222.28' TW=0.00' (Dynamic Tailwater)
1=outlet holes (Controls 0.00 cfs)
2=outlet holes (Orifice Controls 1.88 cfs @ 2.55 fps)

Summary for Pond is1: infiltration pipe

[92] Warning: Device #2 is above defined storage

Inflow Area = 105,601 sf, 41.07% Impervious, Inflow Depth = 1.27" for 2-year event
Inflow = 2.20 cfs @ 12.26 hrs, Volume= 11,195 cf
Outflow = 1.99 cfs @ 12.56 hrs, Volume= 11,195 cf, Atten= 10%, Lag= 17.8 min
Discarded = 0.10 cfs @ 12.56 hrs, Volume= 6,402 cf
Primary = 1.89 cfs @ 12.56 hrs, Volume= 4,793 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 223.26' @ 12.56 hrs Surf.Area= 1,572 sf Storage= 3,757 cf

Plug-Flow detention time= 248.0 min calculated for 11,195 cf (100% of inflow)
Center-of-Mass det. time= 248.4 min (1,082.0 - 833.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	220.00'	2,466 cf	**6.00'W x 262.00'L x 6.00'H Field A** 9,432 cf Overall - 3,267 cf Embedded = 6,165 cf x 40.0% Voids
#2A	220.00'	3,267 cf	**CMP Round 48** x 13 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.57 sf x 20.00'L = 251.3 cf Overall Size= 48.0"W x 48.0"H x 20.00'L
		5,733 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	222.50'	**12.0" Round Culvert** L= 13.0' Ke= 0.500 Inlet / Outlet Invert= 222.50' / 222.00' S= 0.0385 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	226.00'	**30.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#3	Discarded	220.00'	**1.020 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 213.00' Phase-In= 0.01'

Discarded OutFlow Max=0.10 cfs @ 12.56 hrs HW=223.25' (Free Discharge)
└─**3=Exfiltration** (Controls 0.10 cfs)

Primary OutFlow Max=1.88 cfs @ 12.56 hrs HW=223.25' TW=222.28' (Dynamic Tailwater)
├─**1=Culvert** (Inlet Controls 1.88 cfs @ 2.96 fps)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link 1L: (new Link)

Inflow Area = 121,356 sf, 6.66% Impervious, Inflow Depth = 0.63" for 2-year event
Inflow = 0.44 cfs @ 12.67 hrs, Volume= 6,398 cf
Primary = 0.44 cfs @ 12.67 hrs, Volume= 6,398 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P-1: Subcat P-1 Runoff Area=283,622 sf 1.89% Impervious Runoff Depth=1.95"
Flow Length=844' Tc=16.3 min CN=71 Runoff=10.60 cfs 46,128 cf

Subcatchment P-2: Subcat P-2 Runoff Area=13,434 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=81' Tc=13.0 min CN=72 Runoff=0.57 cfs 2,272 cf

Subcatchment P-3A: Subcat P-3A Runoff Area=11,725 sf 46.58% Impervious Runoff Depth=3.17"
Tc=6.0 min CN=85 Runoff=0.97 cfs 3,093 cf

Subcatchment P-3B: Subcat P-3B Runoff Area=12,241 sf 37.68% Impervious Runoff Depth=2.88"
Tc=6.0 min CN=82 Runoff=0.93 cfs 2,941 cf

Subcatchment P-3c: Subcat P-3c Runoff Area=18,468 sf 39.10% Impervious Runoff Depth=2.98"
Tc=6.0 min CN=83 Runoff=1.44 cfs 4,580 cf

Subcatchment P-4a: Subcat P-4a Runoff Area=95,645 sf 8.45% Impervious Runoff Depth=1.44"
Flow Length=350' Tc=11.5 min CN=64 Runoff=2.84 cfs 11,474 cf

Subcatchment P-4b: Subcat P-4b Runoff Area=25,711 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=422' Tc=9.1 min CN=72 Runoff=1.22 cfs 4,349 cf

Subcatchment P-4c: Subcat P-4c Runoff Area=82,620 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=415' Tc=16.2 min CN=72 Runoff=3.23 cfs 13,976 cf

Subcatchment P-5a: Subcat P-5a Runoff Area=20,384 sf 45.51% Impervious Runoff Depth=3.17"
Tc=6.0 min CN=85 Runoff=1.69 cfs 5,377 cf

Subcatchment P-5b: Subcat P-5b Runoff Area=25,195 sf 32.63% Impervious Runoff Depth=2.88"
Tc=6.0 min CN=82 Runoff=1.91 cfs 6,053 cf

Subcatchment P-5c: Subcat P-5c Runoff Area=26,935 sf 33.06% Impervious Runoff Depth=2.88"
Tc=6.0 min CN=82 Runoff=2.04 cfs 6,471 cf

Subcatchment P-5d: Subcat P-5d Runoff Area=29,781 sf 18.57% Impervious Runoff Depth=2.53"
Tc=6.0 min CN=78 Runoff=1.99 cfs 6,269 cf

Subcatchment P-5e: Subcat P-5e Runoff Area=30,879 sf 17.23% Impervious Runoff Depth=2.36"
Tc=6.0 min CN=76 Runoff=1.92 cfs 6,061 cf

Subcatchment P-5f: Subcat P-5f Runoff Area=27,195 sf 21.01% Impervious Runoff Depth=2.44"
Tc=6.0 min CN=77 Runoff=1.75 cfs 5,530 cf

Subcatchment P-6: Subcat P-6 Runoff Area=40,896 sf 9.30% Impervious Runoff Depth=2.36"
Tc=6.0 min CN=76 Runoff=2.54 cfs 8,027 cf

Subcatchment P-7: Subcat P-7 Runoff Area=32,294 sf 0.82% Impervious Runoff Depth=2.11"
Tc=6.0 min CN=73 Runoff=1.78 cfs 5,677 cf

Subcatchment R-0: Subcat R-0 Runoff Area=1,268 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.13 cfs 480 cf

Subcatchment R-1: Subcat R-1 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-10: Subcat R-10 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-11: Subcat R-11 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-12: Subcat R-12 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-13: Subcat R-13 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-14: Subcat R-14 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-15: Subcat R-15 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-16: Subcat R-16 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-17: Subcat R-17 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-18: Subcat R-18 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-19: Subcat R-19 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-2: Subcat R-2 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-20: Subcat R-20 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-21: Subcat R-21 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-22: Subcat R-22 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-23: Subcat R-23 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-24: Subcat R-24 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-25: Subcat R-25 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-26: Subcat R-26 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-27: Subcat R-27 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-28: Subcat R-28 Runoff Area=5,312 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.56 cfs 2,011 cf

Subcatchment R-3: Subcat R-3 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-4: Subcat R-4 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-5: Subcat R-5 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-6: Subcat R-6 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-7: Subcat R-7 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-8: Subcat R-8 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Subcatchment R-9: Subcat R-9 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=4.54"
Tc=6.0 min CN=98 Runoff=0.18 cfs 642 cf

Reach 1R: Routing through grass Avg. Flow Depth=0.14' Max Vel=0.98 fps Inflow=1.79 cfs 2,340 cf
n=0.150 L=58.0' S=0.2414 '/' Capacity=173.93 cfs Outflow=1.68 cfs 2,340 cf

Reach 9001R: Routing sheet flow Avg. Flow Depth=0.04' Max Vel=0.33 fps Inflow=2.48 cfs 11,474 cf
n=0.150 L=680.0' S=0.0941 '/' Capacity=463.86 cfs Outflow=1.29 cfs 11,474 cf

Reach 9002R: Routing sheet flow Avg. Flow Depth=0.02' Max Vel=0.31 fps Inflow=1.22 cfs 4,349 cf
n=0.150 L=345.0' S=0.1420 '/' Capacity=569.83 cfs Outflow=0.75 cfs 4,349 cf

Reach R-01: Routing through woods Avg. Flow Depth=0.25' Max Vel=0.34 fps Inflow=1.68 cfs 2,340 cf
n=0.400 L=82.0' S=0.1098 '/' Capacity=43.98 cfs Outflow=1.48 cfs 2,340 cf

Reach SP-1: SP-1 Inflow=10.60 cfs 46,128 cf
Outflow=10.60 cfs 46,128 cf

Reach SP-2: SP-2 Inflow=0.57 cfs 2,272 cf
Outflow=0.57 cfs 2,272 cf

Reach SP-3: SP-3
Inflow=6.15 cfs 43,209 cf
Outflow=6.15 cfs 43,209 cf

Reach SP-4: SP-4
Inflow=7.73 cfs 47,080 cf
Outflow=7.73 cfs 47,080 cf

Reach SW1: Swale
Avg. Flow Depth=0.48' Max Vel=0.70 fps Inflow=2.84 cfs 11,474 cf
n=0.080 L=267.0' S=0.0050 '/' Capacity=37.23 cfs Outflow=2.48 cfs 11,474 cf

Pond 1P: drywells
Peak Elev=255.99' Storage=1,563 cf Inflow=2.33 cfs 8,432 cf
Discarded=0.08 cfs 4,702 cf Primary=2.24 cfs 3,731 cf Outflow=2.33 cfs 8,432 cf

Pond 2P: drywells
Peak Elev=223.91' Storage=1,136 cf Inflow=1.38 cfs 4,975 cf
Discarded=0.07 cfs 3,201 cf Primary=1.63 cfs 1,774 cf Outflow=1.70 cfs 4,975 cf

Pond 3P: drywells
Peak Elev=226.15' Storage=1,421 cf Inflow=1.78 cfs 6,421 cf
Discarded=0.08 cfs 4,081 cf Primary=1.79 cfs 2,340 cf Outflow=1.87 cfs 6,421 cf

Pond CB10: CB
Peak Elev=235.39' Inflow=1.91 cfs 6,053 cf
12.0" Round Culvert x 2.00 n=0.013 L=9.0' S=0.0100 '/' Outflow=1.91 cfs 6,053 cf

Pond CB12: CB
Peak Elev=229.87' Inflow=2.04 cfs 6,471 cf
12.0" Round Culvert x 2.00 n=0.013 L=19.0' S=0.0100 '/' Outflow=2.04 cfs 6,471 cf

Pond CB14: CB
Peak Elev=224.49' Inflow=1.99 cfs 6,269 cf
12.0" Round Culvert x 2.00 n=0.013 L=21.0' S=0.0300 '/' Outflow=1.99 cfs 6,269 cf

Pond CB16: CB
Peak Elev=217.90' Inflow=1.92 cfs 6,061 cf
12.0" Round Culvert x 2.00 n=0.013 L=15.0' S=0.0227 '/' Outflow=1.92 cfs 6,061 cf

Pond CB18: CB
Peak Elev=210.82' Inflow=1.75 cfs 5,530 cf
12.0" Round Culvert x 2.00 n=0.013 L=37.0' S=0.0100 '/' Outflow=1.75 cfs 5,530 cf

Pond CB2: CB
Peak Elev=255.85' Inflow=0.97 cfs 3,093 cf
12.0" Round Culvert x 2.00 n=0.013 L=22.0' S=0.0182 '/' Outflow=0.97 cfs 3,093 cf

Pond CB4: CB
Peak Elev=257.80' Inflow=0.93 cfs 2,941 cf
12.0" Round Culvert x 2.00 n=0.013 L=22.0' S=0.0300 '/' Outflow=0.93 cfs 2,941 cf

Pond CB6: CB
Peak Elev=251.16' Inflow=1.44 cfs 4,580 cf
12.0" Round Culvert x 2.00 n=0.013 L=11.0' S=0.0100 '/' Outflow=1.44 cfs 4,580 cf

Pond CB8: CB
Peak Elev=243.91' Inflow=1.69 cfs 5,377 cf
12.0" Round Culvert x 2.00 n=0.013 L=17.0' S=0.0200 '/' Outflow=1.69 cfs 5,377 cf

Pond DB1: DB1
Peak Elev=209.14' Storage=10,555 cf Inflow=14.01 cfs 43,211 cf
Primary=6.15 cfs 43,209 cf Secondary=0.00 cfs 0 cf Outflow=6.15 cfs 43,209 cf

Pond DB2: DB2
Peak Elev=247.05' Storage=5,124 cf Inflow=8.12 cfs 22,372 cf
Primary=2.55 cfs 22,371 cf Secondary=0.00 cfs 0 cf Outflow=2.55 cfs 22,371 cf

Pond DMH1: DMH
Peak Elev=251.98' Inflow=0.97 cfs 3,093 cf
15.0" Round Culvert n=0.013 L=64.0' S=0.0300 '/' Outflow=0.97 cfs 3,093 cf

Pond DMH10: DMH Peak Elev=211.81' Inflow=9.54 cfs 30,231 cf
24.0" Round Culvert n=0.013 L=113.0' S=0.0130 '/' Outflow=9.54 cfs 30,231 cf

Pond DMH11: DMH Peak Elev=210.40' Inflow=11.29 cfs 35,761 cf
24.0" Round Culvert n=0.013 L=62.0' S=0.0134 '/' Outflow=11.29 cfs 35,761 cf

Pond DMH12: DMH Peak Elev=233.43' Inflow=2.55 cfs 22,371 cf
15.0" Round Culvert n=0.013 L=76.0' S=0.0434 '/' Outflow=2.55 cfs 22,371 cf

Pond DMH2: DMH Peak Elev=252.30' Inflow=0.93 cfs 2,941 cf
15.0" Round Culvert n=0.013 L=75.0' S=0.0300 '/' Outflow=0.93 cfs 2,941 cf

Pond DMH3: DMH Peak Elev=250.99' Inflow=1.44 cfs 4,580 cf
15.0" Round Culvert n=0.013 L=55.0' S=0.0100 '/' Outflow=1.44 cfs 4,580 cf

Pond DMH4: DMH Peak Elev=249.72' Inflow=3.34 cfs 10,613 cf
18.0" Round Culvert n=0.013 L=159.0' S=0.0179 '/' Outflow=3.34 cfs 10,613 cf

Pond DMH5: DMH Peak Elev=230.03' Inflow=2.55 cfs 22,371 cf
15.0" Round Culvert n=0.013 L=124.0' S=0.0200 '/' Outflow=2.55 cfs 22,371 cf

Pond DMH6: DMH Peak Elev=243.59' Inflow=1.69 cfs 5,377 cf
15.0" Round Culvert n=0.013 L=146.0' S=0.0573 '/' Outflow=1.69 cfs 5,377 cf

Pond DMH7: DMH Peak Elev=235.25' Inflow=3.60 cfs 11,430 cf
18.0" Round Culvert n=0.013 L=140.0' S=0.0393 '/' Outflow=3.60 cfs 11,430 cf

Pond DMH8: DMH Peak Elev=228.24' Inflow=5.64 cfs 17,901 cf
24.0" Round Culvert n=0.013 L=137.0' S=0.0300 '/' Outflow=5.64 cfs 17,901 cf

Pond DMH9: DMH Peak Elev=220.72' Inflow=7.63 cfs 24,170 cf
24.0" Round Culvert n=0.013 L=147.0' S=0.0200 '/' Outflow=7.63 cfs 24,170 cf

Pond G: gabion Peak Elev=222.47' Storage=13 cf Inflow=2.42 cfs 14,942 cf
Outflow=2.42 cfs 14,942 cf

Pond is1: infiltration pipe Peak Elev=223.41' Storage=3,920 cf Inflow=2.55 cfs 22,371 cf
Discarded=0.11 cfs 7,234 cf Primary=2.42 cfs 14,942 cf Outflow=2.53 cfs 22,176 cf

Link 1L: (new Link) Inflow=1.86 cfs 15,823 cf
Primary=1.86 cfs 15,823 cf

Total Runoff Area = 829,393 sf Runoff Volume = 158,105 cf Average Runoff Depth = 2.29"
84.31% Pervious = 699,253 sf 15.69% Impervious = 130,141 sf

Summary for Subcatchment P-1: Subcat P-1

Runoff = 10.60 cfs @ 12.24 hrs, Volume= 46,128 cf, Depth= 1.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
4,874	98	Paved parking, HSG B
10,508	61	>75% Grass cover, Good, HSG B
72,656	55	Woods, Good, HSG B
482	98	Paved parking, HSG D
132,075	77	Woods, Good, HSG D
24,002	80	>75% Grass cover, Good, HSG D
34,297	70	Woods, Good, HSG C
4,728	74	>75% Grass cover, Good, HSG C
283,622	71	Weighted Average
278,266		98.11% Pervious Area
5,356		1.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0625	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
8.4	794	0.1000	1.58		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
16.3	844	Total			

Summary for Subcatchment P-2: Subcat P-2

Runoff = 0.57 cfs @ 12.19 hrs, Volume= 2,272 cf, Depth= 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
6,580	74	>75% Grass cover, Good, HSG C
6,854	70	Woods, Good, HSG C
13,434	72	Weighted Average
13,434		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	31	0.0465	1.08		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
13.0	81	Total			

Summary for Subcatchment P-3A: Subcat P-3A

Runoff = 0.97 cfs @ 12.09 hrs, Volume= 3,093 cf, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
5,462	98	Paved parking, HSG C
6,263	74	>75% Grass cover, Good, HSG C
11,725	85	Weighted Average
6,263		53.42% Pervious Area
5,462		46.58% Impervious Area

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

Summary for Subcatchment P-3B: Subcat P-3B

Runoff = 0.93 cfs @ 12.09 hrs, Volume= 2,941 cf, Depth= 2.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
533	61	>75% Grass cover, Good, HSG B
4,612	98	Paved parking, HSG C
7,096	74	>75% Grass cover, Good, HSG C
12,241	82	Weighted Average
7,629		62.32% Pervious Area
4,612		37.68% Impervious Area

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

Summary for Subcatchment P-3c: Subcat P-3c

Runoff = 1.44 cfs @ 12.09 hrs, Volume= 4,580 cf, Depth= 2.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
7,221	98	Paved parking, HSG C
11,247	74	>75% Grass cover, Good, HSG C
18,468	83	Weighted Average
11,247		60.90% Pervious Area
7,221		39.10% Impervious Area

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

Summary for Subcatchment P-4a: Subcat P-4a

Runoff = 2.84 cfs @ 12.17 hrs, Volume= 11,474 cf, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
7,742	98	Paved parking, HSG B
56,628	61	>75% Grass cover, Good, HSG B
23,518	55	Woods, Good, HSG B
343	98	Paved parking, HSG C
16	70	Woods, Good, HSG C
7,398	74	>75% Grass cover, Good, HSG C
95,645	64	Weighted Average
87,560		91.55% Pervious Area
8,085		8.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
2.8	300	0.1300	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.5	350	Total			

Summary for Subcatchment P-4b: Subcat P-4b

Runoff = 1.22 cfs @ 12.14 hrs, Volume= 4,349 cf, Depth= 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
596	61	>75% Grass cover, Good, HSG B
1,158	55	Woods, Good, HSG B
17,524	74	>75% Grass cover, Good, HSG C
6,433	70	Woods, Good, HSG C
25,711	72	Weighted Average
25,711		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	30	0.0500	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
3.3	392	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.1	422	Total			

Summary for Subcatchment P-4c: Subcat P-4c

Runoff = 3.23 cfs @ 12.23 hrs, Volume= 13,976 cf, Depth= 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
156	77	Woods, Good, HSG D
36,333	74	>75% Grass cover, Good, HSG C
0	98	Paved parking, HSG C
46,131	70	Woods, Good, HSG C
82,620	72	Weighted Average
82,620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
3.7	365	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.2	415	Total			

Summary for Subcatchment P-5a: Subcat P-5a

Runoff = 1.69 cfs @ 12.09 hrs, Volume= 5,377 cf, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
9,276	98	Paved parking, HSG C
11,108	74	>75% Grass cover, Good, HSG C
20,384	85	Weighted Average
11,108		54.49% Pervious Area
9,276		45.51% Impervious Area

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

Summary for Subcatchment P-5b: Subcat P-5b

Runoff = 1.91 cfs @ 12.09 hrs, Volume= 6,053 cf, Depth= 2.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
8,220	98	Paved parking, HSG C
16,975	74	>75% Grass cover, Good, HSG C
25,195	82	Weighted Average
16,975		67.37% Pervious Area
8,220		32.63% Impervious Area

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

Summary for Subcatchment P-5c: Subcat P-5c

Runoff = 2.04 cfs @ 12.09 hrs, Volume= 6,471 cf, Depth= 2.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
8,906	98	Paved parking, HSG C
18,029	74	>75% Grass cover, Good, HSG C
26,935	82	Weighted Average
18,029		66.94% Pervious Area
8,906		33.06% Impervious Area

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

Summary for Subcatchment P-5d: Subcat P-5d

Runoff = 1.99 cfs @ 12.09 hrs, Volume= 6,269 cf, Depth= 2.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
5,640	70	Woods, Good, HSG C
18,610	74	>75% Grass cover, Good, HSG C
5,531	98	Paved parking, HSG C
29,781	78	Weighted Average
24,250		81.43% Pervious Area
5,531		18.57% Impervious Area

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

Summary for Subcatchment P-5e: Subcat P-5e

Runoff = 1.92 cfs @ 12.09 hrs, Volume= 6,061 cf, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
10,965	74	>75% Grass cover, Good, HSG C
5,320	98	Paved parking, HSG C
14,594	70	Woods, Good, HSG C
30,879	76	Weighted Average
25,559		82.77% Pervious Area
5,320		17.23% Impervious Area

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

Summary for Subcatchment P-5f: Subcat P-5f

Runoff = 1.75 cfs @ 12.09 hrs, Volume= 5,530 cf, Depth= 2.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
5,715	98	Paved parking, HSG C
10,921	74	>75% Grass cover, Good, HSG C
10,559	70	Woods, Good, HSG C
27,195	77	Weighted Average
21,480		78.99% Pervious Area
5,715		21.01% Impervious Area

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

Summary for Subcatchment P-6: Subcat P-6

Runoff = 2.54 cfs @ 12.09 hrs, Volume= 8,027 cf, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
37,052	74	>75% Grass cover, Good, HSG C
3,802	98	Paved parking, HSG C
42	70	Woods, Good, HSG C
40,896	76	Weighted Average
37,094		90.70% Pervious Area
3,802		9.30% Impervious Area

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

Summary for Subcatchment P-7: Subcat P-7

Runoff = 1.78 cfs @ 12.10 hrs, Volume= 5,677 cf, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
24,388	74	>75% Grass cover, Good, HSG C
266	98	Paved parking, HSG C
7,640	70	Woods, Good, HSG C
32,294	73	Weighted Average
32,028		99.18% Pervious Area
266		0.82% Impervious Area

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

Summary for Subcatchment R-0: Subcat R-0

Runoff = 0.13 cfs @ 12.09 hrs, Volume= 480 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,268	98	Roofs, HSG C
1,268		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-1: Subcat R-1

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-10: Subcat R-10

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-11: Subcat R-11

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-12: Subcat R-12

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-13: Subcat R-13

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-14: Subcat R-14

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
0	98	Roofs, HSG B
1,696	98	Roofs, HSG C
1,696	98	Weighted Average
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-15: Subcat R-15

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
555	98	Roofs, HSG B
1,141	98	Roofs, HSG C
1,696	98	Weighted Average
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-16: Subcat R-16

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-17: Subcat R-17

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-18: Subcat R-18

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-19: Subcat R-19

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-2: Subcat R-2

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-20: Subcat R-20

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-21: Subcat R-21

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-22: Subcat R-22

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-23: Subcat R-23

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-24: Subcat R-24

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-25: Subcat R-25

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-26: Subcat R-26

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-27: Subcat R-27

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-28: Subcat R-28

Runoff = 0.56 cfs @ 12.09 hrs, Volume= 2,011 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
5,312	98	Roofs, HSG B
5,312		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-3: Subcat R-3

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-4: Subcat R-4

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-5: Subcat R-5

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-6: Subcat R-6

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-7: Subcat R-7

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-8: Subcat R-8

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-9: Subcat R-9

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 642 cf, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=4.78"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Reach 1R: Routing through grass

A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.

This reach demonstrates a procedure for performing a shallow concetrated flow routing through woods. In this case, the "reach" is defined as a channel with very low side slopes. The Manning's value of 0.40 is selected from the table of sheet flow roughness coefficients, which is comparable to the Manning's value for "woods with light underbrush".

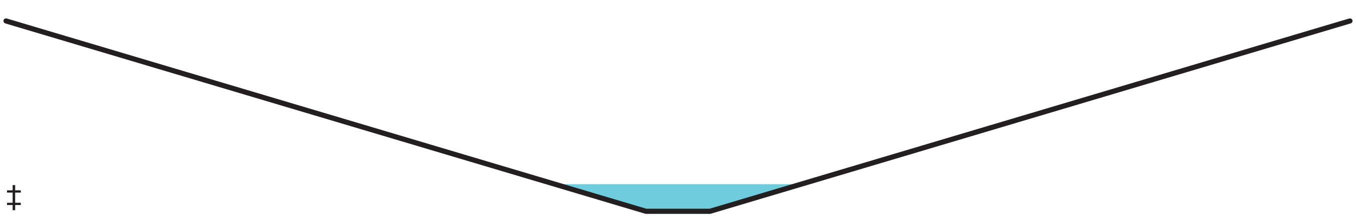
[80] Warning: Exceeded Pond 3P by 1.44' @ 16.55 hrs (0.00 cfs 740 cf)

Inflow Area = 16,959 sf,100.00% Impervious, Inflow Depth = 1.66" for 10-year event
Inflow = 1.79 cfs @ 12.06 hrs, Volume= 2,340 cf
Outflow = 1.68 cfs @ 12.10 hrs, Volume= 2,340 cf, Atten= 6%, Lag= 2.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.98 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 0.41 fps, Avg. Travel Time= 2.4 min

Peak Storage= 100 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.14' , Surface Width= 19.23'
Bank-Full Depth= 1.00' Flow Area= 55.0 sf, Capacity= 173.93 cfs

5.00' x 1.00' deep channel, n= 0.150 Sheet flow over Short Grass
Side Slope Z-value= 50.0 '/' Top Width= 105.00'
Length= 58.0' Slope= 0.2414 '/'
Inlet Invert= 226.00', Outlet Invert= 212.00'



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Summary for Reach 9001R: Routing sheet flow through a subcatchment

A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.

This reach demonstrates a procedure for performing a sheet-flow routing through a subcatchment area. In this case, the "reach" is defined as a wide channel with very low side slopes. The Manning's value of 0.15 is selected from the table of sheet flow roughness coefficients, which are much higher than normal Manning's values, in order to allow for the greater frictional losses of shallow flow. This value is comparable to the Manning's value for "very weedy reaches".

This example assumes that sheet flow occurs evenly over the entire 100' channel width, and that the flow depth is therefore very small. If the flow is concentrated or forms channels, the description and Manning's value must be adjusted accordingly.

Inflow Area = 95,645 sf, 8.45% Impervious, Inflow Depth = 1.44" for 10-year event
Inflow = 2.48 cfs @ 12.26 hrs, Volume= 11,474 cf
Outflow = 1.29 cfs @ 12.60 hrs, Volume= 11,474 cf, Atten= 48%, Lag= 20.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.33 fps, Min. Travel Time= 33.9 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 72.8 min

Peak Storage= 2,633 cf @ 12.60 hrs
Average Depth at Peak Storage= 0.04' , Surface Width= 107.46'
Bank-Full Depth= 1.00' Flow Area= 200.0 sf, Capacity= 463.86 cfs

100.00' x 1.00' deep channel, n= 0.150
Side Slope Z-value= 100.0 '/' Top Width= 300.00'
Length= 680.0' Slope= 0.0941 '/'
Inlet Invert= 264.00', Outlet Invert= 200.00'

‡

Summary for Reach 9002R: Routing sheet flow through a subcatchment

A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.

This reach demonstrates a procedure for performing a sheet-flow routing through a subcatchment area. In this case, the "reach" is defined as a wide channel with very low side slopes. The Manning's value of 0.15 is selected from the table of sheet flow roughness coefficients, which are much higher than normal Manning's values, in order to allow for the greater frictional losses of shallow flow. This value is comparable to the Manning's value for "very weedy reaches".

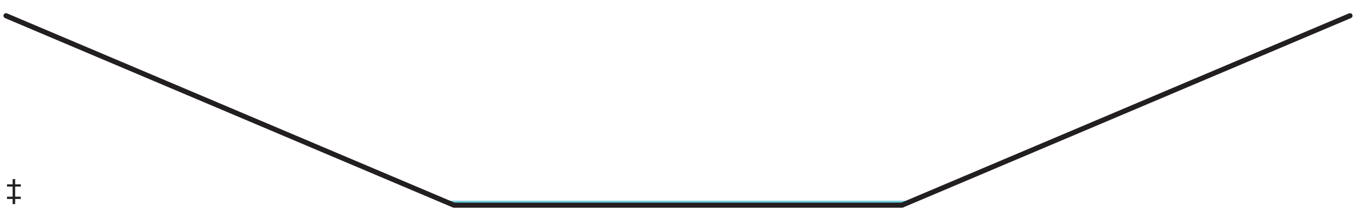
This example assumes that sheet flow occurs evenly over the entire 100' channel width, and that the flow depth is therefore very small. If the flow is concentrated or forms channels, the description and Manning's value must be adjusted accordingly.

Inflow Area = 25,711 sf, 0.00% Impervious, Inflow Depth = 2.03" for 10-year event
Inflow = 1.22 cfs @ 12.14 hrs, Volume= 4,349 cf
Outflow = 0.75 cfs @ 12.30 hrs, Volume= 4,349 cf, Atten= 39%, Lag= 10.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.31 fps, Min. Travel Time= 18.6 min
Avg. Velocity = 0.18 fps, Avg. Travel Time= 32.4 min

Peak Storage= 836 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.02' , Surface Width= 104.73'
Bank-Full Depth= 1.00' Flow Area= 200.0 sf, Capacity= 569.83 cfs

100.00' x 1.00' deep channel, n= 0.150
Side Slope Z-value= 100.0 '/' Top Width= 300.00'
Length= 345.0' Slope= 0.1420 '/'
Inlet Invert= 249.00', Outlet Invert= 200.00'



Summary for Reach R-01: Routing through woods

A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.

This reach demonstrates a procedure for performing a shallow concetrated flow routing through woods. In this case, the "reach" is defined as a channel with very low side slopes. The Manning's value of 0.40 is selected from the table of sheet flow roughness coefficients, which is comparable to the Manning's value for "woods with light underbrush".

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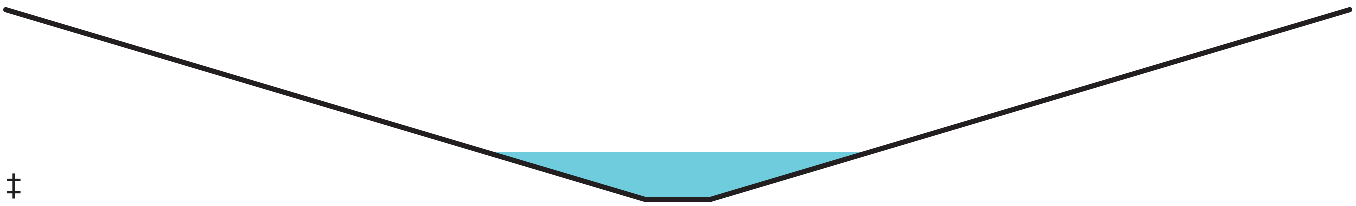
[62] Hint: Exceeded Reach 1R OUTLET depth by 0.12' @ 12.20 hrs

Inflow Area = 16,959 sf,100.00% Impervious, Inflow Depth = 1.66" for 10-year event
Inflow = 1.68 cfs @ 12.10 hrs, Volume= 2,340 cf
Outflow = 1.48 cfs @ 12.15 hrs, Volume= 2,340 cf, Atten= 12%, Lag= 2.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.34 fps, Min. Travel Time= 4.0 min
Avg. Velocity = 0.11 fps, Avg. Travel Time= 12.5 min

Peak Storage= 356 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.25' , Surface Width= 29.90'
Bank-Full Depth= 1.00' Flow Area= 55.0 sf, Capacity= 43.98 cfs

5.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 50.0 '/' Top Width= 105.00'
Length= 82.0' Slope= 0.1098 '/'
Inlet Invert= 212.00', Outlet Invert= 203.00'



‡

Summary for Reach SP-1: SP-1

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

Inflow Area = 283,622 sf, 1.89% Impervious, Inflow Depth = 1.95" for 10-year event
Inflow = 10.60 cfs @ 12.24 hrs, Volume= 46,128 cf
Outflow = 10.60 cfs @ 12.24 hrs, Volume= 46,128 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach SP-2: SP-2

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

Inflow Area = 13,434 sf, 0.00% Impervious, Inflow Depth = 2.03" for 10-year event
Inflow = 0.57 cfs @ 12.19 hrs, Volume= 2,272 cf
Outflow = 0.57 cfs @ 12.19 hrs, Volume= 2,272 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach SP-3: SP-3

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

Inflow Area = 205,802 sf, 27.39% Impervious, Inflow Depth = 2.52" for 10-year event
Inflow = 6.15 cfs @ 12.32 hrs, Volume= 43,209 cf
Outflow = 6.15 cfs @ 12.32 hrs, Volume= 43,209 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach SP-4: SP-4

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

Inflow Area = 326,536 sf, 20.95% Impervious, Inflow Depth = 1.73" for 10-year event
Inflow = 7.73 cfs @ 12.26 hrs, Volume= 47,080 cf
Outflow = 7.73 cfs @ 12.26 hrs, Volume= 47,080 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach SW1: Swale

Inflow Area = 95,645 sf, 8.45% Impervious, Inflow Depth = 1.44" for 10-year event
Inflow = 2.84 cfs @ 12.17 hrs, Volume= 11,474 cf
Outflow = 2.48 cfs @ 12.26 hrs, Volume= 11,474 cf, Atten= 13%, Lag= 5.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.70 fps, Min. Travel Time= 6.3 min
Avg. Velocity = 0.21 fps, Avg. Travel Time= 20.9 min

Peak Storage= 944 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.48' , Surface Width= 8.86'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 37.23 cfs

6.00' x 2.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 18.00'
Length= 267.0' Slope= 0.0050 '/'
Inlet Invert= 267.33', Outlet Invert= 266.00'

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Summary for Pond 1P: drywells

Soil type 307C (sandy loam) Rawls infiltration rate = 1.02 inches per hour

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[92] Warning: Device #1 is above defined storage
[92] Warning: Device #3 is above defined storage
[93] Warning: Storage range exceeded by 0.99'
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=21)

Inflow Area = 22,271 sf,100.00% Impervious, Inflow Depth = 4.54" for 10-year event
Inflow = 2.33 cfs @ 12.09 hrs, Volume= 8,432 cf
Outflow = 2.33 cfs @ 12.09 hrs, Volume= 8,432 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.08 cfs @ 12.09 hrs, Volume= 4,702 cf
Primary = 2.24 cfs @ 12.09 hrs, Volume= 3,731 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 255.99' @ 12.09 hrs Surf.Area= 539 sf Storage= 1,563 cf

Plug-Flow detention time= 163.2 min calculated for 8,421 cf (100% of inflow)
Center-of-Mass det. time= 163.8 min (912.5 - 748.8)

Volume	Invert	Avail.Storage	Storage Description
#1	250.50'	982 cf	**5.33'D x 4.00'H Drywell structure** x 11 Inside #2
			1,243 cf Overall - 4.0" Wall Thickness = 982 cf
#2	250.00'	581 cf	**7.00'W x 7.00'L x 5.00'H Stone** x 11
			2,695 cf Overall - 1,243 cf Embedded = 1,452 cf x 40.0% Voids
		1,563 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	256.00'	**4.0" Vert. Roof drain overflow X 11.00** C= 0.600
			Limited to weir flow at low heads
#2	Discarded	250.00'	**1.020 in/hr Exfiltration over Wetted area**
			Conductivity to Groundwater Elevation = 245.00' Phase-In= 0.01'
#3	Primary	255.50'	**2.5' long x 5.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
			2.50 3.00 3.50 4.00 4.50 5.00 5.50
			Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
			2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.08 cfs @ 12.09 hrs HW=255.98' (Free Discharge)
└**2=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=2.18 cfs @ 12.09 hrs HW=255.98' TW=245.98' (Dynamic Tailwater)
├**1=Roof drain overflow** (Controls 0.00 cfs)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 2.18 cfs @ 1.80 fps)

Summary for Pond 2P: drywells

Soil type 307C (sandy loam) Rawls infiltration rate = 1.02 inches per hour

[92] Warning: Device #1 is above defined storage
[92] Warning: Device #3 is above defined storage
[93] Warning: Storage range exceeded by 0.91'
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=23)

Inflow Area = 13,139 sf,100.00% Impervious, Inflow Depth = 4.54" for 10-year event
Inflow = 1.38 cfs @ 12.09 hrs, Volume= 4,975 cf
Outflow = 1.70 cfs @ 12.06 hrs, Volume= 4,975 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.07 cfs @ 12.06 hrs, Volume= 3,201 cf
Primary = 1.63 cfs @ 12.06 hrs, Volume= 1,774 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 223.91' @ 12.06 hrs Surf.Area= 392 sf Storage= 1,136 cf

Plug-Flow detention time= 174.4 min calculated for 4,968 cf (100% of inflow)
Center-of-Mass det. time= 174.8 min (923.6 - 748.8)

Volume	Invert	Avail.Storage	Storage Description
#1	218.50'	714 cf	**5.33'D x 4.00'H Drywell structure** x 8 Inside #2 904 cf Overall - 4.0" Wall Thickness = 714 cf
#2	218.00'	422 cf	**7.00'W x 7.00'L x 5.00'H Stone** x 8 1,960 cf Overall - 904 cf Embedded = 1,056 cf x 40.0% Voids
		1,136 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	224.00'	**4.0" Vert. Roof drain overflow X 8.00** C= 0.600 Limited to weir flow at low heads
#2	Discarded	218.00'	**1.020 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 214.00' Phase-In= 0.01'
#3	Primary	223.50'	**2.5' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.07 cfs @ 12.06 hrs HW=223.89' (Free Discharge)
└─**2=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=1.52 cfs @ 12.06 hrs HW=223.89' TW=207.87' (Dynamic Tailwater)
├─**1=Roof drain overflow** (Controls 0.00 cfs)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 1.52 cfs @ 1.56 fps)

Summary for Pond 3P: drywells

Soil type 307C (sandy loam) Rawls infiltration rate = 1.02 inches per hour

[92] Warning: Device #1 is above defined storage
[92] Warning: Device #3 is above defined storage
[93] Warning: Storage range exceeded by 1.15'
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=24)

Inflow Area = 16,959 sf,100.00% Impervious, Inflow Depth = 4.54" for 10-year event
Inflow = 1.78 cfs @ 12.09 hrs, Volume= 6,421 cf
Outflow = 1.87 cfs @ 12.06 hrs, Volume= 6,421 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.08 cfs @ 12.09 hrs, Volume= 4,081 cf
Primary = 1.79 cfs @ 12.06 hrs, Volume= 2,340 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 226.15' @ 12.09 hrs Surf.Area= 490 sf Storage= 1,421 cf

Plug-Flow detention time= 171.6 min calculated for 6,412 cf (100% of inflow)
Center-of-Mass det. time= 172.0 min (920.8 - 748.8)

Volume	Invert	Avail.Storage	Storage Description
#1	220.50'	892 cf	**5.33'D x 4.00'H Drywell structure** x 10 Inside #2 1,130 cf Overall - 4.0" Wall Thickness = 892 cf
#2	220.00'	528 cf	**7.00'W x 7.00'L x 5.00'H Stone** x 10 2,450 cf Overall - 1,130 cf Embedded = 1,320 cf x 40.0% Voids
		1,421 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	226.50'	**4.0" Vert. Roof drain overflow X 10.00** C= 0.600 Limited to weir flow at low heads
#2	Discarded	220.00'	**1.020 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 216.00' Phase-In= 0.01'
#3	Primary	226.00'	**2.5' long x 5.0' breadth Broad-Crested Rectangular Weir X 10.00** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.08 cfs @ 12.09 hrs HW=226.15' (Free Discharge)
└─**2=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=1.69 cfs @ 12.06 hrs HW=226.15' TW=226.13' (Dynamic Tailwater)
├─**1=Roof drain overflow** (Controls 0.00 cfs)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 1.69 cfs @ 0.45 fps)

Summary for Pond CB10: CB

Inflow Area = 25,195 sf, 32.63% Impervious, Inflow Depth = 2.88" for 10-year event
Inflow = 1.91 cfs @ 12.09 hrs, Volume= 6,053 cf
Outflow = 1.91 cfs @ 12.09 hrs, Volume= 6,053 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.91 cfs @ 12.09 hrs, Volume= 6,053 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 235.39' @ 12.09 hrs
Flood Elev= 239.42'

Device	Routing	Invert	Outlet Devices
#1	Primary	234.69'	**12.0" Round Culvert X 2.00** L= 9.0' Ke= 0.500 Inlet / Outlet Invert= 234.69' / 234.60' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.87 cfs @ 12.09 hrs HW=235.38' TW=235.24' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.87 cfs @ 2.27 fps)

Summary for Pond CB12: CB

Inflow Area = 26,935 sf, 33.06% Impervious, Inflow Depth = 2.88" for 10-year event
Inflow = 2.04 cfs @ 12.09 hrs, Volume= 6,471 cf
Outflow = 2.04 cfs @ 12.09 hrs, Volume= 6,471 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.04 cfs @ 12.09 hrs, Volume= 6,471 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 229.87' @ 12.09 hrs
Flood Elev= 233.72'

Device	Routing	Invert	Outlet Devices
#1	Primary	229.29'	**12.0" Round Culvert X 2.00** L= 19.0' Ke= 0.500 Inlet / Outlet Invert= 229.29' / 229.10' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.00 cfs @ 12.09 hrs HW=229.86' TW=228.23' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 2.00 cfs @ 3.13 fps)

Summary for Pond CB14: CB

Inflow Area = 29,781 sf, 18.57% Impervious, Inflow Depth = 2.53" for 10-year event
Inflow = 1.99 cfs @ 12.09 hrs, Volume= 6,269 cf
Outflow = 1.99 cfs @ 12.09 hrs, Volume= 6,269 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.99 cfs @ 12.09 hrs, Volume= 6,269 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 224.49' @ 12.09 hrs
Flood Elev= 227.69'

Device	Routing	Invert	Outlet Devices
#1	Primary	223.98'	**12.0" Round Culvert X 2.00** L= 21.0' Ke= 0.500 Inlet / Outlet Invert= 223.98' / 223.35' S= 0.0300 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.95 cfs @ 12.09 hrs HW=224.49' TW=220.71' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.95 cfs @ 2.43 fps)

Summary for Pond CB16: CB

Inflow Area = 30,879 sf, 17.23% Impervious, Inflow Depth = 2.36" for 10-year event
Inflow = 1.92 cfs @ 12.09 hrs, Volume= 6,061 cf
Outflow = 1.92 cfs @ 12.09 hrs, Volume= 6,061 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.92 cfs @ 12.09 hrs, Volume= 6,061 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 217.90' @ 12.09 hrs
Flood Elev= 220.61'

Device	Routing	Invert	Outlet Devices
#1	Primary	217.40'	**12.0" Round Culvert X 2.00** L= 15.0' Ke= 0.500 Inlet / Outlet Invert= 217.40' / 217.06' S= 0.0227 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.89 cfs @ 12.09 hrs HW=217.90' TW=211.80' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.89 cfs @ 2.41 fps)

Summary for Pond CB18: CB

Inflow Area = 27,195 sf, 21.01% Impervious, Inflow Depth = 2.44" for 10-year event
Inflow = 1.75 cfs @ 12.09 hrs, Volume= 5,530 cf
Outflow = 1.75 cfs @ 12.09 hrs, Volume= 5,530 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.75 cfs @ 12.09 hrs, Volume= 5,530 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 210.82' @ 12.10 hrs
Flood Elev= 213.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	210.30'	**12.0" Round Culvert X 2.00** L= 37.0' Ke= 0.500 Inlet / Outlet Invert= 210.30' / 209.93' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.72 cfs @ 12.09 hrs HW=210.82' TW=210.38' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.72 cfs @ 3.06 fps)

Summary for Pond CB2: CB

Inflow Area = 11,725 sf, 46.58% Impervious, Inflow Depth = 3.17" for 10-year event
Inflow = 0.97 cfs @ 12.09 hrs, Volume= 3,093 cf
Outflow = 0.97 cfs @ 12.09 hrs, Volume= 3,093 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.97 cfs @ 12.09 hrs, Volume= 3,093 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 255.85' @ 12.09 hrs
Flood Elev= 258.73'

Device	Routing	Invert	Outlet Devices
#1	Primary	255.50'	**12.0" Round Culvert X 2.00** L= 22.0' Ke= 0.500 Inlet / Outlet Invert= 255.50' / 255.10' S= 0.0182 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.95 cfs @ 12.09 hrs HW=255.84' TW=251.97' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.95 cfs @ 1.99 fps)

Summary for Pond CB4: CB

Inflow Area = 12,241 sf, 37.68% Impervious, Inflow Depth = 2.88" for 10-year event
Inflow = 0.93 cfs @ 12.09 hrs, Volume= 2,941 cf
Outflow = 0.93 cfs @ 12.09 hrs, Volume= 2,941 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.93 cfs @ 12.09 hrs, Volume= 2,941 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 257.80' @ 12.09 hrs
Flood Elev= 261.26'

Device	Routing	Invert	Outlet Devices
#1	Primary	257.46'	**12.0" Round Culvert X 2.00** L= 22.0' Ke= 0.500

Inlet / Outlet Invert= 257.46' / 256.80' S= 0.0300 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.91 cfs @ 12.09 hrs HW=257.80' TW=252.29' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.91 cfs @ 1.97 fps)

Summary for Pond CB6: CB

Inflow Area =	18,468 sf, 39.10% Impervious,	Inflow Depth = 2.98"	for 10-year event
Inflow =	1.44 cfs @ 12.09 hrs, Volume=	4,580 cf	
Outflow =	1.44 cfs @ 12.09 hrs, Volume=	4,580 cf, Atten= 0%, Lag= 0.0 min	
Primary =	1.44 cfs @ 12.09 hrs, Volume=	4,580 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 251.16' @ 12.09 hrs
Flood Elev= 254.22'

Device	Routing	Invert	Outlet Devices
#1	Primary	250.61'	**12.0" Round Culvert X 2.00** L= 11.0' Ke= 0.500 Inlet / Outlet Invert= 250.61' / 250.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.41 cfs @ 12.09 hrs HW=251.15' TW=250.98' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.41 cfs @ 2.36 fps)

Summary for Pond CB8: CB

Inflow Area =	20,384 sf, 45.51% Impervious,	Inflow Depth = 3.17"	for 10-year event
Inflow =	1.69 cfs @ 12.09 hrs, Volume=	5,377 cf	
Outflow =	1.69 cfs @ 12.09 hrs, Volume=	5,377 cf, Atten= 0%, Lag= 0.0 min	
Primary =	1.69 cfs @ 12.09 hrs, Volume=	5,377 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 243.91' @ 12.09 hrs
Flood Elev= 246.68'

Device	Routing	Invert	Outlet Devices
#1	Primary	243.40'	**12.0" Round Culvert X 2.00** L= 17.0' Ke= 0.500 Inlet / Outlet Invert= 243.40' / 243.06' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.65 cfs @ 12.09 hrs HW=243.90' TW=243.58' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.65 cfs @ 3.05 fps)

Summary for Pond DB1: DB1

Groundwater must be verified with test pit

Inflow Area = 205,802 sf, 27.39% Impervious, Inflow Depth = 2.52" for 10-year event
Inflow = 14.01 cfs @ 12.09 hrs, Volume= 43,211 cf
Outflow = 6.15 cfs @ 12.32 hrs, Volume= 43,209 cf, Atten= 56%, Lag= 14.1 min
Primary = 6.15 cfs @ 12.32 hrs, Volume= 43,209 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 209.14' @ 12.32 hrs Surf.Area= 7,810 sf Storage= 10,555 cf
Flood Elev= 212.20' Surf.Area= 13,749 sf Storage= 33,060 cf

Plug-Flow detention time= 24.4 min calculated for 43,209 cf (100% of inflow)
Center-of-Mass det. time= 24.0 min (846.6 - 822.6)

Volume	Invert	Avail.Storage	Storage Description
#1	206.50'	32,544 cf	**Surface Storage (Irregular)**Listed below (Recalc)
#2	205.50'	516 cf	**Filter Media (Irregular)**Listed below (Recalc) 2,580 cf Overall x 20.0% Voids
		33,060 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
206.50	2,580	292.7	0	0	2,580
208.00	3,931	343.8	4,848	4,848	5,212
210.00	6,340	407.4	10,175	15,023	9,087
212.00	9,234	471.0	15,484	30,507	13,619
212.20	11,169	496.1	2,037	32,544	15,553

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
205.50	2,580	292.7	0	0	2,580
206.50	2,580	292.7	2,580	2,580	2,873

Device	Routing	Invert	Outlet Devices
#1	Primary	205.50'	**12.0" Round Culvert** L= 28.0' Ke= 0.500 Inlet / Outlet Invert= 205.50' / 205.21' S= 0.0104 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	205.50'	**4.0" Vert. Perf Pipe Outlet X 4.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	208.90'	**24.0" x 24.0" Horiz. Horizonal Orifice** C= 0.600 Limited to weir flow at low heads
#4	Secondary	210.75'	**10.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=6.06 cfs @ 12.32 hrs HW=209.13' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 6.06 cfs of 6.69 cfs potential flow)
  ├─**2=Perf Pipe Outlet** (Orifice Controls 3.13 cfs @ 8.96 fps)
  └─**3=Horizonal Orifice** (Weir Controls 2.93 cfs @ 1.58 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=205.50' TW=0.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DB2: DB2

Inflow Area = 105,601 sf, 41.07% Impervious, Inflow Depth = 2.54" for 10-year event
Inflow = 8.12 cfs @ 12.09 hrs, Volume= 22,372 cf
Outflow = 2.55 cfs @ 12.41 hrs, Volume= 22,371 cf, Atten= 69%, Lag= 19.3 min
Primary = 2.55 cfs @ 12.41 hrs, Volume= 22,371 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 247.05' @ 12.41 hrs Surf.Area= 3,619 sf Storage= 5,124 cf
Flood Elev= 250.00' Surf.Area= 7,238 sf Storage= 18,626 cf

Plug-Flow detention time= 13.9 min calculated for 22,340 cf (100% of inflow)
Center-of-Mass det. time= 14.0 min (823.1 - 809.2)

Volume	Invert	Avail.Storage	Storage Description
#1	244.50'	17,872 cf	**Surface Storage (Irregular)**Listed below (Recalc)
#2	239.55'	754 cf	**Filter Media (Irregular)**Listed below (Recalc) 3,772 cf Overall x 20.0% Voids
		18,626 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
244.50	762	148.0	0	0	762
245.00	1,072	161.0	456	456	1,091
246.00	1,868	209.0	1,452	1,908	2,516
247.00	2,807	247.0	2,322	4,230	3,914
248.00	3,902	286.0	3,340	7,569	5,589
249.00	5,141	321.0	4,507	12,076	7,307
250.00	6,476	346.0	5,796	17,872	8,675

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
239.55	762	148.0	0	0	762
244.50	762	148.0	3,772	3,772	1,495

Device	Routing	Invert	Outlet Devices
#1	Primary	239.55'	**12.0" Round Culvert** L= 95.0' Ke= 0.500 Inlet / Outlet Invert= 239.55' / 234.80' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	239.55'	**6.0" Vert. Perf Pipe Oulet** C= 0.600 Limited to weir flow at low heads
#3	Device 1	248.65'	**24.0" x 24.0" Horiz. Horizontal Orifice** C= 0.600

			Limited to weir flow at low heads
#4	Secondary	249.70'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=2.55 cfs @ 12.41 hrs HW=247.05' TW=233.43' (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.55 cfs of 9.98 cfs potential flow)
  ├─**2=Perf Pipe Oulet** (Orifice Controls 2.55 cfs @ 12.96 fps)
  └─**3=Horizontal Orifice** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=239.55' TW=223.98' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DMH1: DMH

Inflow Area = 11,725 sf, 46.58% Impervious, Inflow Depth = 3.17" for 10-year event
Inflow = 0.97 cfs @ 12.09 hrs, Volume= 3,093 cf
Outflow = 0.97 cfs @ 12.09 hrs, Volume= 3,093 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.97 cfs @ 12.09 hrs, Volume= 3,093 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 251.98' @ 12.09 hrs
Flood Elev= 258.52'

Device	Routing	Invert	Outlet Devices
#1	Primary	251.51'	**15.0" Round Culvert** L= 64.0' Ke= 0.500 Inlet / Outlet Invert= 251.51' / 249.59' S= 0.0300 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.95 cfs @ 12.09 hrs HW=251.97' TW=249.70' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.95 cfs @ 2.31 fps)

Summary for Pond DMH10: DMH

Inflow Area = 133,174 sf, 27.97% Impervious, Inflow Depth = 2.72" for 10-year event
Inflow = 9.54 cfs @ 12.09 hrs, Volume= 30,231 cf
Outflow = 9.54 cfs @ 12.09 hrs, Volume= 30,231 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.54 cfs @ 12.09 hrs, Volume= 30,231 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 211.81' @ 12.09 hrs
Flood Elev= 227.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	210.40'	**24.0" Round Culvert** L= 113.0' Ke= 0.500 Inlet / Outlet Invert= 210.40' / 208.93' S= 0.0130 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=9.38 cfs @ 12.09 hrs HW=211.79' TW=210.38' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 9.38 cfs @ 5.64 fps)

Summary for Pond DMH11: DMH

Inflow Area = 160,369 sf, 26.79% Impervious, Inflow Depth = 2.68" for 10-year event
Inflow = 11.29 cfs @ 12.09 hrs, Volume= 35,761 cf
Outflow = 11.29 cfs @ 12.09 hrs, Volume= 35,761 cf, Atten= 0%, Lag= 0.0 min
Primary = 11.29 cfs @ 12.09 hrs, Volume= 35,761 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 210.40' @ 12.09 hrs
Flood Elev= 215.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	208.83'	**24.0" Round Culvert** L= 62.0' Ke= 0.500 Inlet / Outlet Invert= 208.83' / 208.00' S= 0.0134 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=11.09 cfs @ 12.09 hrs HW=210.38' TW=208.23' (Dynamic Tailwater)
1=Culvert (Inlet Controls 11.09 cfs @ 4.24 fps)

Summary for Pond DMH12: DMH

Inflow Area = 105,601 sf, 41.07% Impervious, Inflow Depth = 2.54" for 10-year event
Inflow = 2.55 cfs @ 12.41 hrs, Volume= 22,371 cf
Outflow = 2.55 cfs @ 12.41 hrs, Volume= 22,371 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.55 cfs @ 12.41 hrs, Volume= 22,371 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 233.43' @ 12.41 hrs
Flood Elev= 238.03'

Device	Routing	Invert	Outlet Devices
#1	Primary	232.63'	**15.0" Round Culvert** L= 76.0' Ke= 0.500 Inlet / Outlet Invert= 232.63' / 229.33' S= 0.0434 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.55 cfs @ 12.41 hrs HW=233.43' TW=230.03' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.55 cfs @ 3.05 fps)

Summary for Pond DMH2: DMH

Inflow Area = 12,241 sf, 37.68% Impervious, Inflow Depth = 2.88" for 10-year event
Inflow = 0.93 cfs @ 12.09 hrs, Volume= 2,941 cf
Outflow = 0.93 cfs @ 12.09 hrs, Volume= 2,941 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.93 cfs @ 12.09 hrs, Volume= 2,941 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 252.30' @ 12.09 hrs
Flood Elev= 260.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	251.84'	**15.0" Round Culvert** L= 75.0' Ke= 0.500

Inlet / Outlet Invert= 251.84' / 249.59' S= 0.0300 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.91 cfs @ 12.09 hrs HW=252.29' TW=249.70' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.91 cfs @ 2.29 fps)

Summary for Pond DMH3: DMH

Inflow Area = 18,468 sf, 39.10% Impervious, Inflow Depth = 2.98" for 10-year event
Inflow = 1.44 cfs @ 12.09 hrs, Volume= 4,580 cf
Outflow = 1.44 cfs @ 12.09 hrs, Volume= 4,580 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.44 cfs @ 12.09 hrs, Volume= 4,580 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 250.99' @ 12.09 hrs
Flood Elev= 254.76'

Device	Routing	Invert	Outlet Devices
#1	Primary	250.40'	**15.0" Round Culvert** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 250.40' / 249.85' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.41 cfs @ 12.09 hrs HW=250.98' TW=249.70' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 1.41 cfs @ 3.68 fps)

Summary for Pond DMH4: DMH

Inflow Area = 42,434 sf, 40.76% Impervious, Inflow Depth = 3.00" for 10-year event
Inflow = 3.34 cfs @ 12.09 hrs, Volume= 10,613 cf
Outflow = 3.34 cfs @ 12.09 hrs, Volume= 10,613 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.34 cfs @ 12.09 hrs, Volume= 10,613 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 249.72' @ 12.09 hrs
Flood Elev= 257.23'

Device	Routing	Invert	Outlet Devices
#1	Primary	248.85'	**18.0" Round Culvert** L= 159.0' Ke= 0.500 Inlet / Outlet Invert= 248.85' / 246.00' S= 0.0179 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=3.27 cfs @ 12.09 hrs HW=249.70' TW=246.04' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.27 cfs @ 3.15 fps)

Summary for Pond DMH5: DMH

Inflow Area = 105,601 sf, 41.07% Impervious, Inflow Depth = 2.54" for 10-year event
Inflow = 2.55 cfs @ 12.41 hrs, Volume= 22,371 cf
Outflow = 2.55 cfs @ 12.41 hrs, Volume= 22,371 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.55 cfs @ 12.41 hrs, Volume= 22,371 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 230.03' @ 12.41 hrs
Flood Elev= 237.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	229.23'	**15.0" Round Culvert** L= 124.0' Ke= 0.500 Inlet / Outlet Invert= 229.23' / 226.75' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.55 cfs @ 12.41 hrs HW=230.03' TW=223.40' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 2.55 cfs @ 3.05 fps)

Summary for Pond DMH6: DMH

Inflow Area =	20,384 sf, 45.51% Impervious,	Inflow Depth = 3.17"	for 10-year event
Inflow =	1.69 cfs @ 12.09 hrs, Volume=	5,377 cf	
Outflow =	1.69 cfs @ 12.09 hrs, Volume=	5,377 cf,	Atten= 0%, Lag= 0.0 min
Primary =	1.69 cfs @ 12.09 hrs, Volume=	5,377 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 243.59' @ 12.09 hrs
Flood Elev= 246.62'

Device	Routing	Invert	Outlet Devices
#1	Primary	242.96'	**15.0" Round Culvert** L= 146.0' Ke= 0.500 Inlet / Outlet Invert= 242.96' / 234.60' S= 0.0573 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.65 cfs @ 12.09 hrs HW=243.58' TW=235.24' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.65 cfs @ 2.69 fps)

Summary for Pond DMH7: DMH

Inflow Area =	45,579 sf, 38.39% Impervious,	Inflow Depth = 3.01"	for 10-year event
Inflow =	3.60 cfs @ 12.09 hrs, Volume=	11,430 cf	
Outflow =	3.60 cfs @ 12.09 hrs, Volume=	11,430 cf,	Atten= 0%, Lag= 0.0 min
Primary =	3.60 cfs @ 12.09 hrs, Volume=	11,430 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 235.25' @ 12.09 hrs
Flood Elev= 246.62'

Device	Routing	Invert	Outlet Devices
#1	Primary	234.35'	**18.0" Round Culvert** L= 140.0' Ke= 0.500 Inlet / Outlet Invert= 234.35' / 228.85' S= 0.0393 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=3.52 cfs @ 12.09 hrs HW=235.24' TW=228.23' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.52 cfs @ 3.22 fps)

Summary for Pond DMH8: DMH

Inflow Area = 72,514 sf, 36.41% Impervious, Inflow Depth = 2.96" for 10-year event
Inflow = 5.64 cfs @ 12.09 hrs, Volume= 17,901 cf
Outflow = 5.64 cfs @ 12.09 hrs, Volume= 17,901 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.64 cfs @ 12.09 hrs, Volume= 17,901 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 228.24' @ 12.09 hrs
Flood Elev= 233.28'

Device	Routing	Invert	Outlet Devices
#1	Primary	227.21'	**24.0" Round Culvert** L= 137.0' Ke= 0.500 Inlet / Outlet Invert= 227.21' / 223.10' S= 0.0300 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=5.52 cfs @ 12.09 hrs HW=228.23' TW=220.70' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 5.52 cfs @ 3.44 fps)

Summary for Pond DMH9: DMH

Inflow Area = 102,295 sf, 31.22% Impervious, Inflow Depth = 2.84" for 10-year event
Inflow = 7.63 cfs @ 12.09 hrs, Volume= 24,170 cf
Outflow = 7.63 cfs @ 12.09 hrs, Volume= 24,170 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.63 cfs @ 12.09 hrs, Volume= 24,170 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 220.72' @ 12.09 hrs
Flood Elev= 227.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	219.49'	**24.0" Round Culvert** L= 147.0' Ke= 0.500 Inlet / Outlet Invert= 219.49' / 216.55' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=7.48 cfs @ 12.09 hrs HW=220.70' TW=211.79' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.48 cfs @ 3.75 fps)

Summary for Pond G: gabion

Inflow Area = 105,601 sf, 41.07% Impervious, Inflow Depth = 1.70" for 10-year event
Inflow = 2.42 cfs @ 12.54 hrs, Volume= 14,942 cf
Outflow = 2.42 cfs @ 12.54 hrs, Volume= 14,942 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.42 cfs @ 12.54 hrs, Volume= 14,942 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 222.47' @ 12.54 hrs Surf.Area= 36 sf Storage= 13 cf
Flood Elev= 223.25' Storage= 37 cf

Plug-Flow detention time= 0.1 min calculated for 14,921 cf (100% of inflow)
Center-of-Mass det. time= 0.1 min (804.0 - 804.0)

Volume	Invert	Avail.Storage	Storage Description
#1	222.00'	37 cf	**15.0" Round Pipe Storage** L= 30.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	222.63'	**3.0" Vert. outlet holes X 15.00** C= 0.600 Limited to weir flow at low heads
#2	Primary	222.00'	**3.0" Horiz. outlet holes X 15.00** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.42 cfs @ 12.54 hrs HW=222.47' TW=0.00' (Dynamic Tailwater)
—**1=outlet holes** (Controls 0.00 cfs)
—**2=outlet holes** (Orifice Controls 2.42 cfs @ 3.29 fps)

Summary for Pond is1: infiltration pipe

[92] Warning: Device #2 is above defined storage

Inflow Area = 105,601 sf, 41.07% Impervious, Inflow Depth = 2.54" for 10-year event
Inflow = 2.55 cfs @ 12.41 hrs, Volume= 22,371 cf
Outflow = 2.53 cfs @ 12.54 hrs, Volume= 22,176 cf, Atten= 1%, Lag= 7.7 min
Discarded = 0.11 cfs @ 12.54 hrs, Volume= 7,234 cf
Primary = 2.42 cfs @ 12.54 hrs, Volume= 14,942 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 223.41' @ 12.54 hrs Surf.Area= 1,572 sf Storage= 3,920 cf

Plug-Flow detention time= 142.5 min calculated for 22,145 cf (99% of inflow)
Center-of-Mass det. time= 138.0 min (961.1 - 823.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	220.00'	2,466 cf	**6.00'W x 262.00'L x 6.00'H Field A** 9,432 cf Overall - 3,267 cf Embedded = 6,165 cf x 40.0% Voids
#2A	220.00'	3,267 cf	**CMP Round 48** x 13 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.57 sf x 20.00'L = 251.3 cf Overall Size= 48.0"W x 48.0"H x 20.00'L
		5,733 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	222.50'	**12.0" Round Culvert** L= 13.0' Ke= 0.500 Inlet / Outlet Invert= 222.50' / 222.00' S= 0.0385 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	226.00'	**30.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#3	Discarded	220.00'	**1.020 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 213.00' Phase-In= 0.01'

Discarded OutFlow Max=0.11 cfs @ 12.54 hrs HW=223.41' (Free Discharge)
└—**3=Exfiltration** (Controls 0.11 cfs)

Primary OutFlow Max=2.42 cfs @ 12.54 hrs HW=223.41' TW=222.47' (Dynamic Tailwater)
├—**1=Culvert** (Inlet Controls 2.42 cfs @ 3.24 fps)
└—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link 1L: (new Link)

Inflow Area = 121,356 sf, 6.66% Impervious, Inflow Depth = 1.56" for 10-year event
Inflow = 1.86 cfs @ 12.51 hrs, Volume= 15,823 cf
Primary = 1.86 cfs @ 12.51 hrs, Volume= 15,823 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P-1: Subcat P-1 Runoff Area=283,622 sf 1.89% Impervious Runoff Depth=2.91"
Flow Length=844' Tc=16.3 min CN=71 Runoff=16.05 cfs 68,703 cf

Subcatchment P-2: Subcat P-2 Runoff Area=13,434 sf 0.00% Impervious Runoff Depth=3.00"
Flow Length=81' Tc=13.0 min CN=72 Runoff=0.85 cfs 3,360 cf

Subcatchment P-3A: Subcat P-3A Runoff Area=11,725 sf 46.58% Impervious Runoff Depth=4.31"
Tc=6.0 min CN=85 Runoff=1.31 cfs 4,213 cf

Subcatchment P-3B: Subcat P-3B Runoff Area=12,241 sf 37.68% Impervious Runoff Depth=4.00"
Tc=6.0 min CN=82 Runoff=1.28 cfs 4,077 cf

Subcatchment P-3c: Subcat P-3c Runoff Area=18,468 sf 39.10% Impervious Runoff Depth=4.10"
Tc=6.0 min CN=83 Runoff=1.97 cfs 6,311 cf

Subcatchment P-4a: Subcat P-4a Runoff Area=95,645 sf 8.45% Impervious Runoff Depth=2.27"
Flow Length=350' Tc=11.5 min CN=64 Runoff=4.69 cfs 18,097 cf

Subcatchment P-4b: Subcat P-4b Runoff Area=25,711 sf 0.00% Impervious Runoff Depth=3.00"
Flow Length=422' Tc=9.1 min CN=72 Runoff=1.83 cfs 6,431 cf

Subcatchment P-4c: Subcat P-4c Runoff Area=82,620 sf 0.00% Impervious Runoff Depth=3.00"
Flow Length=415' Tc=16.2 min CN=72 Runoff=4.85 cfs 20,665 cf

Subcatchment P-5a: Subcat P-5a Runoff Area=20,384 sf 45.51% Impervious Runoff Depth=4.31"
Tc=6.0 min CN=85 Runoff=2.27 cfs 7,325 cf

Subcatchment P-5b: Subcat P-5b Runoff Area=25,195 sf 32.63% Impervious Runoff Depth=4.00"
Tc=6.0 min CN=82 Runoff=2.63 cfs 8,391 cf

Subcatchment P-5c: Subcat P-5c Runoff Area=26,935 sf 33.06% Impervious Runoff Depth=4.00"
Tc=6.0 min CN=82 Runoff=2.81 cfs 8,970 cf

Subcatchment P-5d: Subcat P-5d Runoff Area=29,781 sf 18.57% Impervious Runoff Depth=3.59"
Tc=6.0 min CN=78 Runoff=2.81 cfs 8,904 cf

Subcatchment P-5e: Subcat P-5e Runoff Area=30,879 sf 17.23% Impervious Runoff Depth=3.39"
Tc=6.0 min CN=76 Runoff=2.76 cfs 8,720 cf

Subcatchment P-5f: Subcat P-5f Runoff Area=27,195 sf 21.01% Impervious Runoff Depth=3.49"
Tc=6.0 min CN=77 Runoff=2.50 cfs 7,904 cf

Subcatchment P-6: Subcat P-6 Runoff Area=40,896 sf 9.30% Impervious Runoff Depth=3.39"
Tc=6.0 min CN=76 Runoff=3.66 cfs 11,549 cf

Subcatchment P-7: Subcat P-7 Runoff Area=32,294 sf 0.82% Impervious Runoff Depth=3.10"
Tc=6.0 min CN=73 Runoff=2.64 cfs 8,334 cf

Subcatchment R-0: Subcat R-0 Runoff Area=1,268 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.17 cfs 610 cf

Subcatchment R-1: Subcat R-1 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-10: Subcat R-10 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-11: Subcat R-11 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-12: Subcat R-12 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-13: Subcat R-13 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-14: Subcat R-14 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-15: Subcat R-15 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-16: Subcat R-16 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-17: Subcat R-17 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-18: Subcat R-18 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-19: Subcat R-19 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-2: Subcat R-2 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-20: Subcat R-20 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-21: Subcat R-21 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-22: Subcat R-22 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-23: Subcat R-23 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-24: Subcat R-24 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-25: Subcat R-25 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-26: Subcat R-26 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-27: Subcat R-27 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-28: Subcat R-28 Runoff Area=5,312 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.70 cfs 2,555 cf

Subcatchment R-3: Subcat R-3 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-4: Subcat R-4 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-5: Subcat R-5 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-6: Subcat R-6 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-7: Subcat R-7 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-8: Subcat R-8 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Subcatchment R-9: Subcat R-9 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=5.77"
Tc=6.0 min CN=98 Runoff=0.22 cfs 816 cf

Reach 1R: Routing through grass Avg. Flow Depth=0.16' Max Vel=1.04 fps Inflow=2.30 cfs 3,630 cf
n=0.150 L=58.0' S=0.2414 '/' Capacity=173.93 cfs Outflow=2.15 cfs 3,630 cf

Reach 9001R: Routing sheet flow Avg. Flow Depth=0.06' Max Vel=0.43 fps Inflow=4.20 cfs 18,097 cf
n=0.150 L=680.0' S=0.0941 '/' Capacity=463.86 cfs Outflow=2.49 cfs 18,097 cf

Reach 9002R: Routing sheet flow Avg. Flow Depth=0.03' Max Vel=0.37 fps Inflow=1.83 cfs 6,431 cf
n=0.150 L=345.0' S=0.1420 '/' Capacity=569.83 cfs Outflow=1.23 cfs 6,431 cf

Reach R-01: Routing through woods Avg. Flow Depth=0.28' Max Vel=0.36 fps Inflow=2.15 cfs 3,630 cf
n=0.400 L=82.0' S=0.1098 '/' Capacity=43.98 cfs Outflow=1.92 cfs 3,630 cf

Reach SP-1: SP-1 Inflow=16.05 cfs 68,703 cf
Outflow=16.05 cfs 68,703 cf

Reach SP-2: SP-2 Inflow=0.85 cfs 3,360 cf
Outflow=0.85 cfs 3,360 cf

Reach SP-3: SP-3
Inflow=7.48 cfs 61,315 cf
Outflow=7.48 cfs 61,315 cf

Reach SP-4: SP-4
Inflow=11.33 cfs 72,639 cf
Outflow=11.33 cfs 72,639 cf

Reach SW1: Swale
Avg. Flow Depth=0.64' Max Vel=0.83 fps Inflow=4.69 cfs 18,097 cf
n=0.080 L=267.0' S=0.0050 '/' Capacity=37.23 cfs Outflow=4.20 cfs 18,097 cf

Pond 1P: drywells
Peak Elev=256.06' Storage=1,563 cf Inflow=2.94 cfs 10,712 cf
Discarded=0.08 cfs 5,195 cf Primary=2.89 cfs 5,517 cf Outflow=2.98 cfs 10,712 cf

Pond 2P: drywells
Peak Elev=223.95' Storage=1,136 cf Inflow=1.73 cfs 6,320 cf
Discarded=0.07 cfs 3,550 cf Primary=1.90 cfs 2,770 cf Outflow=1.96 cfs 6,320 cf

Pond 3P: drywells
Peak Elev=226.18' Storage=1,421 cf Inflow=2.24 cfs 8,157 cf
Discarded=0.08 cfs 4,527 cf Primary=2.30 cfs 3,630 cf Outflow=2.39 cfs 8,157 cf

Pond CB10: CB
Peak Elev=235.59' Inflow=2.63 cfs 8,391 cf
12.0" Round Culvert x 2.00 n=0.013 L=9.0' S=0.0100 '/' Outflow=2.63 cfs 8,391 cf

Pond CB12: CB
Peak Elev=229.99' Inflow=2.81 cfs 8,970 cf
12.0" Round Culvert x 2.00 n=0.013 L=19.0' S=0.0100 '/' Outflow=2.81 cfs 8,970 cf

Pond CB14: CB
Peak Elev=224.61' Inflow=2.81 cfs 8,904 cf
12.0" Round Culvert x 2.00 n=0.013 L=21.0' S=0.0300 '/' Outflow=2.81 cfs 8,904 cf

Pond CB16: CB
Peak Elev=218.02' Inflow=2.76 cfs 8,720 cf
12.0" Round Culvert x 2.00 n=0.013 L=15.0' S=0.0227 '/' Outflow=2.76 cfs 8,720 cf

Pond CB18: CB
Peak Elev=211.14' Inflow=2.50 cfs 7,904 cf
12.0" Round Culvert x 2.00 n=0.013 L=37.0' S=0.0100 '/' Outflow=2.50 cfs 7,904 cf

Pond CB2: CB
Peak Elev=255.91' Inflow=1.31 cfs 4,213 cf
12.0" Round Culvert x 2.00 n=0.013 L=22.0' S=0.0182 '/' Outflow=1.31 cfs 4,213 cf

Pond CB4: CB
Peak Elev=257.86' Inflow=1.28 cfs 4,077 cf
12.0" Round Culvert x 2.00 n=0.013 L=22.0' S=0.0300 '/' Outflow=1.28 cfs 4,077 cf

Pond CB6: CB
Peak Elev=251.28' Inflow=1.97 cfs 6,311 cf
12.0" Round Culvert x 2.00 n=0.013 L=11.0' S=0.0100 '/' Outflow=1.97 cfs 6,311 cf

Pond CB8: CB
Peak Elev=244.03' Inflow=2.27 cfs 7,325 cf
12.0" Round Culvert x 2.00 n=0.013 L=17.0' S=0.0200 '/' Outflow=2.27 cfs 7,325 cf

Pond DB1: DB1
Peak Elev=209.91' Storage=14,983 cf Inflow=19.79 cfs 61,317 cf
Primary=7.48 cfs 61,315 cf Secondary=0.00 cfs 0 cf Outflow=7.48 cfs 61,315 cf

Pond DB2: DB2
Peak Elev=248.08' Storage=8,647 cf Inflow=11.10 cfs 31,667 cf
Primary=2.72 cfs 31,667 cf Secondary=0.00 cfs 0 cf Outflow=2.72 cfs 31,667 cf

Pond DMH1: DMH
Peak Elev=252.06' Inflow=1.31 cfs 4,213 cf
15.0" Round Culvert n=0.013 L=64.0' S=0.0300 '/' Outflow=1.31 cfs 4,213 cf

Pond DMH10: DMH Peak Elev=212.25' Inflow=13.28 cfs 42,309 cf
24.0" Round Culvert n=0.013 L=113.0' S=0.0130 '/' Outflow=13.28 cfs 42,309 cf

Pond DMH11: DMH Peak Elev=210.91' Inflow=15.78 cfs 50,213 cf
24.0" Round Culvert n=0.013 L=62.0' S=0.0134 '/' Outflow=15.78 cfs 50,213 cf

Pond DMH12: DMH Peak Elev=233.47' Inflow=2.72 cfs 31,667 cf
15.0" Round Culvert n=0.013 L=76.0' S=0.0434 '/' Outflow=2.72 cfs 31,667 cf

Pond DMH2: DMH Peak Elev=252.38' Inflow=1.28 cfs 4,077 cf
15.0" Round Culvert n=0.013 L=75.0' S=0.0300 '/' Outflow=1.28 cfs 4,077 cf

Pond DMH3: DMH Peak Elev=251.11' Inflow=1.97 cfs 6,311 cf
15.0" Round Culvert n=0.013 L=55.0' S=0.0100 '/' Outflow=1.97 cfs 6,311 cf

Pond DMH4: DMH Peak Elev=249.89' Inflow=4.55 cfs 14,601 cf
18.0" Round Culvert n=0.013 L=159.0' S=0.0179 '/' Outflow=4.55 cfs 14,601 cf

Pond DMH5: DMH Peak Elev=230.07' Inflow=2.72 cfs 31,667 cf
15.0" Round Culvert n=0.013 L=124.0' S=0.0200 '/' Outflow=2.72 cfs 31,667 cf

Pond DMH6: DMH Peak Elev=243.71' Inflow=2.27 cfs 7,325 cf
15.0" Round Culvert n=0.013 L=146.0' S=0.0573 '/' Outflow=2.27 cfs 7,325 cf

Pond DMH7: DMH Peak Elev=235.44' Inflow=4.90 cfs 15,715 cf
18.0" Round Culvert n=0.013 L=140.0' S=0.0393 '/' Outflow=4.90 cfs 15,715 cf

Pond DMH8: DMH Peak Elev=228.45' Inflow=7.71 cfs 24,685 cf
24.0" Round Culvert n=0.013 L=137.0' S=0.0300 '/' Outflow=7.71 cfs 24,685 cf

Pond DMH9: DMH Peak Elev=220.99' Inflow=10.52 cfs 33,589 cf
24.0" Round Culvert n=0.013 L=147.0' S=0.0200 '/' Outflow=10.52 cfs 33,589 cf

Pond G: gabion Peak Elev=222.54' Storage=15 cf Inflow=2.60 cfs 23,817 cf
Outflow=2.60 cfs 23,817 cf

Pond is1: infiltration pipe Peak Elev=223.47' Storage=3,984 cf Inflow=2.72 cfs 31,667 cf
Discarded=0.11 cfs 7,606 cf Primary=2.60 cfs 23,817 cf Outflow=2.71 cfs 31,423 cf

Link 1L: (new Link) Inflow=3.47 cfs 24,528 cf
Primary=3.47 cfs 24,528 cf

Total Runoff Area = 829,393 sf Runoff Volume = 227,141 cf Average Runoff Depth = 3.29"
84.31% Pervious = 699,253 sf 15.69% Impervious = 130,141 sf

Summary for Subcatchment P-1: Subcat P-1

Runoff = 16.05 cfs @ 12.23 hrs, Volume= 68,703 cf, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
4,874	98	Paved parking, HSG B
10,508	61	>75% Grass cover, Good, HSG B
72,656	55	Woods, Good, HSG B
482	98	Paved parking, HSG D
132,075	77	Woods, Good, HSG D
24,002	80	>75% Grass cover, Good, HSG D
34,297	70	Woods, Good, HSG C
4,728	74	>75% Grass cover, Good, HSG C
283,622	71	Weighted Average
278,266		98.11% Pervious Area
5,356		1.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0625	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
8.4	794	0.1000	1.58		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
16.3	844	Total			

Summary for Subcatchment P-2: Subcat P-2

Runoff = 0.85 cfs @ 12.19 hrs, Volume= 3,360 cf, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
6,580	74	>75% Grass cover, Good, HSG C
6,854	70	Woods, Good, HSG C
13,434	72	Weighted Average
13,434		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	31	0.0465	1.08		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
13.0	81	Total			

Summary for Subcatchment P-3A: Subcat P-3A

Runoff = 1.31 cfs @ 12.09 hrs, Volume= 4,213 cf, Depth= 4.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
5,462	98	Paved parking, HSG C
6,263	74	>75% Grass cover, Good, HSG C
11,725	85	Weighted Average
6,263		53.42% Pervious Area
5,462		46.58% Impervious Area

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

Summary for Subcatchment P-3B: Subcat P-3B

Runoff = 1.28 cfs @ 12.09 hrs, Volume= 4,077 cf, Depth= 4.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
533	61	>75% Grass cover, Good, HSG B
4,612	98	Paved parking, HSG C
7,096	74	>75% Grass cover, Good, HSG C
12,241	82	Weighted Average
7,629		62.32% Pervious Area
4,612		37.68% Impervious Area

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

Summary for Subcatchment P-3c: Subcat P-3c

Runoff = 1.97 cfs @ 12.09 hrs, Volume= 6,311 cf, Depth= 4.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
7,221	98	Paved parking, HSG C
11,247	74	>75% Grass cover, Good, HSG C
18,468	83	Weighted Average
11,247		60.90% Pervious Area
7,221		39.10% Impervious Area

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

Summary for Subcatchment P-4a: Subcat P-4a

Runoff = 4.69 cfs @ 12.17 hrs, Volume= 18,097 cf, Depth= 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
7,742	98	Paved parking, HSG B
56,628	61	>75% Grass cover, Good, HSG B
23,518	55	Woods, Good, HSG B
343	98	Paved parking, HSG C
16	70	Woods, Good, HSG C
7,398	74	>75% Grass cover, Good, HSG C
95,645	64	Weighted Average
87,560		91.55% Pervious Area
8,085		8.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
2.8	300	0.1300	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.5	350	Total			

Summary for Subcatchment P-4b: Subcat P-4b

Runoff = 1.83 cfs @ 12.13 hrs, Volume= 6,431 cf, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
596	61	>75% Grass cover, Good, HSG B
1,158	55	Woods, Good, HSG B
17,524	74	>75% Grass cover, Good, HSG C
6,433	70	Woods, Good, HSG C
25,711	72	Weighted Average
25,711		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	30	0.0500	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
3.3	392	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.1	422	Total			

Summary for Subcatchment P-4c: Subcat P-4c

Runoff = 4.85 cfs @ 12.23 hrs, Volume= 20,665 cf, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
156	77	Woods, Good, HSG D
36,333	74	>75% Grass cover, Good, HSG C
0	98	Paved parking, HSG C
46,131	70	Woods, Good, HSG C
82,620	72	Weighted Average
82,620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
3.7	365	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.2	415	Total			

Summary for Subcatchment P-5a: Subcat P-5a

Runoff = 2.27 cfs @ 12.09 hrs, Volume= 7,325 cf, Depth= 4.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
9,276	98	Paved parking, HSG C
11,108	74	>75% Grass cover, Good, HSG C
20,384	85	Weighted Average
11,108		54.49% Pervious Area
9,276		45.51% Impervious Area

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

Summary for Subcatchment P-5b: Subcat P-5b

Runoff = 2.63 cfs @ 12.09 hrs, Volume= 8,391 cf, Depth= 4.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
8,220	98	Paved parking, HSG C
16,975	74	>75% Grass cover, Good, HSG C
25,195	82	Weighted Average
16,975		67.37% Pervious Area
8,220		32.63% Impervious Area

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

Summary for Subcatchment P-5c: Subcat P-5c

Runoff = 2.81 cfs @ 12.09 hrs, Volume= 8,970 cf, Depth= 4.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
8,906	98	Paved parking, HSG C
18,029	74	>75% Grass cover, Good, HSG C
26,935	82	Weighted Average
18,029		66.94% Pervious Area
8,906		33.06% Impervious Area

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

Summary for Subcatchment P-5d: Subcat P-5d

Runoff = 2.81 cfs @ 12.09 hrs, Volume= 8,904 cf, Depth= 3.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
5,640	70	Woods, Good, HSG C
18,610	74	>75% Grass cover, Good, HSG C
5,531	98	Paved parking, HSG C
29,781	78	Weighted Average
24,250		81.43% Pervious Area
5,531		18.57% Impervious Area

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

Summary for Subcatchment P-5e: Subcat P-5e

Runoff = 2.76 cfs @ 12.09 hrs, Volume= 8,720 cf, Depth= 3.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
10,965	74	>75% Grass cover, Good, HSG C
5,320	98	Paved parking, HSG C
14,594	70	Woods, Good, HSG C
30,879	76	Weighted Average
25,559		82.77% Pervious Area
5,320		17.23% Impervious Area

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

Summary for Subcatchment P-5f: Subcat P-5f

Runoff = 2.50 cfs @ 12.09 hrs, Volume= 7,904 cf, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
5,715	98	Paved parking, HSG C
10,921	74	>75% Grass cover, Good, HSG C
10,559	70	Woods, Good, HSG C
27,195	77	Weighted Average
21,480		78.99% Pervious Area
5,715		21.01% Impervious Area

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

Summary for Subcatchment P-6: Subcat P-6

Runoff = 3.66 cfs @ 12.09 hrs, Volume= 11,549 cf, Depth= 3.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
37,052	74	>75% Grass cover, Good, HSG C
3,802	98	Paved parking, HSG C
42	70	Woods, Good, HSG C
40,896	76	Weighted Average
37,094		90.70% Pervious Area
3,802		9.30% Impervious Area

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

Summary for Subcatchment P-7: Subcat P-7

Runoff = 2.64 cfs @ 12.09 hrs, Volume= 8,334 cf, Depth= 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
24,388	74	>75% Grass cover, Good, HSG C
266	98	Paved parking, HSG C
7,640	70	Woods, Good, HSG C
32,294	73	Weighted Average
32,028		99.18% Pervious Area
266		0.82% Impervious Area

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

Summary for Subcatchment R-0: Subcat R-0

Runoff = 0.17 cfs @ 12.09 hrs, Volume= 610 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,268	98	Roofs, HSG C
1,268		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-1: Subcat R-1

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-10: Subcat R-10

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-11: Subcat R-11

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-12: Subcat R-12

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-13: Subcat R-13

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-14: Subcat R-14

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
0	98	Roofs, HSG B
1,696	98	Roofs, HSG C
1,696	98	Weighted Average
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-15: Subcat R-15

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
555	98	Roofs, HSG B
1,141	98	Roofs, HSG C
1,696	98	Weighted Average
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-16: Subcat R-16

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-17: Subcat R-17

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-18: Subcat R-18

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-19: Subcat R-19

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-2: Subcat R-2

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-20: Subcat R-20

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-21: Subcat R-21

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-22: Subcat R-22

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-23: Subcat R-23

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-24: Subcat R-24

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-25: Subcat R-25

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-26: Subcat R-26

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-27: Subcat R-27

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-28: Subcat R-28

Runoff = 0.70 cfs @ 12.09 hrs, Volume= 2,555 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
5,312	98	Roofs, HSG B
5,312		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-3: Subcat R-3

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-4: Subcat R-4

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-5: Subcat R-5

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-6: Subcat R-6

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-7: Subcat R-7

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-8: Subcat R-8

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-9: Subcat R-9

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 816 cf, Depth= 5.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=6.01"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Reach 1R: Routing through grass

A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.

This reach demonstrates a procedure for performing a shallow concetrated flow routing through woods. In this case, the "reach" is defined as a channel with very low side slopes. The Manning's value of 0.40 is selected from the table of sheet flow roughness coefficients, which is comparable to the Manning's value for "woods with light underbrush".

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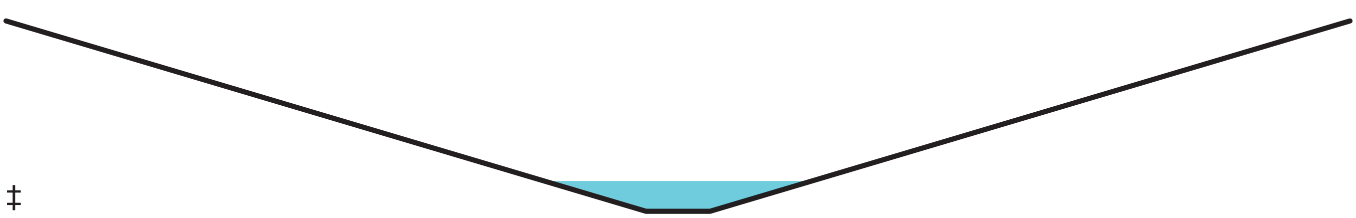
[80] Warning: Exceeded Pond 3P by 1.42' @ 17.30 hrs (0.00 cfs 1,019 cf)

Inflow Area = 16,959 sf,100.00% Impervious, Inflow Depth = 2.57" for 25-year event
Inflow = 2.30 cfs @ 12.09 hrs, Volume= 3,630 cf
Outflow = 2.15 cfs @ 12.10 hrs, Volume= 3,630 cf, Atten= 7%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 1.04 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 2.2 min

Peak Storage= 120 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.16' , Surface Width= 20.93'
Bank-Full Depth= 1.00' Flow Area= 55.0 sf, Capacity= 173.93 cfs

5.00' x 1.00' deep channel, n= 0.150 Sheet flow over Short Grass
Side Slope Z-value= 50.0 '/' Top Width= 105.00'
Length= 58.0' Slope= 0.2414 '/'
Inlet Invert= 226.00', Outlet Invert= 212.00'



‡

Summary for Reach 9001R: Routing sheet flow through a subcatchment

A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.

This reach demonstrates a procedure for performing a sheet-flow routing through a subcatchment area. In this case, the "reach" is defined as a wide channel with very low side slopes. The Manning's value of 0.15 is selected from the table of sheet flow roughness coefficients, which are much higher than normal Manning's values, in order to allow for the greater frictional losses of shallow flow. This value is comparable to the Manning's value for "very weedy reaches".

This example assumes that sheet flow occurs evenly over the entire 100' channel width, and that the flow depth is therefore very small. If the flow is concentrated or forms channels, the description and Manning's value must be adjusted accordingly.

Inflow Area = 95,645 sf, 8.45% Impervious, Inflow Depth = 2.27" for 25-year event
Inflow = 4.20 cfs @ 12.24 hrs, Volume= 18,097 cf
Outflow = 2.49 cfs @ 12.51 hrs, Volume= 18,097 cf, Atten= 41%, Lag= 16.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.43 fps, Min. Travel Time= 26.5 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 68.9 min

Peak Storage= 3,964 cf @ 12.51 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 111.04'
Bank-Full Depth= 1.00' Flow Area= 200.0 sf, Capacity= 463.86 cfs

100.00' x 1.00' deep channel, n= 0.150
Side Slope Z-value= 100.0 '/' Top Width= 300.00'
Length= 680.0' Slope= 0.0941 '/'
Inlet Invert= 264.00', Outlet Invert= 200.00'

‡

Summary for Reach 9002R: Routing sheet flow through a subcatchment

A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.

This reach demonstrates a procedure for performing a sheet-flow routing through a subcatchment area. In this case, the "reach" is defined as a wide channel with very low side slopes. The Manning's value of 0.15 is selected from the table of sheet flow roughness coefficients, which are much higher than normal Manning's values, in order to allow for the greater frictional losses of shallow flow. This value is comparable to the Manning's value for "very weedy reaches".

This example assumes that sheet flow occurs evenly over the entire 100' channel width, and that the flow depth is therefore very small. If the flow is concentrated or forms channels, the description and Manning's value must be adjusted accordingly.

Inflow Area = 25,711 sf, 0.00% Impervious, Inflow Depth = 3.00" for 25-year event
Inflow = 1.83 cfs @ 12.13 hrs, Volume= 6,431 cf
Outflow = 1.23 cfs @ 12.27 hrs, Volume= 6,431 cf, Atten= 33%, Lag= 7.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.37 fps, Min. Travel Time= 15.5 min
Avg. Velocity = 0.18 fps, Avg. Travel Time= 31.9 min

Peak Storage= 1,142 cf @ 12.27 hrs
Average Depth at Peak Storage= 0.03' , Surface Width= 106.41'
Bank-Full Depth= 1.00' Flow Area= 200.0 sf, Capacity= 569.83 cfs

100.00' x 1.00' deep channel, n= 0.150
Side Slope Z-value= 100.0 '/' Top Width= 300.00'
Length= 345.0' Slope= 0.1420 '/'
Inlet Invert= 249.00', Outlet Invert= 200.00'

‡ 

Summary for Reach R-01: Routing through woods

A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.

This reach demonstrates a procedure for performing a shallow concetrated flow routing through woods. In this case, the "reach" is defined as a channel with very low side slopes. The Manning's value of 0.40 is selected from the table of sheet flow roughness coefficients, which is comparable to the Manning's value for "woods with light underbrush".

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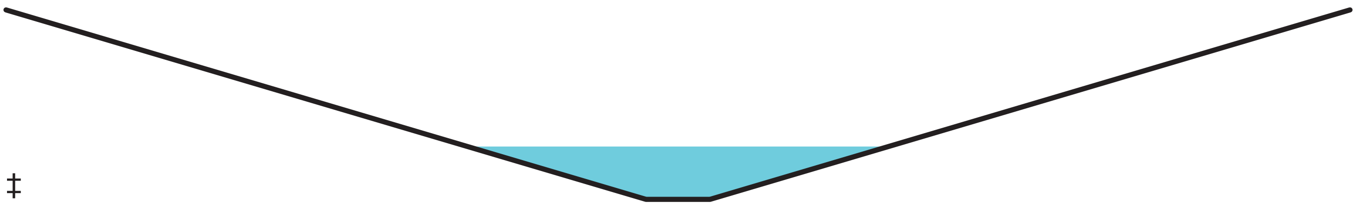
[62] Hint: Exceeded Reach 1R OUTLET depth by 0.14' @ 12.20 hrs

Inflow Area = 16,959 sf,100.00% Impervious, Inflow Depth = 2.57" for 25-year event
Inflow = 2.15 cfs @ 12.10 hrs, Volume= 3,630 cf
Outflow = 1.92 cfs @ 12.14 hrs, Volume= 3,630 cf, Atten= 11%, Lag= 2.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.36 fps, Min. Travel Time= 3.8 min
Avg. Velocity = 0.12 fps, Avg. Travel Time= 11.2 min

Peak Storage= 433 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.28' , Surface Width= 32.87'
Bank-Full Depth= 1.00' Flow Area= 55.0 sf, Capacity= 43.98 cfs

5.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 50.0 '/' Top Width= 105.00'
Length= 82.0' Slope= 0.1098 '/'
Inlet Invert= 212.00', Outlet Invert= 203.00'



‡

Summary for Reach SP-1: SP-1

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

Inflow Area = 283,622 sf, 1.89% Impervious, Inflow Depth = 2.91" for 25-year event
Inflow = 16.05 cfs @ 12.23 hrs, Volume= 68,703 cf
Outflow = 16.05 cfs @ 12.23 hrs, Volume= 68,703 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach SP-2: SP-2

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

Inflow Area = 13,434 sf, 0.00% Impervious, Inflow Depth = 3.00" for 25-year event
Inflow = 0.85 cfs @ 12.19 hrs, Volume= 3,360 cf
Outflow = 0.85 cfs @ 12.19 hrs, Volume= 3,360 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach SP-3: SP-3

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

Inflow Area = 205,802 sf, 27.39% Impervious, Inflow Depth = 3.58" for 25-year event
Inflow = 7.48 cfs @ 12.36 hrs, Volume= 61,315 cf
Outflow = 7.48 cfs @ 12.36 hrs, Volume= 61,315 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach SP-4: SP-4

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

Inflow Area = 326,536 sf, 20.95% Impervious, Inflow Depth = 2.67" for 25-year event
Inflow = 11.33 cfs @ 12.25 hrs, Volume= 72,639 cf
Outflow = 11.33 cfs @ 12.25 hrs, Volume= 72,639 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach SW1: Swale

Inflow Area = 95,645 sf, 8.45% Impervious, Inflow Depth = 2.27" for 25-year event
Inflow = 4.69 cfs @ 12.17 hrs, Volume= 18,097 cf
Outflow = 4.20 cfs @ 12.24 hrs, Volume= 18,097 cf, Atten= 11%, Lag= 4.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.83 fps, Min. Travel Time= 5.4 min
Avg. Velocity = 0.24 fps, Avg. Travel Time= 18.5 min

Peak Storage= 1,350 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.64' , Surface Width= 9.83'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 37.23 cfs

6.00' x 2.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 18.00'
Length= 267.0' Slope= 0.0050 '/'
Inlet Invert= 267.33', Outlet Invert= 266.00'

‡

Summary for Pond 1P: drywells

Soil type 307C (sandy loam) Rawls infiltration rate = 1.02 inches per hour

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[92] Warning: Device #1 is above defined storage
[92] Warning: Device #3 is above defined storage
[93] Warning: Storage range exceeded by 1.06'
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=35)

Inflow Area = 22,271 sf,100.00% Impervious, Inflow Depth = 5.77" for 25-year event
Inflow = 2.94 cfs @ 12.09 hrs, Volume= 10,712 cf
Outflow = 2.98 cfs @ 12.09 hrs, Volume= 10,712 cf, Atten= 0%, Lag= 0.1 min
Discarded = 0.08 cfs @ 12.09 hrs, Volume= 5,195 cf
Primary = 2.89 cfs @ 12.09 hrs, Volume= 5,517 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 256.06' @ 12.09 hrs Surf.Area= 539 sf Storage= 1,563 cf

Plug-Flow detention time= 144.8 min calculated for 10,697 cf (100% of inflow)
Center-of-Mass det. time= 145.4 min (890.5 - 745.1)

Volume	Invert	Avail.Storage	Storage Description
#1	250.50'	982 cf	**5.33'D x 4.00'H Drywell structure** x 11 Inside #2 1,243 cf Overall - 4.0" Wall Thickness = 982 cf
#2	250.00'	581 cf	**7.00'W x 7.00'L x 5.00'H Stone** x 11 2,695 cf Overall - 1,243 cf Embedded = 1,452 cf x 40.0% Voids
		1,563 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	256.00'	**4.0" Vert. Roof drain overflow X 11.00** C= 0.600 Limited to weir flow at low heads
#2	Discarded	250.00'	**1.020 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 245.00' Phase-In= 0.01'
#3	Primary	255.50'	**2.5' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.08 cfs @ 12.09 hrs HW=256.05' (Free Discharge)
└─**2=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=2.81 cfs @ 12.09 hrs HW=256.05' TW=246.80' (Dynamic Tailwater)
├─**1=Roof drain overflow** (Orifice Controls 0.08 cfs @ 0.79 fps)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 2.73 cfs @ 1.97 fps)

Summary for Pond 2P: drywells

Soil type 307C (sandy loam) Rawls infiltration rate = 1.02 inches per hour

[92] Warning: Device #1 is above defined storage
[92] Warning: Device #3 is above defined storage
[93] Warning: Storage range exceeded by 0.95'
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=33)

Inflow Area = 13,139 sf,100.00% Impervious, Inflow Depth = 5.77" for 25-year event
Inflow = 1.73 cfs @ 12.09 hrs, Volume= 6,320 cf
Outflow = 1.96 cfs @ 12.06 hrs, Volume= 6,320 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.07 cfs @ 12.06 hrs, Volume= 3,550 cf
Primary = 1.90 cfs @ 12.06 hrs, Volume= 2,770 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 223.95' @ 12.06 hrs Surf.Area= 392 sf Storage= 1,136 cf

Plug-Flow detention time= 155.1 min calculated for 6,311 cf (100% of inflow)
Center-of-Mass det. time= 155.6 min (900.7 - 745.1)

Volume	Invert	Avail.Storage	Storage Description
#1	218.50'	714 cf	**5.33'D x 4.00'H Drywell structure** x 8 Inside #2 904 cf Overall - 4.0" Wall Thickness = 714 cf
#2	218.00'	422 cf	**7.00'W x 7.00'L x 5.00'H Stone** x 8 1,960 cf Overall - 904 cf Embedded = 1,056 cf x 40.0% Voids
		1,136 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	224.00'	**4.0" Vert. Roof drain overflow X 8.00** C= 0.600 Limited to weir flow at low heads
#2	Discarded	218.00'	**1.020 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 214.00' Phase-In= 0.01'
#3	Primary	223.50'	**2.5' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.07 cfs @ 12.06 hrs HW=223.93' (Free Discharge)
└─**2=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=1.77 cfs @ 12.06 hrs HW=223.93' TW=208.69' (Dynamic Tailwater)
├─**1=Roof drain overflow** (Controls 0.00 cfs)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 1.77 cfs @ 1.65 fps)

Summary for Pond 3P: drywells

Soil type 307C (sandy loam) Rawls infiltration rate = 1.02 inches per hour

[92] Warning: Device #1 is above defined storage
[92] Warning: Device #3 is above defined storage
[93] Warning: Storage range exceeded by 1.18'
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=32)

Inflow Area = 16,959 sf,100.00% Impervious, Inflow Depth = 5.77" for 25-year event
Inflow = 2.24 cfs @ 12.09 hrs, Volume= 8,157 cf
Outflow = 2.39 cfs @ 12.09 hrs, Volume= 8,157 cf, Atten= 0%, Lag= 0.4 min
Discarded = 0.08 cfs @ 12.10 hrs, Volume= 4,527 cf
Primary = 2.30 cfs @ 12.09 hrs, Volume= 3,630 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 226.18' @ 12.10 hrs Surf.Area= 490 sf Storage= 1,421 cf

Plug-Flow detention time= 152.6 min calculated for 8,146 cf (100% of inflow)
Center-of-Mass det. time= 153.1 min (898.2 - 745.1)

Volume	Invert	Avail.Storage	Storage Description
#1	220.50'	892 cf	**5.33'D x 4.00'H Drywell structure** x 10 Inside #2 1,130 cf Overall - 4.0" Wall Thickness = 892 cf
#2	220.00'	528 cf	**7.00'W x 7.00'L x 5.00'H Stone** x 10 2,450 cf Overall - 1,130 cf Embedded = 1,320 cf x 40.0% Voids
		1,421 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	226.50'	**4.0" Vert. Roof drain overflow X 10.00** C= 0.600 Limited to weir flow at low heads
#2	Discarded	220.00'	**1.020 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 216.00' Phase-In= 0.01'
#3	Primary	226.00'	**2.5' long x 5.0' breadth Broad-Crested Rectangular Weir X 10.00** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.08 cfs @ 12.10 hrs HW=226.18' (Free Discharge)
└─**2=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=2.23 cfs @ 12.09 hrs HW=226.18' TW=226.16' (Dynamic Tailwater)
├─**1=Roof drain overflow** (Controls 0.00 cfs)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 2.23 cfs @ 0.50 fps)

Summary for Pond CB10: CB

Inflow Area = 25,195 sf, 32.63% Impervious, Inflow Depth = 4.00" for 25-year event
Inflow = 2.63 cfs @ 12.09 hrs, Volume= 8,391 cf
Outflow = 2.63 cfs @ 12.09 hrs, Volume= 8,391 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.63 cfs @ 12.09 hrs, Volume= 8,391 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 235.59' @ 12.09 hrs
Flood Elev= 239.42'

Device	Routing	Invert	Outlet Devices
#1	Primary	234.69'	**12.0" Round Culvert X 2.00** L= 9.0' Ke= 0.500 Inlet / Outlet Invert= 234.69' / 234.60' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.57 cfs @ 12.09 hrs HW=235.57' TW=235.43' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 2.57 cfs @ 2.33 fps)

Summary for Pond CB12: CB

Inflow Area = 26,935 sf, 33.06% Impervious, Inflow Depth = 4.00" for 25-year event
Inflow = 2.81 cfs @ 12.09 hrs, Volume= 8,970 cf
Outflow = 2.81 cfs @ 12.09 hrs, Volume= 8,970 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.81 cfs @ 12.09 hrs, Volume= 8,970 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 229.99' @ 12.09 hrs
Flood Elev= 233.72'

Device	Routing	Invert	Outlet Devices
#1	Primary	229.29'	**12.0" Round Culvert X 2.00** L= 19.0' Ke= 0.500 Inlet / Outlet Invert= 229.29' / 229.10' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.75 cfs @ 12.09 hrs HW=229.98' TW=228.43' (Dynamic Tailwater)
1=Culvert (Barrel Controls 2.75 cfs @ 3.35 fps)

Summary for Pond CB14: CB

Inflow Area =	29,781 sf, 18.57% Impervious,	Inflow Depth = 3.59"	for 25-year event
Inflow =	2.81 cfs @ 12.09 hrs, Volume=	8,904 cf	
Outflow =	2.81 cfs @ 12.09 hrs, Volume=	8,904 cf,	Atten= 0%, Lag= 0.0 min
Primary =	2.81 cfs @ 12.09 hrs, Volume=	8,904 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 224.61' @ 12.09 hrs
Flood Elev= 227.69'

Device	Routing	Invert	Outlet Devices
#1	Primary	223.98'	**12.0" Round Culvert X 2.00** L= 21.0' Ke= 0.500 Inlet / Outlet Invert= 223.98' / 223.35' S= 0.0300 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.76 cfs @ 12.09 hrs HW=224.60' TW=220.97' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.76 cfs @ 2.69 fps)

Summary for Pond CB16: CB

Inflow Area =	30,879 sf, 17.23% Impervious,	Inflow Depth = 3.39"	for 25-year event
Inflow =	2.76 cfs @ 12.09 hrs, Volume=	8,720 cf	
Outflow =	2.76 cfs @ 12.09 hrs, Volume=	8,720 cf,	Atten= 0%, Lag= 0.0 min
Primary =	2.76 cfs @ 12.09 hrs, Volume=	8,720 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 218.02' @ 12.09 hrs
Flood Elev= 220.61'

Device	Routing	Invert	Outlet Devices
#1	Primary	217.40'	**12.0" Round Culvert X 2.00** L= 15.0' Ke= 0.500 Inlet / Outlet Invert= 217.40' / 217.06' S= 0.0227 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.71 cfs @ 12.09 hrs HW=218.02' TW=212.22' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.71 cfs @ 2.67 fps)

Summary for Pond CB18: CB

Inflow Area = 27,195 sf, 21.01% Impervious, Inflow Depth = 3.49" for 25-year event
Inflow = 2.50 cfs @ 12.09 hrs, Volume= 7,904 cf
Outflow = 2.50 cfs @ 12.09 hrs, Volume= 7,904 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.50 cfs @ 12.09 hrs, Volume= 7,904 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 211.14' @ 12.09 hrs
Flood Elev= 213.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	210.30'	**12.0" Round Culvert X 2.00** L= 37.0' Ke= 0.500 Inlet / Outlet Invert= 210.30' / 209.93' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.47 cfs @ 12.09 hrs HW=211.11' TW=210.88' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 2.47 cfs @ 2.46 fps)

Summary for Pond CB2: CB

Inflow Area = 11,725 sf, 46.58% Impervious, Inflow Depth = 4.31" for 25-year event
Inflow = 1.31 cfs @ 12.09 hrs, Volume= 4,213 cf
Outflow = 1.31 cfs @ 12.09 hrs, Volume= 4,213 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.31 cfs @ 12.09 hrs, Volume= 4,213 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 255.91' @ 12.09 hrs
Flood Elev= 258.73'

Device	Routing	Invert	Outlet Devices
#1	Primary	255.50'	**12.0" Round Culvert X 2.00** L= 22.0' Ke= 0.500 Inlet / Outlet Invert= 255.50' / 255.10' S= 0.0182 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.27 cfs @ 12.09 hrs HW=255.90' TW=252.05' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.27 cfs @ 2.16 fps)

Summary for Pond CB4: CB

Inflow Area = 12,241 sf, 37.68% Impervious, Inflow Depth = 4.00" for 25-year event
Inflow = 1.28 cfs @ 12.09 hrs, Volume= 4,077 cf
Outflow = 1.28 cfs @ 12.09 hrs, Volume= 4,077 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.28 cfs @ 12.09 hrs, Volume= 4,077 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 257.86' @ 12.09 hrs
Flood Elev= 261.26'

Device	Routing	Invert	Outlet Devices
#1	Primary	257.46'	**12.0" Round Culvert X 2.00** L= 22.0' Ke= 0.500

Inlet / Outlet Invert= 257.46' / 256.80' S= 0.0300 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.25 cfs @ 12.09 hrs HW=257.86' TW=252.38' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.25 cfs @ 2.15 fps)

Summary for Pond CB6: CB

Inflow Area = 18,468 sf, 39.10% Impervious, Inflow Depth = 4.10" for 25-year event
Inflow = 1.97 cfs @ 12.09 hrs, Volume= 6,311 cf
Outflow = 1.97 cfs @ 12.09 hrs, Volume= 6,311 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.97 cfs @ 12.09 hrs, Volume= 6,311 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 251.28' @ 12.09 hrs
Flood Elev= 254.22'

Device	Routing	Invert	Outlet Devices
#1	Primary	250.61'	**12.0" Round Culvert X 2.00** L= 11.0' Ke= 0.500 Inlet / Outlet Invert= 250.61' / 250.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.93 cfs @ 12.09 hrs HW=251.27' TW=251.10' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.93 cfs @ 2.47 fps)

Summary for Pond CB8: CB

Inflow Area = 20,384 sf, 45.51% Impervious, Inflow Depth = 4.31" for 25-year event
Inflow = 2.27 cfs @ 12.09 hrs, Volume= 7,325 cf
Outflow = 2.27 cfs @ 12.09 hrs, Volume= 7,325 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.27 cfs @ 12.09 hrs, Volume= 7,325 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 244.03' @ 12.09 hrs
Flood Elev= 246.68'

Device	Routing	Invert	Outlet Devices
#1	Primary	243.40'	**12.0" Round Culvert X 2.00** L= 17.0' Ke= 0.500 Inlet / Outlet Invert= 243.40' / 243.06' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.22 cfs @ 12.09 hrs HW=244.02' TW=243.70' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 2.22 cfs @ 3.13 fps)

Summary for Pond DB1: DB1

Groundwater must be verified with test pit

Inflow Area = 205,802 sf, 27.39% Impervious, Inflow Depth = 3.58" for 25-year event
Inflow = 19.79 cfs @ 12.09 hrs, Volume= 61,317 cf
Outflow = 7.48 cfs @ 12.36 hrs, Volume= 61,315 cf, Atten= 62%, Lag= 16.3 min
Primary = 7.48 cfs @ 12.36 hrs, Volume= 61,315 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 209.91' @ 12.36 hrs Surf.Area= 8,801 sf Storage= 14,983 cf
Flood Elev= 212.20' Surf.Area= 13,749 sf Storage= 33,060 cf

Plug-Flow detention time= 24.6 min calculated for 61,315 cf (100% of inflow)
Center-of-Mass det. time= 24.1 min (837.1 - 813.0)

Volume	Invert	Avail.Storage	Storage Description
#1	206.50'	32,544 cf	**Surface Storage (Irregular)**Listed below (Recalc)
#2	205.50'	516 cf	**Filter Media (Irregular)**Listed below (Recalc) 2,580 cf Overall x 20.0% Voids
		33,060 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
206.50	2,580	292.7	0	0	2,580
208.00	3,931	343.8	4,848	4,848	5,212
210.00	6,340	407.4	10,175	15,023	9,087
212.00	9,234	471.0	15,484	30,507	13,619
212.20	11,169	496.1	2,037	32,544	15,553

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
205.50	2,580	292.7	0	0	2,580
206.50	2,580	292.7	2,580	2,580	2,873

Device	Routing	Invert	Outlet Devices
#1	Primary	205.50'	**12.0" Round Culvert** L= 28.0' Ke= 0.500 Inlet / Outlet Invert= 205.50' / 205.21' S= 0.0104 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	205.50'	**4.0" Vert. Perf Pipe Outlet X 4.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	208.90'	**24.0" x 24.0" Horiz. Horizonal Orifice** C= 0.600 Limited to weir flow at low heads
#4	Secondary	210.75'	**10.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=7.48 cfs @ 12.36 hrs HW=209.91' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.48 cfs @ 9.52 fps)
  ├─**2=Perf Pipe Outlet** (Passes < 3.46 cfs potential flow)
  └─**3=Horizonal Orifice** (Passes < 19.35 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=205.50' TW=0.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DB2: DB2

Inflow Area = 105,601 sf, 41.07% Impervious, Inflow Depth = 3.60" for 25-year event
Inflow = 11.10 cfs @ 12.09 hrs, Volume= 31,667 cf
Outflow = 2.72 cfs @ 12.48 hrs, Volume= 31,667 cf, Atten= 75%, Lag= 23.1 min
Primary = 2.72 cfs @ 12.48 hrs, Volume= 31,667 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 248.08' @ 12.48 hrs Surf.Area= 4,759 sf Storage= 8,647 cf
Flood Elev= 250.00' Surf.Area= 7,238 sf Storage= 18,626 cf

Plug-Flow detention time= 21.7 min calculated for 31,623 cf (100% of inflow)
Center-of-Mass det. time= 21.7 min (822.6 - 800.9)

Volume	Invert	Avail.Storage	Storage Description
#1	244.50'	17,872 cf	**Surface Storage (Irregular)**Listed below (Recalc)
#2	239.55'	754 cf	**Filter Media (Irregular)**Listed below (Recalc) 3,772 cf Overall x 20.0% Voids
		18,626 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
244.50	762	148.0	0	0	762
245.00	1,072	161.0	456	456	1,091
246.00	1,868	209.0	1,452	1,908	2,516
247.00	2,807	247.0	2,322	4,230	3,914
248.00	3,902	286.0	3,340	7,569	5,589
249.00	5,141	321.0	4,507	12,076	7,307
250.00	6,476	346.0	5,796	17,872	8,675

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
239.55	762	148.0	0	0	762
244.50	762	148.0	3,772	3,772	1,495

Device	Routing	Invert	Outlet Devices
#1	Primary	239.55'	**12.0" Round Culvert** L= 95.0' Ke= 0.500 Inlet / Outlet Invert= 239.55' / 234.80' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	239.55'	**6.0" Vert. Perf Pipe Oulet** C= 0.600 Limited to weir flow at low heads
#3	Device 1	248.65'	**24.0" x 24.0" Horiz. Horizontal Orifice** C= 0.600

			Limited to weir flow at low heads
#4	Secondary	249.70'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=2.72 cfs @ 12.48 hrs HW=248.08' TW=233.47' (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.72 cfs of 10.43 cfs potential flow)
  ├─**2=Perf Pipe Oulet** (Orifice Controls 2.72 cfs @ 13.85 fps)
  └─**3=Horizontal Orifice** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=239.55' TW=223.98' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DMH1: DMH

Inflow Area = 11,725 sf, 46.58% Impervious, Inflow Depth = 4.31" for 25-year event
Inflow = 1.31 cfs @ 12.09 hrs, Volume= 4,213 cf
Outflow = 1.31 cfs @ 12.09 hrs, Volume= 4,213 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.31 cfs @ 12.09 hrs, Volume= 4,213 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 252.06' @ 12.09 hrs
Flood Elev= 258.52'

Device	Routing	Invert	Outlet Devices
#1	Primary	251.51'	**15.0" Round Culvert** L= 64.0' Ke= 0.500 Inlet / Outlet Invert= 251.51' / 249.59' S= 0.0300 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.27 cfs @ 12.09 hrs HW=252.05' TW=249.88' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.27 cfs @ 2.50 fps)

Summary for Pond DMH10: DMH

Inflow Area = 133,174 sf, 27.97% Impervious, Inflow Depth = 3.81" for 25-year event
Inflow = 13.28 cfs @ 12.09 hrs, Volume= 42,309 cf
Outflow = 13.28 cfs @ 12.09 hrs, Volume= 42,309 cf, Atten= 0%, Lag= 0.0 min
Primary = 13.28 cfs @ 12.09 hrs, Volume= 42,309 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 212.25' @ 12.09 hrs
Flood Elev= 227.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	210.40'	**24.0" Round Culvert** L= 113.0' Ke= 0.500 Inlet / Outlet Invert= 210.40' / 208.93' S= 0.0130 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=13.01 cfs @ 12.09 hrs HW=212.21' TW=210.87' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 13.01 cfs @ 5.72 fps)

Summary for Pond DMH11: DMH

Inflow Area = 160,369 sf, 26.79% Impervious, Inflow Depth = 3.76" for 25-year event
Inflow = 15.78 cfs @ 12.09 hrs, Volume= 50,213 cf
Outflow = 15.78 cfs @ 12.09 hrs, Volume= 50,213 cf, Atten= 0%, Lag= 0.0 min
Primary = 15.78 cfs @ 12.09 hrs, Volume= 50,213 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 210.91' @ 12.09 hrs
Flood Elev= 215.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	208.83'	**24.0" Round Culvert** L= 62.0' Ke= 0.500 Inlet / Outlet Invert= 208.83' / 208.00' S= 0.0134 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=15.45 cfs @ 12.09 hrs HW=210.87' TW=209.04' (Dynamic Tailwater)
1=Culvert (Inlet Controls 15.45 cfs @ 4.92 fps)

Summary for Pond DMH12: DMH

Inflow Area = 105,601 sf, 41.07% Impervious, Inflow Depth = 3.60" for 25-year event
Inflow = 2.72 cfs @ 12.48 hrs, Volume= 31,667 cf
Outflow = 2.72 cfs @ 12.48 hrs, Volume= 31,667 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.72 cfs @ 12.48 hrs, Volume= 31,667 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 233.47' @ 12.48 hrs
Flood Elev= 238.03'

Device	Routing	Invert	Outlet Devices
#1	Primary	232.63'	**15.0" Round Culvert** L= 76.0' Ke= 0.500 Inlet / Outlet Invert= 232.63' / 229.33' S= 0.0434 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.72 cfs @ 12.48 hrs HW=233.47' TW=230.07' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.72 cfs @ 3.11 fps)

Summary for Pond DMH2: DMH

Inflow Area = 12,241 sf, 37.68% Impervious, Inflow Depth = 4.00" for 25-year event
Inflow = 1.28 cfs @ 12.09 hrs, Volume= 4,077 cf
Outflow = 1.28 cfs @ 12.09 hrs, Volume= 4,077 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.28 cfs @ 12.09 hrs, Volume= 4,077 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 252.38' @ 12.09 hrs
Flood Elev= 260.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	251.84'	**15.0" Round Culvert** L= 75.0' Ke= 0.500

Inlet / Outlet Invert= 251.84' / 249.59' S= 0.0300 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.25 cfs @ 12.09 hrs HW=252.38' TW=249.88' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.25 cfs @ 2.49 fps)

Summary for Pond DMH3: DMH

Inflow Area = 18,468 sf, 39.10% Impervious, Inflow Depth = 4.10" for 25-year event
Inflow = 1.97 cfs @ 12.09 hrs, Volume= 6,311 cf
Outflow = 1.97 cfs @ 12.09 hrs, Volume= 6,311 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.97 cfs @ 12.09 hrs, Volume= 6,311 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 251.11' @ 12.09 hrs
Flood Elev= 254.76'

Device	Routing	Invert	Outlet Devices
#1	Primary	250.40'	**15.0" Round Culvert** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 250.40' / 249.85' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.93 cfs @ 12.09 hrs HW=251.10' TW=249.88' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 1.93 cfs @ 3.94 fps)

Summary for Pond DMH4: DMH

Inflow Area = 42,434 sf, 40.76% Impervious, Inflow Depth = 4.13" for 25-year event
Inflow = 4.55 cfs @ 12.09 hrs, Volume= 14,601 cf
Outflow = 4.55 cfs @ 12.09 hrs, Volume= 14,601 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.55 cfs @ 12.09 hrs, Volume= 14,601 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 249.89' @ 12.09 hrs
Flood Elev= 257.23'

Device	Routing	Invert	Outlet Devices
#1	Primary	248.85'	**18.0" Round Culvert** L= 159.0' Ke= 0.500 Inlet / Outlet Invert= 248.85' / 246.00' S= 0.0179 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=4.45 cfs @ 12.09 hrs HW=249.88' TW=246.81' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 4.45 cfs @ 3.45 fps)

Summary for Pond DMH5: DMH

Inflow Area = 105,601 sf, 41.07% Impervious, Inflow Depth = 3.60" for 25-year event
Inflow = 2.72 cfs @ 12.48 hrs, Volume= 31,667 cf
Outflow = 2.72 cfs @ 12.48 hrs, Volume= 31,667 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.72 cfs @ 12.48 hrs, Volume= 31,667 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 230.07' @ 12.48 hrs
Flood Elev= 237.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	229.23'	**15.0" Round Culvert** L= 124.0' Ke= 0.500 Inlet / Outlet Invert= 229.23' / 226.75' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.72 cfs @ 12.48 hrs HW=230.07' TW=223.46' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 2.72 cfs @ 3.11 fps)

Summary for Pond DMH6: DMH

Inflow Area = 20,384 sf, 45.51% Impervious, Inflow Depth = 4.31" for 25-year event
Inflow = 2.27 cfs @ 12.09 hrs, Volume= 7,325 cf
Outflow = 2.27 cfs @ 12.09 hrs, Volume= 7,325 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.27 cfs @ 12.09 hrs, Volume= 7,325 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 243.71' @ 12.09 hrs
Flood Elev= 246.62'

Device	Routing	Invert	Outlet Devices
#1	Primary	242.96'	**15.0" Round Culvert** L= 146.0' Ke= 0.500 Inlet / Outlet Invert= 242.96' / 234.60' S= 0.0573 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.22 cfs @ 12.09 hrs HW=243.70' TW=235.42' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 2.22 cfs @ 2.93 fps)

Summary for Pond DMH7: DMH

Inflow Area = 45,579 sf, 38.39% Impervious, Inflow Depth = 4.14" for 25-year event
Inflow = 4.90 cfs @ 12.09 hrs, Volume= 15,715 cf
Outflow = 4.90 cfs @ 12.09 hrs, Volume= 15,715 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.90 cfs @ 12.09 hrs, Volume= 15,715 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 235.44' @ 12.09 hrs
Flood Elev= 246.62'

Device	Routing	Invert	Outlet Devices
#1	Primary	234.35'	**18.0" Round Culvert** L= 140.0' Ke= 0.500 Inlet / Outlet Invert= 234.35' / 228.85' S= 0.0393 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=4.79 cfs @ 12.09 hrs HW=235.43' TW=228.43' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 4.79 cfs @ 3.53 fps)

Summary for Pond DMH8: DMH

Inflow Area = 72,514 sf, 36.41% Impervious, Inflow Depth = 4.09" for 25-year event
Inflow = 7.71 cfs @ 12.09 hrs, Volume= 24,685 cf
Outflow = 7.71 cfs @ 12.09 hrs, Volume= 24,685 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.71 cfs @ 12.09 hrs, Volume= 24,685 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 228.45' @ 12.09 hrs
Flood Elev= 233.28'

Device	Routing	Invert	Outlet Devices
#1	Primary	227.21'	**24.0" Round Culvert** L= 137.0' Ke= 0.500 Inlet / Outlet Invert= 227.21' / 223.10' S= 0.0300 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=7.54 cfs @ 12.09 hrs HW=228.43' TW=220.97' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.54 cfs @ 3.76 fps)

Summary for Pond DMH9: DMH

Inflow Area = 102,295 sf, 31.22% Impervious, Inflow Depth = 3.94" for 25-year event
Inflow = 10.52 cfs @ 12.09 hrs, Volume= 33,589 cf
Outflow = 10.52 cfs @ 12.09 hrs, Volume= 33,589 cf, Atten= 0%, Lag= 0.0 min
Primary = 10.52 cfs @ 12.09 hrs, Volume= 33,589 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 220.99' @ 12.09 hrs
Flood Elev= 227.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	219.49'	**24.0" Round Culvert** L= 147.0' Ke= 0.500 Inlet / Outlet Invert= 219.49' / 216.55' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=10.29 cfs @ 12.09 hrs HW=220.97' TW=212.21' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 10.29 cfs @ 4.14 fps)

Summary for Pond G: gabion

Inflow Area = 105,601 sf, 41.07% Impervious, Inflow Depth = 2.71" for 25-year event
Inflow = 2.60 cfs @ 12.60 hrs, Volume= 23,817 cf
Outflow = 2.60 cfs @ 12.60 hrs, Volume= 23,817 cf, Atten= 0%, Lag= 0.2 min
Primary = 2.60 cfs @ 12.60 hrs, Volume= 23,817 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 222.54' @ 12.60 hrs Surf.Area= 37 sf Storage= 15 cf
Flood Elev= 223.25' Storage= 37 cf

Plug-Flow detention time= 0.1 min calculated for 23,784 cf (100% of inflow)
Center-of-Mass det. time= 0.1 min (817.5 - 817.4)

Volume	Invert	Avail.Storage	Storage Description
#1	222.00'	37 cf	**15.0" Round Pipe Storage** L= 30.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	222.63'	**3.0" Vert. outlet holes X 15.00** C= 0.600 Limited to weir flow at low heads
#2	Primary	222.00'	**3.0" Horiz. outlet holes X 15.00** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.60 cfs @ 12.60 hrs HW=222.54' TW=0.00' (Dynamic Tailwater)
—**1=outlet holes** (Controls 0.00 cfs)
—**2=outlet holes** (Orifice Controls 2.60 cfs @ 3.53 fps)

Summary for Pond is1: infiltration pipe

[92] Warning: Device #2 is above defined storage

Inflow Area =	105,601 sf, 41.07% Impervious,	Inflow Depth = 3.60"	for 25-year event	
Inflow =	2.72 cfs @	12.48 hrs, Volume=	31,667 cf	
Outflow =	2.71 cfs @	12.60 hrs, Volume=	31,423 cf,	Atten= 0%, Lag= 7.3 min
Discarded =	0.11 cfs @	12.60 hrs, Volume=	7,606 cf	
Primary =	2.60 cfs @	12.60 hrs, Volume=	23,817 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 223.47' @ 12.60 hrs Surf.Area= 1,572 sf Storage= 3,984 cf

Plug-Flow detention time= 106.4 min calculated for 31,379 cf (99% of inflow)
Center-of-Mass det. time= 102.6 min (925.2 - 822.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	220.00'	2,466 cf	**6.00'W x 262.00'L x 6.00'H Field A** 9,432 cf Overall - 3,267 cf Embedded = 6,165 cf x 40.0% Voids
#2A	220.00'	3,267 cf	**CMP Round 48** x 13 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.57 sf x 20.00'L = 251.3 cf Overall Size= 48.0"W x 48.0"H x 20.00'L
		5,733 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	222.50'	**12.0" Round Culvert** L= 13.0' Ke= 0.500 Inlet / Outlet Invert= 222.50' / 222.00' S= 0.0385 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	226.00'	**30.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#3	Discarded	220.00'	**1.020 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 213.00' Phase-In= 0.01'

Discarded OutFlow Max=0.11 cfs @ 12.60 hrs HW=223.47' (Free Discharge)
└─**3=Exfiltration** (Controls 0.11 cfs)

Primary OutFlow Max=2.60 cfs @ 12.60 hrs HW=223.47' TW=222.54' (Dynamic Tailwater)
├─**1=Culvert** (Inlet Controls 2.60 cfs @ 3.35 fps)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link 1L: (new Link)

Inflow Area = 121,356 sf, 6.66% Impervious, Inflow Depth = 2.43" for 25-year event
Inflow = 3.47 cfs @ 12.45 hrs, Volume= 24,528 cf
Primary = 3.47 cfs @ 12.45 hrs, Volume= 24,528 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P-1: Subcat P-1 Runoff Area=283,622 sf 1.89% Impervious Runoff Depth=5.04"
Flow Length=844' Tc=16.3 min CN=71 Runoff=28.11 cfs 119,185 cf

Subcatchment P-2: Subcat P-2 Runoff Area=13,434 sf 0.00% Impervious Runoff Depth=5.16"
Flow Length=81' Tc=13.0 min CN=72 Runoff=1.47 cfs 5,779 cf

Subcatchment P-3A: Subcat P-3A Runoff Area=11,725 sf 46.58% Impervious Runoff Depth=6.73"
Tc=6.0 min CN=85 Runoff=1.99 cfs 6,571 cf

Subcatchment P-3B: Subcat P-3B Runoff Area=12,241 sf 37.68% Impervious Runoff Depth=6.36"
Tc=6.0 min CN=82 Runoff=2.00 cfs 6,492 cf

Subcatchment P-3c: Subcat P-3c Runoff Area=18,468 sf 39.10% Impervious Runoff Depth=6.48"
Tc=6.0 min CN=83 Runoff=3.05 cfs 9,980 cf

Subcatchment P-4a: Subcat P-4a Runoff Area=95,645 sf 8.45% Impervious Runoff Depth=4.21"
Flow Length=350' Tc=11.5 min CN=64 Runoff=8.94 cfs 33,542 cf

Subcatchment P-4b: Subcat P-4b Runoff Area=25,711 sf 0.00% Impervious Runoff Depth=5.16"
Flow Length=422' Tc=9.1 min CN=72 Runoff=3.15 cfs 11,061 cf

Subcatchment P-4c: Subcat P-4c Runoff Area=82,620 sf 0.00% Impervious Runoff Depth=5.16"
Flow Length=415' Tc=16.2 min CN=72 Runoff=8.40 cfs 35,544 cf

Subcatchment P-5a: Subcat P-5a Runoff Area=20,384 sf 45.51% Impervious Runoff Depth=6.73"
Tc=6.0 min CN=85 Runoff=3.46 cfs 11,425 cf

Subcatchment P-5b: Subcat P-5b Runoff Area=25,195 sf 32.63% Impervious Runoff Depth=6.36"
Tc=6.0 min CN=82 Runoff=4.11 cfs 13,362 cf

Subcatchment P-5c: Subcat P-5c Runoff Area=26,935 sf 33.06% Impervious Runoff Depth=6.36"
Tc=6.0 min CN=82 Runoff=4.39 cfs 14,285 cf

Subcatchment P-5d: Subcat P-5d Runoff Area=29,781 sf 18.57% Impervious Runoff Depth=5.88"
Tc=6.0 min CN=78 Runoff=4.55 cfs 14,600 cf

Subcatchment P-5e: Subcat P-5e Runoff Area=30,879 sf 17.23% Impervious Runoff Depth=5.64"
Tc=6.0 min CN=76 Runoff=4.55 cfs 14,520 cf

Subcatchment P-5f: Subcat P-5f Runoff Area=27,195 sf 21.01% Impervious Runoff Depth=5.76"
Tc=6.0 min CN=77 Runoff=4.08 cfs 13,059 cf

Subcatchment P-6: Subcat P-6 Runoff Area=40,896 sf 9.30% Impervious Runoff Depth=5.64"
Tc=6.0 min CN=76 Runoff=6.03 cfs 19,230 cf

Subcatchment P-7: Subcat P-7 Runoff Area=32,294 sf 0.82% Impervious Runoff Depth=5.28"
Tc=6.0 min CN=73 Runoff=4.48 cfs 14,216 cf

Subcatchment R-0: Subcat R-0 Runoff Area=1,268 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.24 cfs 876 cf

Subcatchment R-1: Subcat R-1 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-10: Subcat R-10 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-11: Subcat R-11 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-12: Subcat R-12 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-13: Subcat R-13 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-14: Subcat R-14 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-15: Subcat R-15 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-16: Subcat R-16 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-17: Subcat R-17 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-18: Subcat R-18 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-19: Subcat R-19 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-2: Subcat R-2 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-20: Subcat R-20 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-21: Subcat R-21 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-22: Subcat R-22 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-23: Subcat R-23 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-24: Subcat R-24 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-25: Subcat R-25 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-26: Subcat R-26 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-27: Subcat R-27 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-28: Subcat R-28 Runoff Area=5,312 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=1.00 cfs 3,670 cf

Subcatchment R-3: Subcat R-3 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-4: Subcat R-4 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-5: Subcat R-5 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-6: Subcat R-6 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-7: Subcat R-7 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-8: Subcat R-8 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Subcatchment R-9: Subcat R-9 Runoff Area=1,696 sf 100.00% Impervious Runoff Depth=8.29"
Tc=6.0 min CN=98 Runoff=0.32 cfs 1,172 cf

Reach 1R: Routing through grass Avg. Flow Depth=0.19' Max Vel=1.14 fps Inflow=3.12 cfs 6,364 cf
n=0.150 L=58.0' S=0.2414 '/' Capacity=173.93 cfs Outflow=3.09 cfs 6,364 cf

Reach 9001R: Routing sheet flow Avg. Flow Depth=0.09' Max Vel=0.57 fps Inflow=8.26 cfs 33,542 cf
n=0.150 L=680.0' S=0.0941 '/' Capacity=463.86 cfs Outflow=5.55 cfs 33,542 cf

Reach 9002R: Routing sheet flow Avg. Flow Depth=0.05' Max Vel=0.47 fps Inflow=3.15 cfs 11,061 cf
n=0.150 L=345.0' S=0.1420 '/' Capacity=569.83 cfs Outflow=2.33 cfs 11,061 cf

Reach R-01: Routing through woods Avg. Flow Depth=0.33' Max Vel=0.40 fps Inflow=3.09 cfs 6,364 cf
n=0.400 L=82.0' S=0.1098 '/' Capacity=43.98 cfs Outflow=2.80 cfs 6,364 cf

Reach SP-1: SP-1 Inflow=28.11 cfs 119,185 cf
Outflow=28.11 cfs 119,185 cf

Reach SP-2: SP-2 Inflow=1.47 cfs 5,779 cf
Outflow=1.47 cfs 5,779 cf

Reach SP-3: SP-3
Inflow=16.46 cfs 100,372 cf
Outflow=16.46 cfs 100,372 cf

Reach SP-4: SP-4
Inflow=22.16 cfs 129,608 cf
Outflow=22.16 cfs 129,608 cf

Reach SW1: Swale
Avg. Flow Depth=0.92' Max Vel=1.02 fps Inflow=8.94 cfs 33,542 cf
n=0.080 L=267.0' S=0.0050 '/' Capacity=37.23 cfs Outflow=8.26 cfs 33,542 cf

Pond 1P: drywells
Peak Elev=256.15' Storage=1,563 cf Inflow=4.18 cfs 15,385 cf
Discarded=0.08 cfs 6,015 cf Primary=4.10 cfs 9,370 cf Outflow=4.19 cfs 15,385 cf

Pond 2P: drywells
Peak Elev=224.02' Storage=1,136 cf Inflow=2.47 cfs 9,077 cf
Discarded=0.07 cfs 4,169 cf Primary=2.42 cfs 4,907 cf Outflow=2.49 cfs 9,077 cf

Pond 3P: drywells
Peak Elev=226.22' Storage=1,421 cf Inflow=3.18 cfs 11,716 cf
Discarded=0.08 cfs 5,352 cf Primary=3.12 cfs 6,364 cf Outflow=3.21 cfs 11,716 cf

Pond CB10: CB
Peak Elev=236.18' Inflow=4.11 cfs 13,362 cf
12.0" Round Culvert x 2.00 n=0.013 L=9.0' S=0.0100 '/' Outflow=4.11 cfs 13,362 cf

Pond CB12: CB
Peak Elev=230.23' Inflow=4.39 cfs 14,285 cf
12.0" Round Culvert x 2.00 n=0.013 L=19.0' S=0.0100 '/' Outflow=4.39 cfs 14,285 cf

Pond CB14: CB
Peak Elev=224.84' Inflow=4.55 cfs 14,600 cf
12.0" Round Culvert x 2.00 n=0.013 L=21.0' S=0.0300 '/' Outflow=4.55 cfs 14,600 cf

Pond CB16: CB
Peak Elev=218.26' Inflow=4.55 cfs 14,520 cf
12.0" Round Culvert x 2.00 n=0.013 L=15.0' S=0.0227 '/' Outflow=4.55 cfs 14,520 cf

Pond CB18: CB
Peak Elev=212.90' Inflow=4.08 cfs 13,059 cf
12.0" Round Culvert x 2.00 n=0.013 L=37.0' S=0.0100 '/' Outflow=4.08 cfs 13,059 cf

Pond CB2: CB
Peak Elev=256.02' Inflow=1.99 cfs 6,571 cf
12.0" Round Culvert x 2.00 n=0.013 L=22.0' S=0.0182 '/' Outflow=1.99 cfs 6,571 cf

Pond CB4: CB
Peak Elev=257.98' Inflow=2.00 cfs 6,492 cf
12.0" Round Culvert x 2.00 n=0.013 L=22.0' S=0.0300 '/' Outflow=2.00 cfs 6,492 cf

Pond CB6: CB
Peak Elev=251.52' Inflow=3.05 cfs 9,980 cf
12.0" Round Culvert x 2.00 n=0.013 L=11.0' S=0.0100 '/' Outflow=3.05 cfs 9,980 cf

Pond CB8: CB
Peak Elev=244.26' Inflow=3.46 cfs 11,425 cf
12.0" Round Culvert x 2.00 n=0.013 L=17.0' S=0.0200 '/' Outflow=3.46 cfs 11,425 cf

Pond DB1: DB1
Peak Elev=211.20' Storage=24,145 cf Inflow=32.06 cfs 100,374 cf
Primary=8.63 cfs 93,116 cf Secondary=7.84 cfs 7,256 cf Outflow=16.46 cfs 100,372 cf

Pond DB2: DB2
Peak Elev=249.00' Storage=12,847 cf Inflow=17.17 cfs 51,643 cf
Primary=8.35 cfs 51,643 cf Secondary=0.00 cfs 0 cf Outflow=8.35 cfs 51,643 cf

Pond DMH1: DMH
Peak Elev=252.21' Inflow=1.99 cfs 6,571 cf
15.0" Round Culvert n=0.013 L=64.0' S=0.0300 '/' Outflow=1.99 cfs 6,571 cf

Pond DMH10: DMH Peak Elev=214.62' Inflow=21.07 cfs 68,192 cf
24.0" Round Culvert n=0.013 L=113.0' S=0.0130 '/' Outflow=21.07 cfs 68,192 cf

Pond DMH11: DMH Peak Elev=213.26' Inflow=25.15 cfs 81,251 cf
24.0" Round Culvert n=0.013 L=62.0' S=0.0134 '/' Outflow=25.15 cfs 81,251 cf

Pond DMH12: DMH Peak Elev=235.25' Inflow=8.35 cfs 51,643 cf
15.0" Round Culvert n=0.013 L=76.0' S=0.0434 '/' Outflow=8.35 cfs 51,643 cf

Pond DMH2: DMH Peak Elev=252.54' Inflow=2.00 cfs 6,492 cf
15.0" Round Culvert n=0.013 L=75.0' S=0.0300 '/' Outflow=2.00 cfs 6,492 cf

Pond DMH3: DMH Peak Elev=251.33' Inflow=3.05 cfs 9,980 cf
15.0" Round Culvert n=0.013 L=55.0' S=0.0100 '/' Outflow=3.05 cfs 9,980 cf

Pond DMH4: DMH Peak Elev=250.27' Inflow=7.04 cfs 23,044 cf
18.0" Round Culvert n=0.013 L=159.0' S=0.0179 '/' Outflow=7.04 cfs 23,044 cf

Pond DMH5: DMH Peak Elev=231.85' Inflow=8.35 cfs 51,643 cf
15.0" Round Culvert n=0.013 L=124.0' S=0.0200 '/' Outflow=8.35 cfs 51,643 cf

Pond DMH6: DMH Peak Elev=243.94' Inflow=3.46 cfs 11,425 cf
15.0" Round Culvert n=0.013 L=146.0' S=0.0573 '/' Outflow=3.46 cfs 11,425 cf

Pond DMH7: DMH Peak Elev=235.89' Inflow=7.57 cfs 24,787 cf
18.0" Round Culvert n=0.013 L=140.0' S=0.0393 '/' Outflow=7.57 cfs 24,787 cf

Pond DMH8: DMH Peak Elev=228.84' Inflow=11.96 cfs 39,072 cf
24.0" Round Culvert n=0.013 L=137.0' S=0.0300 '/' Outflow=11.96 cfs 39,072 cf

Pond DMH9: DMH Peak Elev=221.68' Inflow=16.52 cfs 53,672 cf
24.0" Round Culvert n=0.013 L=147.0' S=0.0200 '/' Outflow=16.52 cfs 53,672 cf

Pond G: gabion Peak Elev=223.26' Storage=37 cf Inflow=6.53 cfs 43,098 cf
Outflow=6.51 cfs 43,098 cf

Pond is1: infiltration pipe Peak Elev=226.02' Storage=5,733 cf Inflow=8.35 cfs 51,643 cf
Discarded=0.17 cfs 8,273 cf Primary=6.53 cfs 43,098 cf Outflow=6.70 cfs 51,371 cf

Link 1L: (new Link) Inflow=7.47 cfs 44,603 cf
Primary=7.47 cfs 44,603 cf

Total Runoff Area = 829,393 sf Runoff Volume = 379,029 cf Average Runoff Depth = 5.48"
84.31% Pervious = 699,253 sf 15.69% Impervious = 130,141 sf

Summary for Subcatchment P-1: Subcat P-1

Runoff = 28.11 cfs @ 12.22 hrs, Volume= 119,185 cf, Depth= 5.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
4,874	98	Paved parking, HSG B
10,508	61	>75% Grass cover, Good, HSG B
72,656	55	Woods, Good, HSG B
482	98	Paved parking, HSG D
132,075	77	Woods, Good, HSG D
24,002	80	>75% Grass cover, Good, HSG D
34,297	70	Woods, Good, HSG C
4,728	74	>75% Grass cover, Good, HSG C
283,622	71	Weighted Average
278,266		98.11% Pervious Area
5,356		1.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0625	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
8.4	794	0.1000	1.58		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
16.3	844	Total			

Summary for Subcatchment P-2: Subcat P-2

Runoff = 1.47 cfs @ 12.18 hrs, Volume= 5,779 cf, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
6,580	74	>75% Grass cover, Good, HSG C
6,854	70	Woods, Good, HSG C
13,434	72	Weighted Average
13,434		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	31	0.0465	1.08		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
13.0	81	Total			

Summary for Subcatchment P-3A: Subcat P-3A

Runoff = 1.99 cfs @ 12.09 hrs, Volume= 6,571 cf, Depth= 6.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
5,462	98	Paved parking, HSG C
6,263	74	>75% Grass cover, Good, HSG C
11,725	85	Weighted Average
6,263		53.42% Pervious Area
5,462		46.58% Impervious Area

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

Summary for Subcatchment P-3B: Subcat P-3B

Runoff = 2.00 cfs @ 12.09 hrs, Volume= 6,492 cf, Depth= 6.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
533	61	>75% Grass cover, Good, HSG B
4,612	98	Paved parking, HSG C
7,096	74	>75% Grass cover, Good, HSG C
12,241	82	Weighted Average
7,629		62.32% Pervious Area
4,612		37.68% Impervious Area

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

Summary for Subcatchment P-3c: Subcat P-3c

Runoff = 3.05 cfs @ 12.09 hrs, Volume= 9,980 cf, Depth= 6.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
7,221	98	Paved parking, HSG C
11,247	74	>75% Grass cover, Good, HSG C
18,468	83	Weighted Average
11,247		60.90% Pervious Area
7,221		39.10% Impervious Area

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

Summary for Subcatchment P-4a: Subcat P-4a

Runoff = 8.94 cfs @ 12.16 hrs, Volume= 33,542 cf, Depth= 4.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
7,742	98	Paved parking, HSG B
56,628	61	>75% Grass cover, Good, HSG B
23,518	55	Woods, Good, HSG B
343	98	Paved parking, HSG C
16	70	Woods, Good, HSG C
7,398	74	>75% Grass cover, Good, HSG C
95,645	64	Weighted Average
87,560		91.55% Pervious Area
8,085		8.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
2.8	300	0.1300	1.80		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.5	350	Total			

Summary for Subcatchment P-4b: Subcat P-4b

Runoff = 3.15 cfs @ 12.13 hrs, Volume= 11,061 cf, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
596	61	>75% Grass cover, Good, HSG B
1,158	55	Woods, Good, HSG B
17,524	74	>75% Grass cover, Good, HSG C
6,433	70	Woods, Good, HSG C
25,711	72	Weighted Average
25,711		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	30	0.0500	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
3.3	392	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.1	422	Total			

Summary for Subcatchment P-4c: Subcat P-4c

Runoff = 8.40 cfs @ 12.22 hrs, Volume= 35,544 cf, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
156	77	Woods, Good, HSG D
36,333	74	>75% Grass cover, Good, HSG C
0	98	Paved parking, HSG C
46,131	70	Woods, Good, HSG C
82,620	72	Weighted Average
82,620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
3.7	365	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.2	415	Total			

Summary for Subcatchment P-5a: Subcat P-5a

Runoff = 3.46 cfs @ 12.09 hrs, Volume= 11,425 cf, Depth= 6.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
9,276	98	Paved parking, HSG C
11,108	74	>75% Grass cover, Good, HSG C
20,384	85	Weighted Average
11,108		54.49% Pervious Area
9,276		45.51% Impervious Area

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

Summary for Subcatchment P-5b: Subcat P-5b

Runoff = 4.11 cfs @ 12.09 hrs, Volume= 13,362 cf, Depth= 6.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
8,220	98	Paved parking, HSG C
16,975	74	>75% Grass cover, Good, HSG C
25,195	82	Weighted Average
16,975		67.37% Pervious Area
8,220		32.63% Impervious Area

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

Summary for Subcatchment P-5c: Subcat P-5c

Runoff = 4.39 cfs @ 12.09 hrs, Volume= 14,285 cf, Depth= 6.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
8,906	98	Paved parking, HSG C
18,029	74	>75% Grass cover, Good, HSG C
26,935	82	Weighted Average
18,029		66.94% Pervious Area
8,906		33.06% Impervious Area

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

Summary for Subcatchment P-5d: Subcat P-5d

Runoff = 4.55 cfs @ 12.09 hrs, Volume= 14,600 cf, Depth= 5.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
5,640	70	Woods, Good, HSG C
18,610	74	>75% Grass cover, Good, HSG C
5,531	98	Paved parking, HSG C
29,781	78	Weighted Average
24,250		81.43% Pervious Area
5,531		18.57% Impervious Area

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

Summary for Subcatchment P-5e: Subcat P-5e

Runoff = 4.55 cfs @ 12.09 hrs, Volume= 14,520 cf, Depth= 5.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
10,965	74	>75% Grass cover, Good, HSG C
5,320	98	Paved parking, HSG C
14,594	70	Woods, Good, HSG C
30,879	76	Weighted Average
25,559		82.77% Pervious Area
5,320		17.23% Impervious Area

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

Summary for Subcatchment P-5f: Subcat P-5f

Runoff = 4.08 cfs @ 12.09 hrs, Volume= 13,059 cf, Depth= 5.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
5,715	98	Paved parking, HSG C
10,921	74	>75% Grass cover, Good, HSG C
10,559	70	Woods, Good, HSG C
27,195	77	Weighted Average
21,480		78.99% Pervious Area
5,715		21.01% Impervious Area

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

Summary for Subcatchment P-6: Subcat P-6

Runoff = 6.03 cfs @ 12.09 hrs, Volume= 19,230 cf, Depth= 5.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
37,052	74	>75% Grass cover, Good, HSG C
3,802	98	Paved parking, HSG C
42	70	Woods, Good, HSG C
40,896	76	Weighted Average
37,094		90.70% Pervious Area
3,802		9.30% Impervious Area

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

Summary for Subcatchment P-7: Subcat P-7

Runoff = 4.48 cfs @ 12.09 hrs, Volume= 14,216 cf, Depth= 5.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
24,388	74	>75% Grass cover, Good, HSG C
266	98	Paved parking, HSG C
7,640	70	Woods, Good, HSG C
32,294	73	Weighted Average
32,028		99.18% Pervious Area
266		0.82% Impervious Area

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

Summary for Subcatchment R-0: Subcat R-0

Runoff = 0.24 cfs @ 12.09 hrs, Volume= 876 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,268	98	Roofs, HSG C
1,268		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-1: Subcat R-1

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-10: Subcat R-10

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-11: Subcat R-11

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-12: Subcat R-12

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-13: Subcat R-13

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-14: Subcat R-14

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
0	98	Roofs, HSG B
1,696	98	Roofs, HSG C
1,696	98	Weighted Average
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-15: Subcat R-15

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
555	98	Roofs, HSG B
1,141	98	Roofs, HSG C
1,696	98	Weighted Average
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-16: Subcat R-16

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-17: Subcat R-17

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-18: Subcat R-18

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-19: Subcat R-19

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-2: Subcat R-2

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-20: Subcat R-20

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-21: Subcat R-21

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-22: Subcat R-22

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-23: Subcat R-23

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-24: Subcat R-24

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-25: Subcat R-25

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-26: Subcat R-26

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-27: Subcat R-27

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-28: Subcat R-28

Runoff = 1.00 cfs @ 12.09 hrs, Volume= 3,670 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
5,312	98	Roofs, HSG B
5,312		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-3: Subcat R-3

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-4: Subcat R-4

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-5: Subcat R-5

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-6: Subcat R-6

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-7: Subcat R-7

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-8: Subcat R-8

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Subcatchment R-9: Subcat R-9

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 1,172 cf, Depth= 8.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=8.53"

Area (sf)	CN	Description
1,696	98	Roofs, HSG C
1,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Summary for Reach 1R: Routing through grass

A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.

This reach demonstrates a procedure for performing a shallow concetrated flow routing through woods. In this case, the "reach" is defined as a channel with very low side slopes. The Manning's value of 0.40 is selected from the table of sheet flow roughness coefficients, which is comparable to the Manning's value for "woods with light underbrush".

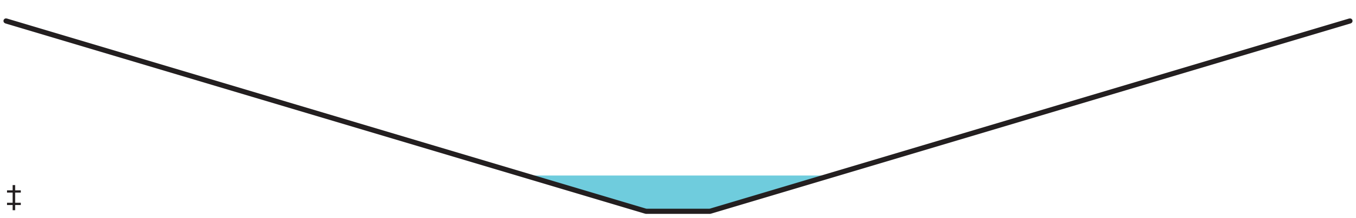
[80] Warning: Exceeded Pond 3P by 1.31' @ 18.40 hrs (0.00 cfs 119 cf)

Inflow Area = 16,959 sf,100.00% Impervious, Inflow Depth = 4.50" for 100-year event
Inflow = 3.12 cfs @ 12.09 hrs, Volume= 6,364 cf
Outflow = 3.09 cfs @ 12.10 hrs, Volume= 6,364 cf, Atten= 1%, Lag= 0.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 1.14 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.47 fps, Avg. Travel Time= 2.0 min

Peak Storage= 157 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.19' , Surface Width= 23.80'
Bank-Full Depth= 1.00' Flow Area= 55.0 sf, Capacity= 173.93 cfs

5.00' x 1.00' deep channel, n= 0.150 Sheet flow over Short Grass
Side Slope Z-value= 50.0 '/' Top Width= 105.00'
Length= 58.0' Slope= 0.2414 '/'
Inlet Invert= 226.00', Outlet Invert= 212.00'



‡

Summary for Reach 9001R: Routing sheet flow through a subcatchment

A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.

This reach demonstrates a procedure for performing a sheet-flow routing through a subcatchment area. In this case, the "reach" is defined as a wide channel with very low side slopes. The Manning's value of 0.15 is selected from the table of sheet flow roughness coefficients, which are much higher than normal Manning's values, in order to allow for the greater frictional losses of shallow flow. This value is comparable to the Manning's value for "very weedy reaches".

This example assumes that sheet flow occurs evenly over the entire 100' channel width, and that the flow depth is therefore very small. If the flow is concentrated or forms channels, the description and Manning's value must be adjusted accordingly.

Inflow Area = 95,645 sf, 8.45% Impervious, Inflow Depth = 4.21" for 100-year event
Inflow = 8.26 cfs @ 12.22 hrs, Volume= 33,542 cf
Outflow = 5.55 cfs @ 12.41 hrs, Volume= 33,542 cf, Atten= 33%, Lag= 11.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.57 fps, Min. Travel Time= 19.7 min
Avg. Velocity = 0.18 fps, Avg. Travel Time= 62.0 min

Peak Storage= 6,572 cf @ 12.41 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 117.75'
Bank-Full Depth= 1.00' Flow Area= 200.0 sf, Capacity= 463.86 cfs

100.00' x 1.00' deep channel, n= 0.150
Side Slope Z-value= 100.0 '/' Top Width= 300.00'
Length= 680.0' Slope= 0.0941 '/'
Inlet Invert= 264.00', Outlet Invert= 200.00'

‡

Summary for Reach 9002R: Routing sheet flow through a subcatchment

A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.

This reach demonstrates a procedure for performing a sheet-flow routing through a subcatchment area. In this case, the "reach" is defined as a wide channel with very low side slopes. The Manning's value of 0.15 is selected from the table of sheet flow roughness coefficients, which are much higher than normal Manning's values, in order to allow for the greater frictional losses of shallow flow. This value is comparable to the Manning's value for "very weedy reaches".

This example assumes that sheet flow occurs evenly over the entire 100' channel width, and that the flow depth is therefore very small. If the flow is concentrated or forms channels, the description and Manning's value must be adjusted accordingly.

Inflow Area = 25,711 sf, 0.00% Impervious, Inflow Depth = 5.16" for 100-year event
Inflow = 3.15 cfs @ 12.13 hrs, Volume= 11,061 cf
Outflow = 2.33 cfs @ 12.23 hrs, Volume= 11,061 cf, Atten= 26%, Lag= 6.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.47 fps, Min. Travel Time= 12.1 min
Avg. Velocity = 0.19 fps, Avg. Travel Time= 30.8 min

Peak Storage= 1,697 cf @ 12.23 hrs
Average Depth at Peak Storage= 0.05' , Surface Width= 109.39'
Bank-Full Depth= 1.00' Flow Area= 200.0 sf, Capacity= 569.83 cfs

100.00' x 1.00' deep channel, n= 0.150
Side Slope Z-value= 100.0 '/' Top Width= 300.00'
Length= 345.0' Slope= 0.1420 '/'
Inlet Invert= 249.00', Outlet Invert= 200.00'

Summary for Reach R-01: Routing through woods

A subcatchment performs runoff calculations, including the associated Tc anc CN determinations. It does not have any facility for routing an inflow hydrograph from another source. However, a reach may be used to perform this type of specialized routing.

This reach demonstrates a procedure for performing a shallow concetrated flow routing through woods. In this case, the "reach" is defined as a channel with very low side slopes. The Manning's value of 0.40 is selected from the table of sheet flow roughness coefficients, which is comparable to the Manning's value for "woods with light underbrush".

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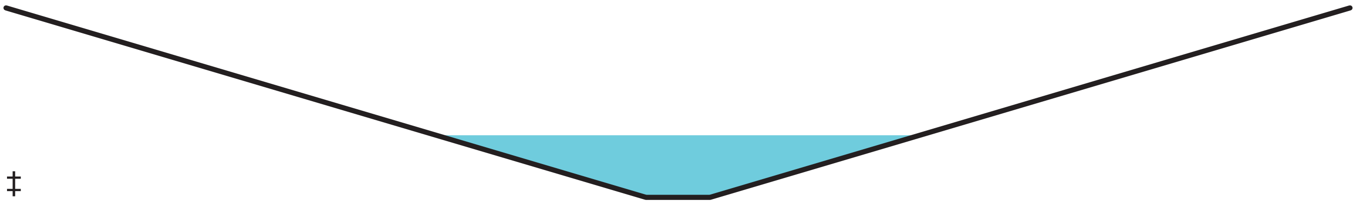
[62] Hint: Exceeded Reach 1R OUTLET depth by 0.16' @ 12.20 hrs

Inflow Area = 16,959 sf,100.00% Impervious, Inflow Depth = 4.50" for 100-year event
Inflow = 3.09 cfs @ 12.10 hrs, Volume= 6,364 cf
Outflow = 2.80 cfs @ 12.14 hrs, Volume= 6,364 cf, Atten= 10%, Lag= 2.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 0.40 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 0.14 fps, Avg. Travel Time= 9.7 min

Peak Storage= 573 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.33' , Surface Width= 37.73'
Bank-Full Depth= 1.00' Flow Area= 55.0 sf, Capacity= 43.98 cfs

5.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 50.0 '/' Top Width= 105.00'
Length= 82.0' Slope= 0.1098 '/'
Inlet Invert= 212.00', Outlet Invert= 203.00'



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Summary for Reach SP-1: SP-1

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

Inflow Area =	283,622 sf,	1.89% Impervious,	Inflow Depth = 5.04"	for 100-year event
Inflow =	28.11 cfs @	12.22 hrs, Volume=	119,185 cf	
Outflow =	28.11 cfs @	12.22 hrs, Volume=	119,185 cf,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach SP-2: SP-2

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

Inflow Area =	13,434 sf,	0.00% Impervious,	Inflow Depth = 5.16"	for 100-year event
Inflow =	1.47 cfs @	12.18 hrs, Volume=	5,779 cf	
Outflow =	1.47 cfs @	12.18 hrs, Volume=	5,779 cf,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach SP-3: SP-3

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

Inflow Area =	205,802 sf,	27.39% Impervious,	Inflow Depth = 5.85"	for 100-year event
Inflow =	16.46 cfs @	12.25 hrs, Volume=	100,372 cf	
Outflow =	16.46 cfs @	12.25 hrs, Volume=	100,372 cf,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach SP-4: SP-4

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

Inflow Area =	326,536 sf,	20.95% Impervious,	Inflow Depth = 4.76"	for 100-year event
Inflow =	22.16 cfs @	12.29 hrs, Volume=	129,608 cf	
Outflow =	22.16 cfs @	12.29 hrs, Volume=	129,608 cf,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2

Summary for Reach SW1: Swale

Inflow Area = 95,645 sf, 8.45% Impervious, Inflow Depth = 4.21" for 100-year event
Inflow = 8.94 cfs @ 12.16 hrs, Volume= 33,542 cf
Outflow = 8.26 cfs @ 12.22 hrs, Volume= 33,542 cf, Atten= 8%, Lag= 3.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 1.02 fps, Min. Travel Time= 4.4 min
Avg. Velocity = 0.28 fps, Avg. Travel Time= 15.7 min

Peak Storage= 2,165 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.92' , Surface Width= 11.55'
Bank-Full Depth= 2.00' Flow Area= 24.0 sf, Capacity= 37.23 cfs

6.00' x 2.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 18.00'
Length= 267.0' Slope= 0.0050 '/'
Inlet Invert= 267.33', Outlet Invert= 266.00'

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Summary for Pond 1P: drywells

Soil type 307C (sandy loam) Rawls infiltration rate = 1.02 inches per hour

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[92] Warning: Device #1 is above defined storage
[92] Warning: Device #3 is above defined storage
[93] Warning: Storage range exceeded by 1.15'
[90] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area = 22,271 sf,100.00% Impervious, Inflow Depth = 8.29" for 100-year event
Inflow = 4.18 cfs @ 12.09 hrs, Volume= 15,385 cf
Outflow = 4.19 cfs @ 12.09 hrs, Volume= 15,385 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.08 cfs @ 12.09 hrs, Volume= 6,015 cf
Primary = 4.10 cfs @ 12.09 hrs, Volume= 9,370 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 256.15' @ 12.09 hrs Surf.Area= 539 sf Storage= 1,563 cf

Plug-Flow detention time= 119.8 min calculated for 15,385 cf (100% of inflow)
Center-of-Mass det. time= 119.8 min (860.2 - 740.4)

Volume	Invert	Avail.Storage	Storage Description
#1	250.50'	982 cf	**5.33'D x 4.00'H Drywell structure** x 11 Inside #2 1,243 cf Overall - 4.0" Wall Thickness = 982 cf
#2	250.00'	581 cf	**7.00'W x 7.00'L x 5.00'H Stone** x 11 2,695 cf Overall - 1,243 cf Embedded = 1,452 cf x 40.0% Voids
		1,563 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	256.00'	**4.0" Vert. Roof drain overflow X 11.00** C= 0.600 Limited to weir flow at low heads
#2	Discarded	250.00'	**1.020 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 245.00' Phase-In= 0.01'
#3	Primary	255.50'	**2.5' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.08 cfs @ 12.09 hrs HW=256.14' (Free Discharge)
└─**2=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=3.99 cfs @ 12.09 hrs HW=256.14' TW=248.04' (Dynamic Tailwater)
├─**1=Roof drain overflow** (Orifice Controls 0.51 cfs @ 1.29 fps)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 3.48 cfs @ 2.16 fps)

Summary for Pond 2P: drywells

Soil type 307C (sandy loam) Rawls infiltration rate = 1.02 inches per hour

[92] Warning: Device #1 is above defined storage
[92] Warning: Device #3 is above defined storage
[93] Warning: Storage range exceeded by 1.02'
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=41)

Inflow Area = 13,139 sf,100.00% Impervious, Inflow Depth = 8.29" for 100-year event
Inflow = 2.47 cfs @ 12.09 hrs, Volume= 9,077 cf
Outflow = 2.49 cfs @ 12.09 hrs, Volume= 9,077 cf, Atten= 0%, Lag= 0.1 min
Discarded = 0.07 cfs @ 12.09 hrs, Volume= 4,169 cf
Primary = 2.42 cfs @ 12.09 hrs, Volume= 4,907 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 224.02' @ 12.09 hrs Surf.Area= 392 sf Storage= 1,136 cf

Plug-Flow detention time= 129.8 min calculated for 9,064 cf (100% of inflow)
Center-of-Mass det. time= 130.4 min (870.8 - 740.4)

Volume	Invert	Avail.Storage	Storage Description
#1	218.50'	714 cf	**5.33'D x 4.00'H Drywell structure** x 8 Inside #2 904 cf Overall - 4.0" Wall Thickness = 714 cf
#2	218.00'	422 cf	**7.00'W x 7.00'L x 5.00'H Stone** x 8 1,960 cf Overall - 904 cf Embedded = 1,056 cf x 40.0% Voids
		1,136 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	224.00'	**4.0" Vert. Roof drain overflow X 8.00** C= 0.600 Limited to weir flow at low heads
#2	Discarded	218.00'	**1.020 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 214.00' Phase-In= 0.01'
#3	Primary	223.50'	**2.5' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.07 cfs @ 12.09 hrs HW=224.01' (Free Discharge)
└─**2=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=2.35 cfs @ 12.09 hrs HW=224.01' TW=210.36' (Dynamic Tailwater)
├─**1=Roof drain overflow** (Orifice Controls 0.00 cfs @ 0.28 fps)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 2.35 cfs @ 1.86 fps)

Summary for Pond 3P: drywells

Soil type 307C (sandy loam) Rawls infiltration rate = 1.02 inches per hour

[92] Warning: Device #1 is above defined storage
[92] Warning: Device #3 is above defined storage
[93] Warning: Storage range exceeded by 1.22'
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=43)

Inflow Area = 16,959 sf,100.00% Impervious, Inflow Depth = 8.29" for 100-year event
Inflow = 3.18 cfs @ 12.09 hrs, Volume= 11,716 cf
Outflow = 3.21 cfs @ 12.09 hrs, Volume= 11,716 cf, Atten= 0%, Lag= 0.1 min
Discarded = 0.08 cfs @ 12.09 hrs, Volume= 5,352 cf
Primary = 3.12 cfs @ 12.09 hrs, Volume= 6,364 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 226.22' @ 12.09 hrs Surf.Area= 490 sf Storage= 1,421 cf

Plug-Flow detention time= 127.5 min calculated for 11,699 cf (100% of inflow)
Center-of-Mass det. time= 128.2 min (868.6 - 740.4)

Volume	Invert	Avail.Storage	Storage Description
#1	220.50'	892 cf	**5.33'D x 4.00'H Drywell structure** x 10 Inside #2 1,130 cf Overall - 4.0" Wall Thickness = 892 cf
#2	220.00'	528 cf	**7.00'W x 7.00'L x 5.00'H Stone** x 10 2,450 cf Overall - 1,130 cf Embedded = 1,320 cf x 40.0% Voids
		1,421 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	226.50'	**4.0" Vert. Roof drain overflow X 10.00** C= 0.600 Limited to weir flow at low heads
#2	Discarded	220.00'	**1.020 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 216.00' Phase-In= 0.01'
#3	Primary	226.00'	**2.5' long x 5.0' breadth Broad-Crested Rectangular Weir X 10.00** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.08 cfs @ 12.09 hrs HW=226.21' (Free Discharge)
└─**2=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=3.03 cfs @ 12.09 hrs HW=226.21' TW=226.18' (Dynamic Tailwater)
├─**1=Roof drain overflow** (Controls 0.00 cfs)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 3.03 cfs @ 0.57 fps)

Summary for Pond CB10: CB

Inflow Area = 25,195 sf, 32.63% Impervious, Inflow Depth = 6.36" for 100-year event
Inflow = 4.11 cfs @ 12.09 hrs, Volume= 13,362 cf
Outflow = 4.11 cfs @ 12.09 hrs, Volume= 13,362 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.11 cfs @ 12.09 hrs, Volume= 13,362 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 236.18' @ 12.09 hrs
Flood Elev= 239.42'

Device	Routing	Invert	Outlet Devices
#1	Primary	234.69'	**12.0" Round Culvert X 2.00** L= 9.0' Ke= 0.500 Inlet / Outlet Invert= 234.69' / 234.60' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=4.01 cfs @ 12.09 hrs HW=236.13' TW=235.85' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 4.01 cfs @ 2.55 fps)

Summary for Pond CB12: CB

Inflow Area = 26,935 sf, 33.06% Impervious, Inflow Depth = 6.36" for 100-year event
Inflow = 4.39 cfs @ 12.09 hrs, Volume= 14,285 cf
Outflow = 4.39 cfs @ 12.09 hrs, Volume= 14,285 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.39 cfs @ 12.09 hrs, Volume= 14,285 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 230.23' @ 12.09 hrs
Flood Elev= 233.72'

Device	Routing	Invert	Outlet Devices
#1	Primary	229.29'	**12.0" Round Culvert X 2.00** L= 19.0' Ke= 0.500 Inlet / Outlet Invert= 229.29' / 229.10' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=4.29 cfs @ 12.09 hrs HW=230.21' TW=228.82' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 4.29 cfs @ 3.70 fps)

Summary for Pond CB14: CB

Inflow Area =	29,781 sf,	18.57% Impervious,	Inflow Depth = 5.88"	for 100-year event
Inflow =	4.55 cfs @	12.09 hrs, Volume=	14,600 cf	
Outflow =	4.55 cfs @	12.09 hrs, Volume=	14,600 cf,	Atten= 0%, Lag= 0.0 min
Primary =	4.55 cfs @	12.09 hrs, Volume=	14,600 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 224.84' @ 12.09 hrs
Flood Elev= 227.69'

Device	Routing	Invert	Outlet Devices
#1	Primary	223.98'	**12.0" Round Culvert X 2.00** L= 21.0' Ke= 0.500 Inlet / Outlet Invert= 223.98' / 223.35' S= 0.0300 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=4.45 cfs @ 12.09 hrs HW=224.83' TW=221.63' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 4.45 cfs @ 3.14 fps)

Summary for Pond CB16: CB

Inflow Area =	30,879 sf,	17.23% Impervious,	Inflow Depth = 5.64"	for 100-year event
Inflow =	4.55 cfs @	12.09 hrs, Volume=	14,520 cf	
Outflow =	4.55 cfs @	12.09 hrs, Volume=	14,520 cf,	Atten= 0%, Lag= 0.0 min
Primary =	4.55 cfs @	12.09 hrs, Volume=	14,520 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 218.26' @ 12.09 hrs
Flood Elev= 220.61'

Device	Routing	Invert	Outlet Devices
#1	Primary	217.40'	**12.0" Round Culvert X 2.00** L= 15.0' Ke= 0.500 Inlet / Outlet Invert= 217.40' / 217.06' S= 0.0227 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=4.45 cfs @ 12.09 hrs HW=218.25' TW=214.47' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 4.45 cfs @ 3.14 fps)

Summary for Pond CB18: CB

Inflow Area = 27,195 sf, 21.01% Impervious, Inflow Depth = 5.76" for 100-year event
Inflow = 4.08 cfs @ 12.09 hrs, Volume= 13,059 cf
Outflow = 4.08 cfs @ 12.09 hrs, Volume= 13,059 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.08 cfs @ 12.09 hrs, Volume= 13,059 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 212.90' @ 12.10 hrs
Flood Elev= 213.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	210.30'	**12.0" Round Culvert X 2.00** L= 37.0' Ke= 0.500 Inlet / Outlet Invert= 210.30' / 209.93' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 12.09 hrs HW=212.80' TW=213.03' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Summary for Pond CB2: CB

Inflow Area = 11,725 sf, 46.58% Impervious, Inflow Depth = 6.73" for 100-year event
Inflow = 1.99 cfs @ 12.09 hrs, Volume= 6,571 cf
Outflow = 1.99 cfs @ 12.09 hrs, Volume= 6,571 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.99 cfs @ 12.09 hrs, Volume= 6,571 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 256.02' @ 12.09 hrs
Flood Elev= 258.73'

Device	Routing	Invert	Outlet Devices
#1	Primary	255.50'	**12.0" Round Culvert X 2.00** L= 22.0' Ke= 0.500 Inlet / Outlet Invert= 255.50' / 255.10' S= 0.0182 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.94 cfs @ 12.09 hrs HW=256.01' TW=252.20' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.94 cfs @ 2.43 fps)

Summary for Pond CB4: CB

Inflow Area = 12,241 sf, 37.68% Impervious, Inflow Depth = 6.36" for 100-year event
Inflow = 2.00 cfs @ 12.09 hrs, Volume= 6,492 cf
Outflow = 2.00 cfs @ 12.09 hrs, Volume= 6,492 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.00 cfs @ 12.09 hrs, Volume= 6,492 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 257.98' @ 12.09 hrs
Flood Elev= 261.26'

Device	Routing	Invert	Outlet Devices
#1	Primary	257.46'	**12.0" Round Culvert X 2.00** L= 22.0' Ke= 0.500

Inlet / Outlet Invert= 257.46' / 256.80' S= 0.0300 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.95 cfs @ 12.09 hrs HW=257.97' TW=252.53' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.95 cfs @ 2.43 fps)

Summary for Pond CB6: CB

Inflow Area = 18,468 sf, 39.10% Impervious, Inflow Depth = 6.48" for 100-year event
Inflow = 3.05 cfs @ 12.09 hrs, Volume= 9,980 cf
Outflow = 3.05 cfs @ 12.09 hrs, Volume= 9,980 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.05 cfs @ 12.09 hrs, Volume= 9,980 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 251.52' @ 12.09 hrs
Flood Elev= 254.22'

Device	Routing	Invert	Outlet Devices
#1	Primary	250.61'	**12.0" Round Culvert X 2.00** L= 11.0' Ke= 0.500 Inlet / Outlet Invert= 250.61' / 250.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.98 cfs @ 12.09 hrs HW=251.51' TW=251.32' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 2.98 cfs @ 2.65 fps)

Summary for Pond CB8: CB

Inflow Area = 20,384 sf, 45.51% Impervious, Inflow Depth = 6.73" for 100-year event
Inflow = 3.46 cfs @ 12.09 hrs, Volume= 11,425 cf
Outflow = 3.46 cfs @ 12.09 hrs, Volume= 11,425 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.46 cfs @ 12.09 hrs, Volume= 11,425 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 244.26' @ 12.09 hrs
Flood Elev= 246.68'

Device	Routing	Invert	Outlet Devices
#1	Primary	243.40'	**12.0" Round Culvert X 2.00** L= 17.0' Ke= 0.500 Inlet / Outlet Invert= 243.40' / 243.06' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.38 cfs @ 12.09 hrs HW=244.24' TW=243.92' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 3.38 cfs @ 3.24 fps)

Summary for Pond DB1: DB1

Groundwater must be verified with test pit

Inflow Area = 205,802 sf, 27.39% Impervious, Inflow Depth = 5.85" for 100-year event
Inflow = 32.06 cfs @ 12.09 hrs, Volume= 100,374 cf
Outflow = 16.46 cfs @ 12.25 hrs, Volume= 100,372 cf, Atten= 49%, Lag= 9.5 min
Primary = 8.63 cfs @ 12.25 hrs, Volume= 93,116 cf
Secondary = 7.84 cfs @ 12.25 hrs, Volume= 7,256 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 211.20' @ 12.25 hrs Surf.Area= 10,594 sf Storage= 24,145 cf
Flood Elev= 212.20' Surf.Area= 13,749 sf Storage= 33,060 cf

Plug-Flow detention time= 26.0 min calculated for 100,233 cf (100% of inflow)
Center-of-Mass det. time= 26.0 min (825.8 - 799.8)

Volume	Invert	Avail.Storage	Storage Description
#1	206.50'	32,544 cf	**Surface Storage (Irregular)**Listed below (Recalc)
#2	205.50'	516 cf	**Filter Media (Irregular)**Listed below (Recalc) 2,580 cf Overall x 20.0% Voids
		33,060 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
206.50	2,580	292.7	0	0	2,580
208.00	3,931	343.8	4,848	4,848	5,212
210.00	6,340	407.4	10,175	15,023	9,087
212.00	9,234	471.0	15,484	30,507	13,619
212.20	11,169	496.1	2,037	32,544	15,553

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
205.50	2,580	292.7	0	0	2,580
206.50	2,580	292.7	2,580	2,580	2,873

Device	Routing	Invert	Outlet Devices
#1	Primary	205.50'	**12.0" Round Culvert** L= 28.0' Ke= 0.500 Inlet / Outlet Invert= 205.50' / 205.21' S= 0.0104 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	205.50'	**4.0" Vert. Perf Pipe Outlet X 4.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	208.90'	**24.0" x 24.0" Horiz. Horizonal Orifice** C= 0.600 Limited to weir flow at low heads
#4	Secondary	210.75'	**10.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=8.62 cfs @ 12.25 hrs HW=211.20' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 8.62 cfs @ 10.98 fps)
  ├─**2=Perf Pipe Outlet** (Passes < 3.95 cfs potential flow)
  └─**3=Horizonal Orifice** (Passes < 29.21 cfs potential flow)

Secondary OutFlow Max=7.80 cfs @ 12.25 hrs HW=211.20' TW=0.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Weir Controls 7.80 cfs @ 1.73 fps)

Summary for Pond DB2: DB2

Inflow Area = 105,601 sf, 41.07% Impervious, Inflow Depth = 5.87" for 100-year event
Inflow = 17.17 cfs @ 12.09 hrs, Volume= 51,643 cf
Outflow = 8.35 cfs @ 12.26 hrs, Volume= 51,643 cf, Atten= 51%, Lag= 10.4 min
Primary = 8.35 cfs @ 12.26 hrs, Volume= 51,643 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 249.00' @ 12.26 hrs Surf.Area= 5,907 sf Storage= 12,847 cf
Flood Elev= 250.00' Surf.Area= 7,238 sf Storage= 18,626 cf

Plug-Flow detention time= 25.7 min calculated for 51,572 cf (100% of inflow)
Center-of-Mass det. time= 25.7 min (815.0 - 789.2)

Volume	Invert	Avail.Storage	Storage Description
#1	244.50'	17,872 cf	**Surface Storage (Irregular)** Listed below (Recalc)
#2	239.55'	754 cf	**Filter Media (Irregular)** Listed below (Recalc) 3,772 cf Overall x 20.0% Voids
		18,626 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
244.50	762	148.0	0	0	762
245.00	1,072	161.0	456	456	1,091
246.00	1,868	209.0	1,452	1,908	2,516
247.00	2,807	247.0	2,322	4,230	3,914
248.00	3,902	286.0	3,340	7,569	5,589
249.00	5,141	321.0	4,507	12,076	7,307
250.00	6,476	346.0	5,796	17,872	8,675

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
239.55	762	148.0	0	0	762
244.50	762	148.0	3,772	3,772	1,495

Device	Routing	Invert	Outlet Devices
#1	Primary	239.55'	**12.0" Round Culvert** L= 95.0' Ke= 0.500 Inlet / Outlet Invert= 239.55' / 234.80' S= 0.0500 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	239.55'	**6.0" Vert. Perf Pipe Oulet** C= 0.600 Limited to weir flow at low heads
#3	Device 1	248.65'	**24.0" x 24.0" Horiz. Horizontal Orifice** C= 0.600

			Limited to weir flow at low heads
#4	Secondary	249.70'	**10.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=8.22 cfs @ 12.26 hrs HW=249.00' TW=235.19' (Dynamic Tailwater)
└─**1=Culvert** (Passes 8.22 cfs of 10.81 cfs potential flow)
  ├─**2=Perf Pipe Oulet** (Orifice Controls 2.87 cfs @ 14.60 fps)
  └─**3=Horizontal Orifice** (Weir Controls 5.35 cfs @ 1.93 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=239.55' TW=223.98' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DMH1: DMH

Inflow Area = 11,725 sf, 46.58% Impervious, Inflow Depth = 6.73" for 100-year event
Inflow = 1.99 cfs @ 12.09 hrs, Volume= 6,571 cf
Outflow = 1.99 cfs @ 12.09 hrs, Volume= 6,571 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.99 cfs @ 12.09 hrs, Volume= 6,571 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 252.21' @ 12.09 hrs
Flood Elev= 258.52'

Device	Routing	Invert	Outlet Devices
#1	Primary	251.51'	**15.0" Round Culvert** L= 64.0' Ke= 0.500 Inlet / Outlet Invert= 251.51' / 249.59' S= 0.0300 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.94 cfs @ 12.09 hrs HW=252.20' TW=250.24' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.94 cfs @ 2.82 fps)

Summary for Pond DMH10: DMH

Inflow Area = 133,174 sf, 27.97% Impervious, Inflow Depth = 6.14" for 100-year event
Inflow = 21.07 cfs @ 12.09 hrs, Volume= 68,192 cf
Outflow = 21.07 cfs @ 12.09 hrs, Volume= 68,192 cf, Atten= 0%, Lag= 0.0 min
Primary = 21.07 cfs @ 12.09 hrs, Volume= 68,192 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 214.62' @ 12.10 hrs
Flood Elev= 227.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	210.40'	**24.0" Round Culvert** L= 113.0' Ke= 0.500 Inlet / Outlet Invert= 210.40' / 208.93' S= 0.0130 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=17.73 cfs @ 12.09 hrs HW=214.45' TW=213.01' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 17.73 cfs @ 5.64 fps)

Summary for Pond DMH11: DMH

[80] Warning: Exceeded Pond CB18 by 0.33' @ 12.10 hrs (4.37 cfs 1,940 cf)

Inflow Area =	160,369 sf,	26.79% Impervious,	Inflow Depth = 6.08"	for 100-year event
Inflow =	25.15 cfs @	12.09 hrs, Volume=	81,251 cf	
Outflow =	25.15 cfs @	12.09 hrs, Volume=	81,251 cf,	Atten= 0%, Lag= 0.0 min
Primary =	25.15 cfs @	12.09 hrs, Volume=	81,251 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 213.26' @ 12.11 hrs
Flood Elev= 215.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	208.83'	**24.0" Round Culvert** L= 62.0' Ke= 0.500 Inlet / Outlet Invert= 208.83' / 208.00' S= 0.0134 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=24.58 cfs @ 12.09 hrs HW=213.01' TW=210.37' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 24.58 cfs @ 7.82 fps)

Summary for Pond DMH12: DMH

Inflow Area =	105,601 sf,	41.07% Impervious,	Inflow Depth = 5.87"	for 100-year event
Inflow =	8.35 cfs @	12.26 hrs, Volume=	51,643 cf	
Outflow =	8.35 cfs @	12.26 hrs, Volume=	51,643 cf,	Atten= 0%, Lag= 0.0 min
Primary =	8.35 cfs @	12.26 hrs, Volume=	51,643 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 235.25' @ 12.26 hrs
Flood Elev= 238.03'

Device	Routing	Invert	Outlet Devices
#1	Primary	232.63'	**15.0" Round Culvert** L= 76.0' Ke= 0.500 Inlet / Outlet Invert= 232.63' / 229.33' S= 0.0434 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=8.22 cfs @ 12.26 hrs HW=235.19' TW=231.79' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 8.22 cfs @ 6.70 fps)

Summary for Pond DMH2: DMH

Inflow Area =	12,241 sf,	37.68% Impervious,	Inflow Depth = 6.36"	for 100-year event
Inflow =	2.00 cfs @	12.09 hrs, Volume=	6,492 cf	
Outflow =	2.00 cfs @	12.09 hrs, Volume=	6,492 cf,	Atten= 0%, Lag= 0.0 min
Primary =	2.00 cfs @	12.09 hrs, Volume=	6,492 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 252.54' @ 12.09 hrs
Flood Elev= 260.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	251.84'	**15.0" Round Culvert** L= 75.0' Ke= 0.500 Inlet / Outlet Invert= 251.84' / 249.59' S= 0.0300 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.95 cfs @ 12.09 hrs HW=252.53' TW=250.24' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.95 cfs @ 2.82 fps)

Summary for Pond DMH3: DMH

Inflow Area = 18,468 sf, 39.10% Impervious, Inflow Depth = 6.48" for 100-year event
Inflow = 3.05 cfs @ 12.09 hrs, Volume= 9,980 cf
Outflow = 3.05 cfs @ 12.09 hrs, Volume= 9,980 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.05 cfs @ 12.09 hrs, Volume= 9,980 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 251.33' @ 12.09 hrs
Flood Elev= 254.76'

Device	Routing	Invert	Outlet Devices
#1	Primary	250.40'	**15.0" Round Culvert** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 250.40' / 249.85' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.98 cfs @ 12.09 hrs HW=251.32' TW=250.24' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 2.98 cfs @ 4.32 fps)

Summary for Pond DMH4: DMH

Inflow Area = 42,434 sf, 40.76% Impervious, Inflow Depth = 6.52" for 100-year event
Inflow = 7.04 cfs @ 12.09 hrs, Volume= 23,044 cf
Outflow = 7.04 cfs @ 12.09 hrs, Volume= 23,044 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.04 cfs @ 12.09 hrs, Volume= 23,044 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 250.27' @ 12.09 hrs
Flood Elev= 257.23'

Device	Routing	Invert	Outlet Devices
#1	Primary	248.85'	**18.0" Round Culvert** L= 159.0' Ke= 0.500 Inlet / Outlet Invert= 248.85' / 246.00' S= 0.0179 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=6.88 cfs @ 12.09 hrs HW=250.24' TW=248.07' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 6.88 cfs @ 4.02 fps)

Summary for Pond DMH5: DMH

Inflow Area = 105,601 sf, 41.07% Impervious, Inflow Depth = 5.87" for 100-year event
Inflow = 8.35 cfs @ 12.26 hrs, Volume= 51,643 cf
Outflow = 8.35 cfs @ 12.26 hrs, Volume= 51,643 cf, Atten= 0%, Lag= 0.0 min
Primary = 8.35 cfs @ 12.26 hrs, Volume= 51,643 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 231.85' @ 12.26 hrs
Flood Elev= 237.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	229.23'	**15.0" Round Culvert** L= 124.0' Ke= 0.500 Inlet / Outlet Invert= 229.23' / 226.75' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=8.22 cfs @ 12.26 hrs HW=231.79' TW=224.96' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 8.22 cfs @ 6.70 fps)

Summary for Pond DMH6: DMH

Inflow Area = 20,384 sf, 45.51% Impervious, Inflow Depth = 6.73" for 100-year event
Inflow = 3.46 cfs @ 12.09 hrs, Volume= 11,425 cf
Outflow = 3.46 cfs @ 12.09 hrs, Volume= 11,425 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.46 cfs @ 12.09 hrs, Volume= 11,425 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 243.94' @ 12.09 hrs
Flood Elev= 246.62'

Device	Routing	Invert	Outlet Devices
#1	Primary	242.96'	**15.0" Round Culvert** L= 146.0' Ke= 0.500 Inlet / Outlet Invert= 242.96' / 234.60' S= 0.0573 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=3.38 cfs @ 12.09 hrs HW=243.92' TW=235.85' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.38 cfs @ 3.34 fps)

Summary for Pond DMH7: DMH

Inflow Area = 45,579 sf, 38.39% Impervious, Inflow Depth = 6.53" for 100-year event
Inflow = 7.57 cfs @ 12.09 hrs, Volume= 24,787 cf
Outflow = 7.57 cfs @ 12.09 hrs, Volume= 24,787 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.57 cfs @ 12.09 hrs, Volume= 24,787 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 235.89' @ 12.09 hrs
Flood Elev= 246.62'

Device	Routing	Invert	Outlet Devices
#1	Primary	234.35'	**18.0" Round Culvert** L= 140.0' Ke= 0.500

Inlet / Outlet Invert= 234.35' / 228.85' S= 0.0393 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=7.38 cfs @ 12.09 hrs HW=235.85' TW=228.82' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.38 cfs @ 4.17 fps)

Summary for Pond DMH8: DMH

Inflow Area =	72,514 sf,	36.41% Impervious,	Inflow Depth = 6.47"	for 100-year event
Inflow =	11.96 cfs @	12.09 hrs, Volume=	39,072 cf	
Outflow =	11.96 cfs @	12.09 hrs, Volume=	39,072 cf,	Atten= 0%, Lag= 0.0 min
Primary =	11.96 cfs @	12.09 hrs, Volume=	39,072 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 228.84' @ 12.09 hrs
Flood Elev= 233.28'

Device	Routing	Invert	Outlet Devices
#1	Primary	227.21'	**24.0" Round Culvert** L= 137.0' Ke= 0.500 Inlet / Outlet Invert= 227.21' / 223.10' S= 0.0300 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=11.67 cfs @ 12.09 hrs HW=228.82' TW=221.63' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 11.67 cfs @ 4.32 fps)

Summary for Pond DMH9: DMH

Inflow Area =	102,295 sf,	31.22% Impervious,	Inflow Depth = 6.30"	for 100-year event
Inflow =	16.52 cfs @	12.09 hrs, Volume=	53,672 cf	
Outflow =	16.52 cfs @	12.09 hrs, Volume=	53,672 cf,	Atten= 0%, Lag= 0.0 min
Primary =	16.52 cfs @	12.09 hrs, Volume=	53,672 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 221.68' @ 12.09 hrs
Flood Elev= 227.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	219.49'	**24.0" Round Culvert** L= 147.0' Ke= 0.500 Inlet / Outlet Invert= 219.49' / 216.55' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=16.13 cfs @ 12.09 hrs HW=221.63' TW=214.44' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 16.13 cfs @ 5.13 fps)

Summary for Pond G: gabion

[93] Warning: Storage range exceeded by 0.01'
[58] Hint: Peaked 0.01' above defined flood level

Inflow Area = 105,601 sf, 41.07% Impervious, Inflow Depth = 4.90" for 100-year event
Inflow = 6.53 cfs @ 12.40 hrs, Volume= 43,098 cf
Outflow = 6.51 cfs @ 12.40 hrs, Volume= 43,098 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.51 cfs @ 12.40 hrs, Volume= 43,098 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 223.26' @ 12.40 hrs Storage= 37 cf
Flood Elev= 223.25' Storage= 37 cf

Plug-Flow detention time= 0.1 min calculated for 43,038 cf (100% of inflow)
Center-of-Mass det. time= 0.1 min (821.4 - 821.3)

Volume	Invert	Avail.Storage	Storage Description
#1	222.00'	37 cf	**15.0" Round Pipe Storage** L= 30.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	222.63'	**3.0" Vert. outlet holes X 15.00** C= 0.600 Limited to weir flow at low heads
#2	Primary	222.00'	**3.0" Horiz. outlet holes X 15.00** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.50 cfs @ 12.40 hrs HW=223.26' TW=0.00' (Dynamic Tailwater)
1=outlet holes (Orifice Controls 2.52 cfs @ 3.43 fps)
2=outlet holes (Orifice Controls 3.98 cfs @ 5.41 fps)

Summary for Pond is1: infiltration pipe

[92] Warning: Device #2 is above defined storage
[93] Warning: Storage range exceeded by 0.02'

Inflow Area = 105,601 sf, 41.07% Impervious, Inflow Depth = 5.87" for 100-year event
Inflow = 8.35 cfs @ 12.26 hrs, Volume= 51,643 cf
Outflow = 6.70 cfs @ 12.40 hrs, Volume= 51,371 cf, Atten= 20%, Lag= 8.2 min
Discarded = 0.17 cfs @ 12.40 hrs, Volume= 8,273 cf
Primary = 6.53 cfs @ 12.40 hrs, Volume= 43,098 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 226.02' @ 12.40 hrs Surf.Area= 1,572 sf Storage= 5,733 cf

Plug-Flow detention time= 73.0 min calculated for 51,371 cf (99% of inflow)
Center-of-Mass det. time= 69.7 min (884.7 - 815.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	220.00'	2,466 cf	**6.00'W x 262.00'L x 6.00'H Field A** 9,432 cf Overall - 3,267 cf Embedded = 6,165 cf x 40.0% Voids
#2A	220.00'	3,267 cf	**CMP Round 48** x 13 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.57 sf x 20.00'L = 251.3 cf Overall Size= 48.0"W x 48.0"H x 20.00'L
		5,733 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	222.50'	**12.0" Round Culvert** L= 13.0' Ke= 0.500 Inlet / Outlet Invert= 222.50' / 222.00' S= 0.0385 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	226.00'	**30.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#3	Discarded	220.00'	**1.020 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 213.00' Phase-In= 0.01'

Discarded OutFlow Max=0.17 cfs @ 12.40 hrs HW=226.01' (Free Discharge)
└─**3=Exfiltration** (Controls 0.17 cfs)

Primary OutFlow Max=6.52 cfs @ 12.40 hrs HW=226.02' TW=223.26' (Dynamic Tailwater)
├─**1=Culvert** (Inlet Controls 6.28 cfs @ 8.00 fps)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.24 cfs @ 0.36 fps)

Summary for Link 1L: (new Link)

Inflow Area = 121,356 sf, 6.66% Impervious, Inflow Depth = 4.41" for 100-year event
Inflow = 7.47 cfs @ 12.36 hrs, Volume= 44,603 cf
Primary = 7.47 cfs @ 12.36 hrs, Volume= 44,603 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Section 5.0

APPENDIX

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	Massachusetts
Location	
Longitude	71.370 degrees West
Latitude	42.249 degrees North
Elevation	0 feet
Date/Time	Mon, 17 Aug 2020 11:52:03 -0400

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.29	0.44	0.54	0.71	0.89	1.12	**1yr**	0.77	1.06	1.30	1.65	2.09	2.66	2.89	**1yr**	2.36	2.78	3.25	3.90	4.57	**1yr**
2yr	0.35	0.54	0.67	0.89	1.12	1.41	**2yr**	0.97	1.29	1.63	2.04	2.55	3.19	3.51	**2yr**	2.83	3.37	3.88	4.62	5.24	**2yr**
5yr	0.42	0.65	0.82	1.10	1.40	1.78	**5yr**	1.21	1.62	2.07	2.59	3.23	4.02	4.47	**5yr**	3.55	4.30	4.93	5.85	6.53	**5yr**
10yr	0.48	0.75	0.94	1.28	1.67	2.14	**10yr**	1.44	1.91	2.48	3.11	3.86	4.78	5.38	**10yr**	4.23	5.17	5.92	7.00	7.72	**10yr**
25yr	0.57	0.90	1.15	1.58	2.10	2.70	**25yr**	1.81	2.39	3.15	3.95	4.89	6.01	6.87	**25yr**	5.32	6.60	7.55	8.87	9.64	**25yr**
50yr	0.64	1.03	1.32	1.86	2.50	3.25	**50yr**	2.16	2.83	3.80	4.76	5.87	7.16	8.27	**50yr**	6.34	7.95	9.07	10.61	11.41	**50yr**
100yr	0.74	1.19	1.54	2.18	2.98	3.90	**100yr**	2.57	3.36	4.57	5.71	7.02	8.53	9.96	**100yr**	7.55	9.58	10.91	12.70	13.51	**100yr**
200yr	0.86	1.39	1.81	2.58	3.56	4.67	**200yr**	3.07	3.98	5.48	6.84	8.40	10.17	12.00	**200yr**	9.00	11.54	13.12	15.21	16.00	**200yr**
500yr	1.03	1.69	2.21	3.21	4.50	5.95	**500yr**	3.89	4.99	6.99	8.72	10.66	12.85	15.37	**500yr**	11.37	14.78	16.75	19.32	20.02	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.23	0.35	0.43	0.58	0.71	0.91	**1yr**	0.61	0.89	1.03	1.41	1.83	2.28	2.48	**1yr**	2.02	2.38	2.96	3.33	3.97	**1yr**
2yr	0.34	0.52	0.65	0.87	1.08	1.27	**2yr**	0.93	1.24	1.45	1.92	2.46	3.06	3.35	**2yr**	2.71	3.22	3.69	4.49	5.09	**2yr**
5yr	0.38	0.59	0.73	1.00	1.27	1.52	**5yr**	1.10	1.48	1.73	2.26	2.89	3.59	4.00	**5yr**	3.18	3.84	4.44	5.45	6.06	**5yr**
10yr	0.42	0.65	0.80	1.12	1.45	1.73	**10yr**	1.25	1.69	1.94	2.55	3.24	4.05	4.56	**10yr**	3.58	4.38	5.08	6.18	6.92	**10yr**

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
25yr	0.48	0.73	0.91	1.30	1.71	2.04	**25yr**	1.48	2.00	2.30	3.02	3.80	4.76	5.44	**25yr**	4.21	5.23	6.10	7.41	8.24	**25yr**
50yr	0.53	0.80	1.00	1.44	1.94	2.32	**50yr**	1.67	2.26	2.60	3.41	4.27	5.37	6.22	**50yr**	4.76	5.99	7.00	8.46	9.40	**50yr**
100yr	0.58	0.88	1.10	1.59	2.18	2.63	**100yr**	1.88	2.57	2.94	3.78	4.82	6.10	7.15	**100yr**	5.40	6.87	8.04	9.68	10.73	**100yr**
200yr	0.63	0.95	1.21	1.75	2.44	2.99	**200yr**	2.10	2.92	3.33	4.27	5.43	6.92	8.20	**200yr**	6.13	7.88	9.26	11.09	12.24	**200yr**
500yr	0.71	1.06	1.36	1.98	2.81	3.54	**500yr**	2.43	3.46	3.92	5.01	6.38	8.22	9.91	**500yr**	7.27	9.53	11.16	13.28	14.62	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.32	0.49	0.60	0.81	1.00	1.19	**1yr**	0.86	1.17	1.36	1.79	2.31	3.01	3.22	**1yr**	2.66	3.10	3.51	4.22	5.20	**1yr**
2yr	0.37	0.57	0.70	0.95	1.17	1.37	**2yr**	1.01	1.34	1.58	2.06	2.65	3.37	3.72	**2yr**	2.99	3.58	4.08	4.82	5.43	**2yr**
5yr	0.46	0.71	0.89	1.22	1.55	1.81	**5yr**	1.33	1.77	2.06	2.66	3.36	4.49	4.96	**5yr**	3.97	4.77	5.42	6.29	7.02	**5yr**
10yr	0.56	0.86	1.06	1.49	1.92	2.24	**10yr**	1.66	2.19	2.56	3.22	4.04	5.55	6.22	**10yr**	4.91	5.98	6.78	7.75	8.54	**10yr**
25yr	0.72	1.10	1.37	1.95	2.57	2.97	**25yr**	2.22	2.90	3.38	4.16	5.18	7.39	8.39	**25yr**	6.54	8.07	9.10	10.19	11.05	**25yr**
50yr	0.88	1.33	1.66	2.38	3.21	3.67	**50yr**	2.77	3.59	4.18	5.05	6.23	9.16	10.52	**50yr**	8.11	10.11	11.36	12.55	13.45	**50yr**
100yr	1.07	1.62	2.03	2.93	4.02	4.56	**100yr**	3.47	4.46	5.17	6.25	7.51	11.37	13.14	**100yr**	10.07	12.64	14.18	15.47	16.37	**100yr**
200yr	1.31	1.97	2.49	3.61	5.04	5.65	**200yr**	4.35	5.53	6.40	7.61	9.04	14.11	16.44	**200yr**	12.49	15.81	17.69	19.06	19.93	**200yr**
500yr	1.73	2.57	3.31	4.80	6.83	7.50	**500yr**	5.89	7.33	8.50	9.90	11.56	18.72	22.10	**500yr**	16.57	21.25	23.70	25.15	25.82	**500yr**

Powered by ACIS
Northeast Regional Climate Center

National Flood Hazard Layer FIRMette

FEMA

71°22'58"W 42°15'4"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

71°22'20"W 42°14'37"N

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/26/2020 at 12:49 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

United States Department of Agriculture

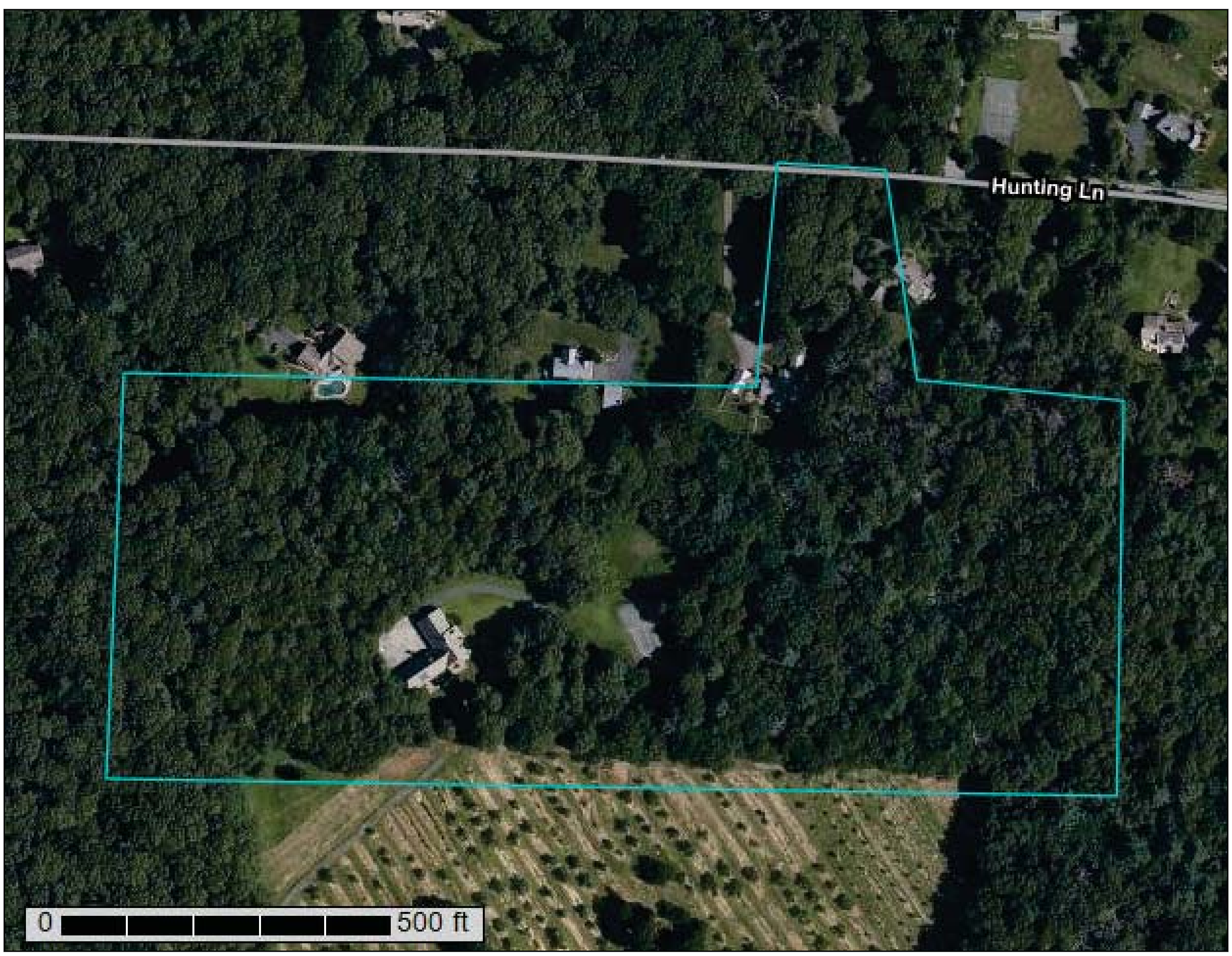
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Middlesex County, Massachusetts



October 26, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

Preface.. 2
How Soil Surveys Are Made..5
Soil Map.. 8
Soil Map..9
Legend..10
Map Unit Legend.. 11
Map Unit Descriptions..11
Middlesex County, Massachusetts..13
103C—Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes...... 13
104C—Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes...... 15
104D—Hollis-Rock outcrop-Charlton complex, 15 to 25 percent slopes.... 18
307B—Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony.... 21
307C—Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony.. 22
Soil Information for All Uses..25
Soil Properties and Qualities.. 25
Soil Physical Properties.. 25
Saturated Hydraulic Conductivity (Ksat)..25
Soil Qualities and Features..28
Hydrologic Soil Group.. 29
References..33

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

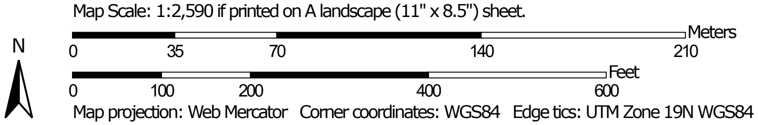
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:2,590 if printed on A landscape (11" x 8.5") sheet.



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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 20, Jun 9, 2020

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

Date(s) aerial images were photographed: Jul 28, 2019—Aug 15, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
103C	Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes	5.8	24.9%
104C	Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes	3.6	15.6%
104D	Hollis-Rock outcrop-Charlton complex, 15 to 25 percent slopes	1.3	5.4%
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	0.8	3.3%
307C	Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony	11.8	50.8%
Totals for Area of Interest		**23.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Middlesex County, Massachusetts

103C—Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2wzp1
Elevation: 0 to 1,390 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Charlton, extremely stony, and similar soils: 50 percent
Hollis, extremely stony, and similar soils: 20 percent
Rock outcrop: 10 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton, Extremely Stony

Setting

Landform: Hills, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands

Hydric soil rating: No

Description of Hollis, Extremely Stony

Setting

Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: gravelly fine sandy loam
Bw - 7 to 16 inches: gravelly fine sandy loam
2R - 16 to 26 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 8 to 23 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Hills, ridges
Parent material: Igneous and metamorphic rock

Typical profile

R - 0 to 79 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water capacity: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Woodbridge, extremely stony

Percent of map unit: 8 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Canton, extremely stony

Percent of map unit: 5 percent
Landform: Moraines, ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Chatfield, extremely stony

Percent of map unit: 5 percent
Landform: Hills, ridges
Landform position (two-dimensional): Summit, backslope, shoulder
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Ridgebury, extremely stony

Percent of map unit: 2 percent
Landform: Hills, ground moraines, depressions, drumlins, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

104C—Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2w69p

Elevation: 0 to 1,270 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hollis, extremely stony, and similar soils: 35 percent
Charlton, extremely stony, and similar soils: 25 percent
Rock outcrop: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hollis, Extremely Stony

Setting

Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: gravelly fine sandy loam
Bw - 7 to 16 inches: gravelly fine sandy loam
2R - 16 to 26 inches: bedrock

Properties and qualities

Slope: 0 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 8 to 23 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Charlton, Extremely Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, backslope, shoulder
Landform position (three-dimensional): Crest, side slope

Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile
Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities
Slope: 0 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Moderate (about 8.7 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Rock Outcrop

Setting
Landform: Hills, ridges
Parent material: Igneous and metamorphic rock

Typical profile
R - 0 to 79 inches: bedrock

Properties and qualities
Slope: 0 to 15 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water capacity: Very low (about 0.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Canton, extremely stony

Percent of map unit: 7 percent
Landform: Hills, moraines, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Chatfield, extremely stony

Percent of map unit: 6 percent
Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Montauk, extremely stony

Percent of map unit: 1 percent
Landform: Recessionial moraines, hills, drumlins, ground moraines
Landform position (two-dimensional): Summit, backslope, shoulder
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Scituate, extremely stony

Percent of map unit: 1 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Footslope, backslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

104D—Hollis-Rock outcrop-Charlton complex, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 98yh
Elevation: 0 to 1,530 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 110 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hollis and similar soils: 35 percent
Rock outcrop: 30 percent
Charlton and similar soils: 20 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hollis

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Crest, head slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable, shallow loamy basal till over granite and gneiss

Typical profile

H1 - 0 to 2 inches: fine sandy loam
H2 - 2 to 14 inches: fine sandy loam
H3 - 14 to 18 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Rock Outcrop

Setting

Parent material: Granite and gneiss

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s

Description of Charlton

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable loamy eolian deposits over friable loamy basal till derived from granite and gneiss

Typical profile

H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 22 inches: sandy loam
H3 - 22 to 65 inches: gravelly sandy loam

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Canton

Percent of map unit: 10 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Head slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Montauk

Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Nose slope, head slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Unnamed

Percent of map unit: 2 percent

307B—Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w675
Elevation: 0 to 1,580 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Paxton, extremely stony, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Extremely Stony

Setting

Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Woodbridge, extremely stony

Percent of map unit: 10 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Charlton, extremely stony

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury, extremely stony

Percent of map unit: 4 percent
Landform: Drainageways, drumlins, hills, ground moraines, depressions
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman, extremely stony

Percent of map unit: 1 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

307C—Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w676
Elevation: 0 to 1,490 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Paxton, extremely stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Extremely Stony

Setting

Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Charlton, extremely stony

Percent of map unit: 8 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Woodbridge, extremely stony

Percent of map unit: 6 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury, extremely stony

Percent of map unit: 1 percent
Landform: Ground moraines, depressions, drumlins, drainageways, hills
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Physical Properties

Soil Physical Properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Saturated Hydraulic Conductivity (Ksat)

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits.

Map—Saturated Hydraulic Conductivity (Ksat)

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

<= 6.8818

> 6.8818 and <= 12.1818

> 12.1818 and <= 13.0322

> 13.0322 and <= 18.3357

Not rated or not available

Soil Rating Lines

<= 6.8818

> 6.8818 and <= 12.1818

> 12.1818 and <= 13.0322

> 13.0322 and <= 18.3357

Not rated or not available

Soil Rating Points

<= 6.8818

> 6.8818 and <= 12.1818

> 12.1818 and <= 13.0322

> 13.0322 and <= 18.3357

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 1:25,000.

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

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

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

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

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

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 20, Jun 9, 2020

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

Date(s) aerial images were photographed: Jul 28, 2019—Aug 15, 2019

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

Table—Saturated Hydraulic Conductivity (Ksat)

Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
103C	Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes	12.1818	5.8	24.9%
104C	Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes	13.0322	3.6	15.6%
104D	Hollis-Rock outcrop-Charlton complex, 15 to 25 percent slopes	18.3357	1.3	5.4%
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	6.8818	0.8	3.3%
307C	Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony	6.8818	11.8	50.8%
Totals for Area of Interest			**23.2**	**100.0%**

Rating Options—Saturated Hydraulic Conductivity (Ksat)

Units of Measure: micrometers per second

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Fastest

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): Depth Range (Weighted Average)

Top Depth: 0

Bottom Depth: 100

Units of Measure: Inches

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

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.

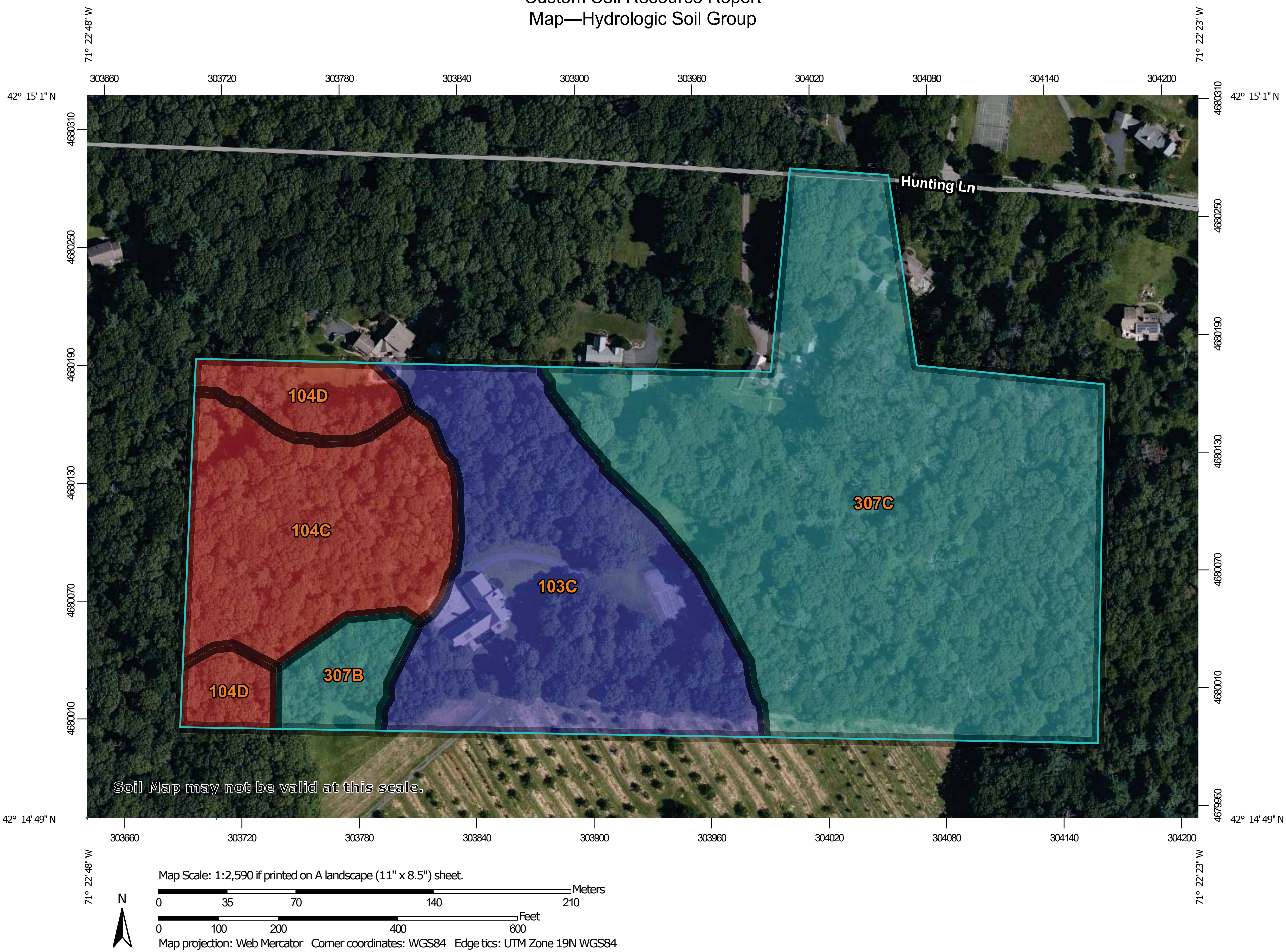
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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.

Custom Soil Resource Report
Map—Hydrologic Soil Group



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 1:25,000.

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

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

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

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

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

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 20, Jun 9, 2020

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

Date(s) aerial images were photographed: Jul 28, 2019—Aug 15, 2019

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

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
103C	Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes	B	5.8	24.9%
104C	Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes	D	3.6	15.6%
104D	Hollis-Rock outcrop-Charlton complex, 15 to 25 percent slopes	D	1.3	5.4%
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	C	0.8	3.3%
307C	Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony	C	11.8	50.8%
Totals for Area of Interest			**23.2**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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Drawdown within 72 hours Analysis for Static Method

IS-1

Infiltration Rate: 1.02 inches/hour *(From table 2.3.3: Rawls, Brakensiek, Saxton, 1982)*

Volume Provided for Infiltration: 2,861 cf (volume provided below outlet pipe)

Basin bottom area: 1,572 sf (6' wide x 262' long)

$\text{Time}_{\text{drawdown}}$ = (Required Recharge Volume in cubic feet as determined by the Static Method)(1/Design Infiltration Rate in inches per hour)(conversion for inches to feet)(1/bottom area in feet)

$\text{Time}_{\text{drawdown}}$ = (2,861 cf) (1 / 1.02 in/hr) (1ft/12 in.) (1 / 1,572 sf)

= 21.41 hours

Stage-Area-Storage for Pond DB2: DB2

Elevation (feet)	Surface (sq-ft)	Wetted (sq-ft)	Storage (cubic-feet)
244.50	762	762	0
244.54	785	787	31
244.58	808	813	63
244.62	832	838	96
244.66	855	864	129
244.70	880	890	164
244.74	904	916	200
244.78	929	943	236
244.82	954	969	274
244.86	980	996	313
244.90	1,006	1,023	352
244.94	1,032	1,050	393
244.98	1,059	1,077	435
245.02	1,086	1,116	478
245.06	1,114	1,166	522
245.10	1,142	1,217	567
245.14	1,170	1,268	613
245.18	1,199	1,320	661
245.22	1,228	1,373	709
245.26	1,258	1,426	759
245.30	1,288	1,480	810
245.34	1,318	1,534	862
245.38	1,349	1,589	915
245.42	1,380	1,644	970
245.46	1,411	1,701	1,026
245.50	1,443	1,757	1,083
245.54	1,475	1,815	1,141
245.58	1,507	1,873	1,201
245.62	1,540	1,931	1,262
245.66	1,573	1,990	1,324
245.70	1,606	2,050	1,387
245.74	1,640	2,110	1,452
245.78	1,674	2,171	1,519
245.82	1,709	2,232	1,586
245.86	1,743	2,294	1,655
245.90	1,779	2,357	1,726
245.94	1,814	2,420	1,798
245.98	1,850	2,484	1,871
246.02	1,885	2,542	1,946
246.06	1,919	2,594	2,022
246.10	1,953	2,645	2,099
246.14	1,988	2,698	2,178
246.18	2,023	2,751	2,258
246.22	2,058	2,804	2,340
246.26	2,094	2,857	2,423
246.30	2,130	2,911	2,507
246.34	2,166	2,965	2,593
246.38	2,202	3,020	2,680
246.42	2,239	3,075	2,769
246.46	2,276	3,130	2,860
246.50	2,314	3,186	2,951
246.54	2,351	3,242	3,045
246.58	2,389	3,298	3,140
246.62	2,428	3,355	3,236
246.66	2,466	3,413	3,334
246.70	2,505	3,470	3,433
246.74	2,545	3,528	3,534
246.78	2,584	3,586	3,637
246.82	2,624	3,645	3,741
246.86	2,664	3,704	3,847
246.90	2,705	3,764	3,954
246.94	2,745	3,823	4,063
246.98	2,786	3,884	4,174
247.02	2,827	3,945	4,286
247.06	2,868	4,007	4,400
247.10	2,908	4,070	4,515
247.14	2,949	4,134	4,633
247.18	2,991	4,197	4,751
247.22	3,032	4,261	4,872
247.26	3,074	4,326	4,994
247.30	3,117	4,391	5,118
247.34	3,159	4,456	5,243
247.38	3,202	4,522	5,370
247.42	3,245	4,588	5,499
247.46	3,288	4,654	5,630
247.50	3,332	4,721	5,762
247.54	3,376	4,788	5,897
247.58	3,420	4,856	6,033
247.62	3,465	4,924	6,170
247.66	3,510	4,992	6,310
247.70	3,555	5,061	6,451
247.74	3,600	5,130	6,594
247.78	3,646	5,200	6,739
247.82	3,692	5,270	6,886
247.86	3,738	5,340	7,034
247.90	3,784	5,411	7,185
247.94	3,831	5,482	7,337
247.98	3,878	5,553	7,491
248.02	3,925	5,622	7,647
248.06	3,972	5,687	7,805
248.10	4,018	5,752	7,965
248.14	4,065	5,818	8,127
248.18	4,112	5,884	8,290
248.22	4,160	5,950	8,456
248.26	4,208	6,017	8,623
248.30	4,256	6,084	8,792
248.34	4,304	6,151	8,964
248.38	4,353	6,219	9,137
248.42	4,402	6,287	9,312
248.46	4,451	6,355	9,489
248.50	4,500	6,423	9,668
248.54	4,550	6,492	9,849
248.58	4,600	6,561	10,032
248.62	4,650	6,631	10,217
248.66	4,701	6,701	10,404
248.70	4,751	6,771	10,593
248.74	4,802	6,841	10,784
248.78	4,854	6,912	10,977
248.82	4,905	6,983	11,172
248.86	4,957	7,055	11,370
248.90	5,009	7,126	11,569
248.94	5,062	7,198	11,770
248.98	5,115	7,271	11,974
249.02	5,166	7,333	12,179
249.06	5,217	7,386	12,387
249.10	5,268	7,439	12,597
249.14	5,319	7,492	12,809
249.18	5,370	7,546	13,022
249.22	5,421	7,599	13,238
249.26	5,473	7,653	13,456
249.30	5,525	7,707	13,676
249.34	5,578	7,761	13,898
249.38	5,630	7,815	14,122
249.42	5,683	7,869	14,348
249.46	5,736	7,924	14,577
249.50	5,789	7,978	14,807
249.54	5,843	8,033	15,040
249.58	5,897	8,088	15,275
249.62	5,951	8,143	15,512
249.66	6,005	8,199	15,751
249.70	6,059	8,254	15,992
249.74	6,114	8,310	16,236
249.78	6,169	8,365	16,481
249.82	6,224	8,421	16,729
249.86	6,280	8,478	16,979
249.90	6,336	8,534	17,232
249.94	6,392	8,590	17,486
249.98	**6,448**	**8,647**	**17,743**

Stage-Area-Storage for Pond is1: infiltration pipe (continued)

Elevation (feet)	Wetted (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Wetted (sq-ft)	Storage (cubic-feet)
222.12	2,708	2,388	222.65	2,992	3,045
222.13	2,714	2,401	222.66	2,998	3,057
222.14	2,719	2,413	222.67	3,003	3,069
222.15	2,724	2,426	222.68	3,008	3,081
222.16	2,730	2,438	222.69	3,014	3,094
222.17	2,735	2,451	222.70	3,019	3,106
222.18	2,740	2,463	222.71	3,025	3,118
222.19	2,746	2,476	222.72	3,030	3,130
222.20	2,751	2,488	222.73	3,035	3,142
222.21	2,757	2,501	222.74	3,041	3,154
222.22	2,762	2,513	222.75	3,046	3,166
222.23	2,767	2,526	222.76	3,051	3,178
222.24	2,773	2,538	222.77	3,057	3,190
222.25	2,778	2,551	222.78	3,062	3,202
222.26	2,783	2,563	222.79	3,067	3,214
222.27	2,789	2,576	222.80	3,073	3,226
222.28	2,794	2,588	222.81	3,078	3,238
222.29	2,799	2,600	222.82	3,084	3,250
222.30	2,805	2,613	222.83	3,089	3,262
222.31	2,810	2,625	222.84	3,094	3,274
222.32	2,816	2,638	222.85	3,100	3,286
222.33	2,821	2,650	222.86	3,105	3,298
222.34	2,826	2,663	222.87	3,110	3,310
222.35	2,832	2,675	222.88	3,116	3,322
222.36	2,837	2,688	222.89	3,121	3,334
222.37	2,842	2,700	222.90	3,126	3,346
222.38	2,848	2,712	222.91	3,132	3,358
222.39	2,853	2,725	222.92	3,137	3,369
222.40	2,858	2,737	222.93	3,142	3,381
222.41	2,864	2,750	222.94	3,148	3,393
222.42	2,869	2,762	222.95	3,153	3,405
222.43	2,874	2,774	222.96	3,159	3,417
222.44	2,880	2,787	222.97	3,164	3,428
222.45	2,885	2,799	222.98	3,169	3,440
222.46	2,891	2,812	222.99	3,175	3,452
222.47	2,896	2,824	223.00	3,180	3,464
222.48	2,901	2,836	223.01	3,185	3,475
222.49	2,907	2,849	223.02	3,191	3,487
222.50	2,912	2,861	223.03	3,196	3,498
222.51	2,917	2,873	223.04	3,201	3,510
222.52	2,923	2,886	223.05	3,207	3,522
222.53	2,928	2,898	223.06	3,212	3,533
222.54	2,933	2,910	223.07	3,218	3,545
222.55	2,939	2,922	223.08	3,223	3,556
222.56	2,944	2,935	223.09	3,228	3,568
222.57	2,950	2,947	223.10	3,234	3,579
222.58	2,955	2,959	223.11	3,239	3,591
222.59	2,960	2,972	223.12	3,244	3,602
222.60	2,966	2,984	223.13	3,250	3,614
222.61	2,971	2,996	223.14	3,255	3,625
222.62	2,976	3,008	223.15	3,260	3,637
222.63	2,982	3,020	223.16	3,266	3,648
222.64	2,987	3,033	223.17	3,271	3,659

DB2 to IS1 The calculations provide the TSS removal rate of a stormwater management system.

Stormwater Management BMP	TSS Removal rate
Parking Lot Sweeping	5 %
Deep Sump Catch Basins	25 %
Hydrodynamic Separator	80 %
Bioretention Area	90 %
Infiltration System	80 %

Average Annual Load	=	1.0	
Parking Lot Sweeping	=	5.0	% Removal Rate
		95.0	% TSS Load Remains
TSS Load Remaining	=	95.0	%
Deep Sump Catch Basins	=	25.0	% Removal Rate
		71.3	% TSS Load Remains
TSS Load Remaining	=	71.3	%
Hydrodynamic Separator	=	80.0	% Removal Rate
		14.3	% TSS Load Remains
TSS Load Remaining	=	14.3	%
Bioretention Area	=	90.0	% Removal Rate
		1.4	% TSS Load Remains
TSS Load Remaining	=	1.4	%
	=	80.0	% Removal Rate
		0.3	% TSS Load Remains

Percentage of TSS Remaining - Initial TSS Load = Final TSS Removal Rate

0.29 - 100.0 = 99.7 %

For this drainage area, this system as designed will remove an estimated
99.7 % of the annual TSS load and therefore will meet the TSS removal standard.

ALLEN & MAJOR ASSOCIATES, INC.

Project No.	2513-02	**Sheet**	2 of 2
Project Description	Hunting Lane		
	Sherborn, MA		
Calculated By	SM	**Date**	04/06/21
Checked By		**Date**	

DB1 to Jellyfish   The calculations provide the TSS removal rate of a stormwater management system.

Stormwater Management BMP	TSS Removal rate
Parking Lot Sweeping	5 %
Deep Sump Catch Basins	25 %
Hydrodynamic Separator	80 %
Bioretention Area	90 %
Jellyfish	89 %

Average Annual Load	=	1.0	
Parking Lot Sweeping	=	5.0	% Removal Rate
		95.0	% TSS Load Remains
TSS Load Remaining	=	95.0	%
Deep Sump Catch Basins	=	25.0	% Removal Rate
		71.3	% TSS Load Remains
TSS Load Remaining	=	71.3	%
Hydrodynamic Separator	=	80.0	% Removal Rate
		14.3	% TSS Load Remains
TSS Load Remaining	=	14.3	%
Bioretention Area	=	90.0	% Removal Rate
		1.4	% TSS Load Remains
TSS Load Remaining	=	1.4	%
	=	89.0	% Removal Rate
		0.2	% TSS Load Remains

Percentage of TSS Remaining - Initial TSS Load = Final TSS Removal Rate

0.16 - 100.0 = 99.8 %

For this drainage area, this system as designed will remove an estimated 99.8 % of the annual TSS load and therefore will meet the TSS removal standard.

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

APPLE HILL ESTATES
SHERBORN, MA

Area	0.40 ac	Unit Site Designation	DMH-04
Weighted C	0.9	Rainfall Station #	68
t_c	6 min		
CDS Model	2015-4	CDS Treatment Capacity	1.4 cfs

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	9.3%	9.3%	0.01	0.01	9.0
0.04	9.5%	18.8%	0.01	0.01	9.1
0.06	8.7%	27.5%	0.02	0.02	8.4
0.08	10.1%	37.6%	0.03	0.03	9.7
0.10	7.2%	44.8%	0.04	0.04	6.8
0.12	6.0%	50.8%	0.04	0.04	5.7
0.14	6.3%	57.1%	0.05	0.05	6.0
0.16	5.6%	62.7%	0.06	0.06	5.3
0.18	4.7%	67.4%	0.06	0.06	4.4
0.20	3.6%	71.0%	0.07	0.07	3.4
0.25	8.2%	79.1%	0.09	0.09	7.6
0.50	14.9%	94.0%	0.18	0.18	13.2
0.75	3.2%	97.3%	0.27	0.27	2.7
1.00	1.2%	98.5%	0.36	0.36	1.0
1.50	0.7%	99.2%	0.54	0.54	0.5
2.00	0.8%	100.0%	0.71	0.71	0.5
					93.3

Removal Efficiency Adjustment[2] =	6.5%
Predicted % Annual Rainfall Treated =	93.5%
Predicted Net Annual Load Removal Efficiency =	**86.9%**

1 - Based on 10 years of rainfall data from NCDC station 736, Blue Hill, Norfolk County, MA

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

APPLE HILL ESTATES
SHERBORN, MA

Area	**0.99 ac**	Unit Site Designation	**DMH-11**
Weighted C	**0.9**	Rainfall Station #	**68**
t_c	**10 min**		
CDS Model	**2015-4**	CDS Treatment Capacity	**1.4 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	9.3%	9.3%	0.02	0.02	9.0
0.04	9.5%	18.8%	0.04	0.04	9.0
0.06	8.7%	27.5%	0.05	0.05	8.2
0.08	10.1%	37.6%	0.07	0.07	9.4
0.10	7.2%	44.8%	0.09	0.09	6.7
0.12	6.0%	50.8%	0.11	0.11	5.5
0.14	6.3%	57.1%	0.12	0.12	5.7
0.16	5.6%	62.7%	0.14	0.14	5.1
0.18	4.7%	67.4%	0.16	0.16	4.2
0.20	3.6%	71.0%	0.18	0.18	3.2
0.25	8.2%	79.1%	0.22	0.22	7.0
0.50	14.9%	94.0%	0.45	0.45	11.3
0.75	3.2%	97.3%	0.67	0.67	2.1
1.00	1.2%	98.5%	0.89	0.89	0.7
1.50	0.7%	99.2%	1.34	1.34	0.2
2.00	0.8%	100.0%	1.78	1.40	0.2
					87.6
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.4%
				Predicted Net Annual Load Removal Efficiency =	**81.1%**

1 - Based on 10 years of rainfall data from NCDC station 736, Blue Hill, Norfolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

ALLEN & MAJOR ASSOCIATES, INC.

DRAINAGE PIPE DESIGN ANALYSIS

A&M Job No.	2513-02
Date:	4/6/2021

Project Location:
Apple Hill Estates
Hunting Lane
Sherborn, MA

Prepared For:
Barsky Estate Realty Trust

Manning's Formula

$V=1.486/n*R^{2/3}*S^{1/2}$
Q = V*A
(25-Year storm)

Where: V is the velocity in Ft/sec.
n is Mannings coefficient of friction
R is the Hydraulic Radius
S is the slope of the pipe

R=Area/Wetted Perimeter

Where: Area=Pi*(R/12)2
Wetted Perimeter=2*Pi*R/12

PIPE	Q_{design}	n	Diameter	A	Wp	R	S	Q_{full}	Q_{full} ≥ Q_{design}	V_{full}	Q_d/Q_f	Results	V_{design}	2.5 ft/s ≤ V_{design} ≤ 10 ft/s
	(cfs)		(inches)	(ft^2)	(ft)	(ft)	(feet/foot)	(cfs)		(ft/s)		Fig. 4-4A	(ft/s)	
CB10	1.14	0.013	12	0.79	3.14	0.25	0.010	3.56	OK	4.54	0.32	0.86	3.90	OK
CB12	1.41	0.013	12	0.79	3.14	0.25	0.010	3.56	OK	4.54	0.39	0.91	4.13	OK
CB14	1.41	0.013	12	0.79	3.14	0.25	0.030	6.17	OK	7.86	0.23	0.79	6.21	OK
CB16	1.38	0.013	12	0.79	3.14	0.25	0.023	5.37	OK	6.83	0.26	0.82	5.60	OK
CB18	1.25	0.013	12	0.79	3.14	0.25	0.010	3.56	OK	4.54	0.35	0.89	4.04	OK
CB2	0.66	0.013	12	0.79	3.14	0.25	0.018	4.81	OK	6.12	0.14	0.65	3.98	OK
CB4	0.64	0.013	12	0.79	3.14	0.25	0.030	6.17	OK	7.86	0.10	0.59	4.64	OK
CB6	0.99	0.013	12	0.79	3.14	0.25	0.010	3.56	OK	4.54	0.28	0.84	3.81	OK
CB8	1.14	0.013	12	0.79	3.14	0.25	0.020	5.04	OK	6.42	0.23	0.79	5.07	OK
DB1	7.45	0.013	12	0.79	3.14	0.25	0.010	3.62	NO GOOD	4.60	2.06	0.47	2.16	NO GOOD
DB2	2.72	0.013	12	0.79	3.14	0.25	0.050	7.97	OK	10.14	0.34	0.88	8.93	OK
DMH1	1.31	0.013	15	1.23	3.93	0.31	0.030	11.19	OK	9.12	0.12	0.63	5.74	OK
DMH10	1.28	0.013	24	3.14	6.28	0.50	0.013	25.79	OK	8.21	0.05	0.47	3.86	OK
DMH11	15.78	0.013	24	3.14	6.28	0.50	0.013	26.19	OK	8.34	0.60	1.04	8.67	OK
DMH12	2.72	0.013	15	1.23	3.93	0.31	0.043	13.46	OK	10.97	0.20	0.76	8.33	OK
DMH2	1.28	0.013	15	1.23	3.93	0.31	0.030	11.19	OK	9.12	0.11	0.60	5.47	OK
DMH3	1.97	0.013	15	1.23	3.93	0.31	0.010	6.46	OK	5.26	0.30	0.85	4.47	OK
DMH4	4.55	0.013	18	1.77	4.71	0.38	0.018	14.05	OK	7.95	0.32	0.86	6.84	OK
DMH5	2.72	0.013	15	1.23	3.93	0.31	0.020	9.14	OK	7.44	0.30	0.85	6.33	OK
DMH6	2.27	0.013	15	1.23	3.93	0.31	0.057	15.46	OK	12.60	0.15	0.68	8.57	OK
DMH7	4.90	0.013	18	1.77	4.71	0.38	0.039	20.82	OK	11.78	0.24	0.80	9.43	OK
DMH8	7.71	0.013	24	3.14	6.28	0.50	0.030	39.18	OK	12.47	0.20	0.76	9.48	OK
DMH9	10.52	0.013	24	3.14	6.28	0.50	0.020	31.99	OK	10.18	0.33	0.87	8.86	OK
IS1	2.60	0.013	12	0.79	3.14	0.25	0.039	6.99	OK	8.90	0.37	0.89	7.92	OK

Notes:
1. DB1 discharges to the existing 12" pipe in Hunting Lane. Use of a larger pipe would inundate the existing municipal system
2. Flow to CBs above equally distributed between indicated CB and its counterpart across the stree

ALLEN & MAJOR ASSOCIATES, INC.

Project No.	2513-02	**Sheet:**	1 of 3
Project Description:	Apple Hill Estates, Hunting Lane, Sherborn MA		
Calculated By:	SM	**Date**:	04-09-21
Checked By:		**Date:**	

ESTIMATION FOR PHOSPHORUS REMOVAL

Existing Condition Phosphorus Loading

Site Use	Phosphorus Load by Land Use (lbs/ac/yr)	Area (Acres)	Existing Phosphorus Load (lbs/yr)
Low Density Residential	0.30	0.87	0.26
Open Space	0.26	2.01	0.52
Forest	0.12	14.05	1.69
	Total	**16.93**	**2.47**

Phosphorus Reduction Requirement

Phosphorus Reduction Requirement =	Proposed Phosphorus Load x 18%*		
=	2.47	x	0.18
=	0.44	lbs/year	
Target Phosphorus Load	2.47	-	0.44
(Post Construction) =	**2.03**	**(Target Phosphorus Load)**	

*Table F-2, Appendix F, MA MS4 General Permit

Proposed Condition Phosphorus Loading

Site Use	Phosphorus Load by Land Use (lbs/ac/yr)	Area (Acres)	Proposed Phosphorus Load (lbs/yr)
High Density Residential	2.32	2.99	6.93
Open Space Soil Type B	0.12	1.57	0.19
Open Space Soil Type C	0.21	5.63	1.18
Open Space Soil Type D	0.37	0.55	0.20
Forest	0.13	6.20	0.81
	Total	**16.93**	**9.31**

Proposed Condition Phosphorus Loading Reduction

BMP	BMP (Appendix F Category)	Total Phosphorous Load to BMP (lbs/yr)***	BMP Removal %**	Phosphorus Removed by BMPs (lbs/year)
Drywells (All roof area)	Infiltration Trench	2.79	94%	2.62
DB-1	Bioretention Basin	2.99	44%	1.32
Jellyfish	Proprietary Filter	1.68	59%	0.99
DB-2	Bioretention Basin	1.49	59%	0.88
IS-1	Infiltration Basin	0.61	81%	0.50
Enhanced Sweeping Program Credit	-	-	-	0.33
Catch Basin Cleaning Credit	-	-	-	0.21
Urban Fertilizer Reduction	-	-	-	0.52
Note: See following pages for phosphorus removal calculations			**Total**	**7.36**

Proposed Load before reduction	**-**	**Loading Reduction**	**=Actual Constructed Phosphorus Load**	
Actual Constructed Phosphorus Load	9.31	-	7.36	**(Target Phosphorus Load)**
Actual Constructed Phosphorus Load	**1.94**	**lb/yr**	**compared to ----------->**	**2.03**	**TARGET IS MET**

Percent Phosphorus Removed =	Loading Reduction / Proposed Load before reduction x 100			
Percent Phosphorus Removed =	**79%**	**>**	**60%**	**TARGET IS MET**

ALLEN & MAJOR ASSOCIATES, INC.

Project No.	2513-02	**Sheet:** 2 of 3	
Project Description:	Apple Hill Estates, Hunting Lane, Sherborn MA		
Calculated By:	SM	**Date: 04-09-21**	
Checked By:		**Date:**	

Phosphorus Calculations Per BMP

	Phosphorus Load by Land Use (lbs/ac/yr)	Area (Acres)	Proposed Phosphorus Load (lbs/yr) (per BMP)			
Drywells (All roof area)				Area to Drywells	52,369	S.F.
High Density Residential	2.32	1.20	2.79	Volume Treated	4,120	C.F.
Open Space Soil Type B	0.12	0.00	0.00	Depth of runoff treated	0.9	IN.
Open Space Soil Type C	0.21	0.00	0.00	**BMP Removal %****	**94%**	
Open Space Soil Type D	0.37	0.00	0.00	**Table 3-9, Appendix F, MA MS4 General Permit		
Forest	0.13	0.00	0.00			
	total	**1.20**	**2.79**			

	Phosphorus Load by Land Use (lbs/ac/yr)	Area (Acres)	Proposed Phosphorus Load (lbs/yr) (per BMP)			
DB-1				Area to DB-1	193,448	S.F.
High Density Residential	2.32	1.01	2.34	Volume Treated	9,349	C.F.
Open Space Soil Type B	0.12	0.00	0.00	Depth of runoff treated	0.6	IN.
Open Space Soil Type C	0.21	2.55	0.54	**BMP Removal %****	**44%**	
Open Space Soil Type D	0.37	0.00	0.00	**Table 3-18, Appendix F, MA MS4 General Permit		
Forest	0.13	0.88	0.11			
	total	**4.44**	**2.99**			
Note: Area to DB-1 reduced by the amount of roof area already treated by the drywells						

	Phosphorus Load by Land Use (lbs/ac/yr)	Area (Acres)	Proposed Phosphorus Load (lbs/yr) (per BMP)			
DB-2				Area to DB-2	84,669	S.F.
High Density Residential	2.32	0.52	1.19	Volume Treated	11,111	C.F.
Open Space Soil Type B	0.12	0.01	0.00	Depth of runoff treated	1.6	IN.
Open Space Soil Type C	0.21	1.42	0.30	**BMP Removal %****	**59%**	
Open Space Soil Type D	0.37	0.00	0.00	**Table 3-18, Appendix F, MA MS4 General Permit		
Forest	0.13	0.00	0.00			
	total	**1.94**	**1.49**			
Note: Area to DB-2 reduced by the amount of roof area already treated by the drywells						

	Phosphorus Load by Land Use (lbs/ac/yr)	Area (Acres)	Proposed Phosphorus Load (lbs/yr) (per BMP)			
IS-1				Area to IS-1	84,669	S.F.
High Density Residential	2.32	0.52	1.19	Volume Treated	2,861	C.F.
Open Space Soil Type B	0.12	0.01	0.00	Depth of runoff treated	0.4	IN.
Open Space Soil Type C	0.21	1.42	0.30	**BMP Removal %****	**81%**	
Open Space Soil Type D	0.37	0.00	0.00	**Table 3-15, Appendix F, MA MS4 General Permit		
Forest	0.13	0.00	0.00			
	total	**1.94**	**1.49**			
Total after reduction provided by DB-2			**0.61**	**lbs/yr**		

Enhanced Sweeping Program Credit		
Ia_{swept} =	1.79	acres
$PLER_{IC\text{-}HDR}$ =	2.32	lb/acre/yr (for High Density Residential)
$PRF_{sweeping}$ =	0.08	(from Table 2-4, assumed monthly w/ regenerative air vacuum)
AF	1.00	12 months / 12 months
$Credit_{sweeping}$ =	$Ia_{swept} * PLER_{IC\text{-}HDR} * PRF_{sweeping} * AF$	
$Credit_{sweeping}$ =	**0.331**	**lb/yr**

ALLEN & MAJOR ASSOCIATES, INC.

Project No.	2513-02
Sheet:	3 of 3
Project Description:	Apple Hill Estates, Hunting Lane, Sherborn MA
Calculated By:	SM
Date:	04-09-21
Checked By:	
Date:	

Catch Basin Cleaning Credit			
Ia_{CB} =	1.79	acres	
PLER $_{IC-HDR}$ =	2.32	lb/acre/yr (for High Density Residential)	
PRF $_{CB}$ =	0.05	(from Table 2-5)	
Credit $_{sweeping}$ =	Ia_{CB} * PLER $_{IC-HDR}$ * PRF_{CB}		
Credit $_{sweeping}$ =	**0.207**	**lb/yr**	

Urban Fertilizer Reduction	Soil Type (Open Space, Acres)		
	B	C	D
Area $_{each\ soil\ type}$ =	1.57	5.63	0.55
PLER $_{each\ soil\ type}$ =	0.12	0.21	0.37
Reduction Factor	33%	(from Section 2.4, Summary of Potential BMPs for Phosphorus Reduction, Sherborn, MA)	
Credit $_{fertilizer}$ =	Area $_{each\ soil\ type}$ * PLER $_{each\ soil\ type}$ * 0.33		
Credit $_{fertilizer}$ =	**0.52**	**lb/yr**	

Stage-Area-Storage for Pond 1P: drywells

Elevation (feet)	Wetted (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Wetted (sq-ft)	Storage (cubic-feet)
250.00	539	0	255.30	2,079	1,563
250.10	570	22	255.40	2,079	1,563
250.20	601	43	255.50	2,079	1,563
250.30	631	65	255.60	2,079	1,563
250.40	662	86	255.70	2,079	1,563
250.50	693	108	255.80	2,079	1,563
250.60	724	141	255.90	2,079	1,563
250.70	755	175	256.00	2,079	1,563
250.80	785	209	256.10	2,079	1,563
250.90	816	243	256.20	2,079	1,563
251.00	847	276	256.30	2,079	1,563
251.10	878	310			
251.20	909	344			
251.30	939	377			
251.40	970	411			
251.50	1,001	445			
251.60	1,032	478			
251.70	1,063	512			
251.80	1,093	546			
251.90	1,124	579			
252.00	1,155	613			
252.10	1,186	647			
252.20	1,217	680			
252.30	1,247	714			
252.40	1,278	748			
252.50	1,309	781			
252.60	1,340	815			
252.70	1,371	849			
252.80	1,401	882			
252.90	1,432	916			
253.00	1,463	950			
253.10	1,494	983			
253.20	1,525	1,017			
253.30	1,555	1,051			
253.40	1,586	1,084			
253.50	1,617	1,118			
253.60	1,648	1,152			
253.70	1,679	1,185			
253.80	1,709	1,219			
253.90	1,740	1,253			
254.00	1,771	1,286			
254.10	1,802	1,320			
254.20	1,833	1,354			
254.30	1,863	1,388			
254.40	1,894	1,421			
254.50	1,925	1,455			
254.60	1,956	1,476			
254.70	1,987	1,498			
254.80	2,017	1,520			
254.90	2,048	1,541			
255.00	**2,079**	**1,563**			
255.10	2,079	1,563			
255.20	2,079	1,563			

Stage-Area-Storage for Pond 2P: drywells

Elevation (feet)	Wetted (sq-ft)	Storage (cubic-feet)
218.00	392	0
218.10	414	16
218.20	437	31
218.30	459	47
218.40	482	63
218.50	504	78
218.60	526	103
218.70	549	127
218.80	571	152
218.90	594	176
219.00	616	201
219.10	638	225
219.20	661	250
219.30	683	274
219.40	706	299
219.50	728	323
219.60	750	348
219.70	773	372
219.80	795	397
219.90	818	421
220.00	840	446
220.10	862	470
220.20	885	495
220.30	907	519
220.40	930	544
220.50	952	568
220.60	974	593
220.70	997	617
220.80	1,019	642
220.90	1,042	666
221.00	1,064	691
221.10	1,086	715
221.20	1,109	740
221.30	1,131	764
221.40	1,154	789
221.50	1,176	813
221.60	1,198	838
221.70	1,221	862
221.80	1,243	887
221.90	1,266	911
222.00	1,288	936
222.10	1,310	960
222.20	1,333	985
222.30	1,355	1,009
222.40	1,378	1,034
222.50	1,400	1,058
222.60	1,422	1,074
222.70	1,445	1,089
222.80	1,467	1,105
222.90	1,490	1,121
223.00	**1,512**	**1,136**
223.10	1,512	1,136
223.20	1,512	1,136
223.30	1,512	1,136
223.40	1,512	1,136
223.50	1,512	1,136
223.60	1,512	1,136
223.70	1,512	1,136
223.80	1,512	1,136
223.90	1,512	1,136
224.00	1,512	1,136
224.10	1,512	1,136
224.20	1,512	1,136
224.30	1,512	1,136

Stage-Area-Storage for Pond 3P: drywells

Elevation (feet)	Wetted (sq-ft)	Storage (cubic-feet)
220.00	490	0
220.10	518	20
220.20	546	39
220.30	574	59
220.40	602	78
220.50	630	98
220.60	658	129
220.70	686	159
220.80	714	190
220.90	742	220
221.00	770	251
221.10	798	282
221.20	826	312
221.30	854	343
221.40	882	374
221.50	910	404
221.60	938	435
221.70	966	465
221.80	994	496
221.90	1,022	527
222.00	1,050	557
222.10	1,078	588
222.20	1,106	618
222.30	1,134	649
222.40	1,162	680
222.50	1,190	710
222.60	1,218	741
222.70	1,246	772
222.80	1,274	802
222.90	1,302	833
223.00	1,330	863
223.10	1,358	894
223.20	1,386	925
223.30	1,414	955
223.40	1,442	986
223.50	1,470	1,016
223.60	1,498	1,047
223.70	1,526	1,078
223.80	1,554	1,108
223.90	1,582	1,139
224.00	1,610	1,170
224.10	1,638	1,200
224.20	1,666	1,231
224.30	1,694	1,261
224.40	1,722	1,292
224.50	1,750	1,323
224.60	1,778	1,342
224.70	1,806	1,362
224.80	1,834	1,381
224.90	1,862	1,401
225.00	**1,890**	**1,421**
225.10	1,890	1,421
225.20	1,890	1,421
225.30	1,890	1,421
225.40	1,890	1,421
225.50	1,890	1,421
225.60	1,890	1,421
225.70	1,890	1,421
225.80	1,890	1,421
225.90	1,890	1,421
226.00	1,890	1,421
226.10	1,890	1,421
226.20	1,890	1,421
226.30	1,890	1,421
226.40	1,890	1,421
226.50	1,890	1,421
226.60	1,890	1,421
226.70	1,890	1,421
226.80	1,890	1,421

Stage-Area-Storage for Pond DB1: DB1 (continued)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
207.09	2,183	207.62	3,941	208.15	5,965
207.10	2,214	207.63	3,976	208.16	6,006
207.11	2,245	207.64	4,012	208.17	6,048
207.12	2,276	207.65	4,048	208.18	6,089
207.13	2,307	207.66	4,084	208.19	6,130
207.14	2,338	207.67	4,120	208.20	6,171
207.15	2,369	207.68	4,156	208.21	6,213
207.16	2,400	207.69	4,192	208.22	6,255
207.17	2,432	207.70	4,229	208.23	6,296
207.18	2,463	207.71	4,265	208.24	6,338
207.19	2,495	207.72	4,302	208.25	6,380
207.20	2,527	207.73	4,338	208.26	6,422
207.21	2,559	207.74	4,375	208.27	6,464
207.22	2,590	207.75	4,412	208.28	6,507
207.23	2,622	207.76	4,449	208.29	6,549
207.24	2,654	207.77	4,486	208.30	6,592
207.25	2,687	207.78	4,523	208.31	6,634
207.26	2,719	207.79	4,560	208.32	6,677
207.27	2,751	207.80	4,597	208.33	6,720
207.28	2,784	207.81	4,635	208.34	6,763
207.29	2,816	207.82	4,672	208.35	6,806
207.30	2,849	207.83	4,710	208.36	6,849
207.31	2,881	207.84	4,748	208.37	6,892
207.32	2,914	207.85	4,785	208.38	6,936
207.33	2,947	207.86	4,823	208.39	6,979
207.34	2,980	207.87	4,861	208.40	7,023
207.35	3,013	207.88	4,899	208.41	7,066
207.36	3,046	207.89	4,937	208.42	7,110
207.37	3,080	207.90	4,976	208.43	7,154
207.38	3,113	207.91	5,014	208.44	7,198
207.39	3,146	207.92	5,053	208.45	7,242
207.40	3,180	207.93	5,091	208.46	7,287
207.41	3,213	207.94	5,130	208.47	7,331
207.42	3,247	207.95	5,169	208.48	7,376
207.43	3,281	207.96	5,207	208.49	7,420
207.44	3,315	207.97	5,246	208.50	7,465
207.45	3,349	207.98	5,285	208.51	7,510
207.46	3,383	207.99	5,325	208.52	7,555
207.47	3,417	208.00	5,364	208.53	7,600
207.48	3,451	208.01	5,403	208.54	7,645
207.49	3,486	208.02	5,443	208.55	7,690
207.50	3,520	208.03	5,482	208.56	7,736
207.51	3,555	208.04	5,522	208.57	7,781
207.52	3,589	208.05	5,562	208.58	7,827
207.53	3,624	208.06	5,602	208.59	7,873
207.54	3,659	208.07	5,642	208.60	7,919
207.55	3,694	208.08	5,682	208.61	7,965
207.56	3,729	208.09	5,722	208.62	8,011
207.57	3,764	208.10	5,762	208.63	8,057
207.58	3,799	208.11	5,803	208.64	8,103
207.59	3,834	208.12	5,843	208.65	8,150
207.60	3,870	208.13	5,884	208.66	8,196
207.61	3,905	208.14	5,925	208.67	8,243

Stage-Area-Storage for Pond DB2: DB2 (continued)

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
247.50	6,517	248.03	8,441	248.56	10,695
247.51	6,550	248.04	8,481	248.57	10,740
247.52	6,584	248.05	8,520	248.58	10,786
247.53	6,617	248.06	8,560	248.59	10,832
247.54	6,651	248.07	8,599	248.60	10,879
247.55	6,685	248.08	8,639	248.61	10,925
247.56	6,719	248.09	8,679	248.62	10,971
247.57	6,753	248.10	8,720	248.63	11,018
247.58	6,787	248.11	8,760	248.64	11,065
247.59	6,821	248.12	8,800	248.65	11,111
247.60	6,856	248.13	8,841	248.66	11,158
247.61	6,890	248.14	8,881	248.67	11,205
247.62	6,925	248.15	8,922	248.68	11,253
247.63	6,959	248.16	8,963	248.69	11,300
247.64	6,994	248.17	9,004	248.70	11,347
247.65	7,029	248.18	9,045	248.71	11,395
247.66	7,064	248.19	9,086	248.72	11,443
247.67	7,099	248.20	9,127	248.73	11,490
247.68	7,135	248.21	9,169	248.74	11,538
247.69	7,170	248.22	9,210	248.75	11,586
247.70	7,205	248.23	9,252	248.76	11,635
247.71	7,241	248.24	9,294	248.77	11,683
247.72	7,277	248.25	9,336	248.78	11,732
247.73	7,313	248.26	9,378	248.79	11,780
247.74	7,349	248.27	9,420	248.80	11,829
247.75	7,385	248.28	9,462	248.81	11,878
247.76	7,421	248.29	9,504	248.82	11,927
247.77	7,457	248.30	9,547	248.83	11,976
247.78	7,493	248.31	9,589	248.84	12,025
247.79	7,530	248.32	9,632	248.85	12,074
247.80	7,567	248.33	9,675	248.86	12,124
247.81	7,603	248.34	9,718	248.87	12,174
247.82	7,640	248.35	9,761	248.88	12,223
247.83	7,677	248.36	9,804	248.89	12,273
247.84	7,714	248.37	9,848	248.90	12,323
247.85	7,751	248.38	9,891	248.91	12,373
247.86	7,789	248.39	9,935	248.92	12,424
247.87	7,826	248.40	9,978	248.93	12,474
247.88	7,864	248.41	10,022	248.94	12,525
247.89	7,901	248.42	10,066	248.95	12,575
247.90	7,939	248.43	10,110	248.96	12,626
247.91	7,977	248.44	10,154	248.97	12,677
247.92	8,015	248.45	10,199	248.98	12,728
247.93	8,053	248.46	10,243	248.99	12,779
247.94	8,092	248.47	10,288	249.00	12,831
247.95	8,130	248.48	10,333	249.01	12,882
247.96	8,168	248.49	10,377	249.02	12,934
247.97	8,207	248.50	10,422	249.03	12,986
247.98	8,246	248.51	10,467	249.04	13,037
247.99	8,285	248.52	10,513	249.05	13,089
248.00	8,324	248.53	10,558	249.06	13,142
248.01	8,363	248.54	10,603	249.07	13,194
248.02	8,402	248.55	10,649	249.08	13,246

Stage-Area-Storage for Pond is1: infiltration pipe (continued)

Elevation (feet)	Wetted (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Wetted (sq-ft)	Storage (cubic-feet)
222.12	2,708	2,388	222.65	2,992	3,045
222.13	2,714	2,401	222.66	2,998	3,057
222.14	2,719	2,413	222.67	3,003	3,069
222.15	2,724	2,426	222.68	3,008	3,081
222.16	2,730	2,438	222.69	3,014	3,094
222.17	2,735	2,451	222.70	3,019	3,106
222.18	2,740	2,463	222.71	3,025	3,118
222.19	2,746	2,476	222.72	3,030	3,130
222.20	2,751	2,488	222.73	3,035	3,142
222.21	2,757	2,501	222.74	3,041	3,154
222.22	2,762	2,513	222.75	3,046	3,166
222.23	2,767	2,526	222.76	3,051	3,178
222.24	2,773	2,538	222.77	3,057	3,190
222.25	2,778	2,551	222.78	3,062	3,202
222.26	2,783	2,563	222.79	3,067	3,214
222.27	2,789	2,576	222.80	3,073	3,226
222.28	2,794	2,588	222.81	3,078	3,238
222.29	2,799	2,600	222.82	3,084	3,250
222.30	2,805	2,613	222.83	3,089	3,262
222.31	2,810	2,625	222.84	3,094	3,274
222.32	2,816	2,638	222.85	3,100	3,286
222.33	2,821	2,650	222.86	3,105	3,298
222.34	2,826	2,663	222.87	3,110	3,310
222.35	2,832	2,675	222.88	3,116	3,322
222.36	2,837	2,688	222.89	3,121	3,334
222.37	2,842	2,700	222.90	3,126	3,346
222.38	2,848	2,712	222.91	3,132	3,358
222.39	2,853	2,725	222.92	3,137	3,369
222.40	2,858	2,737	222.93	3,142	3,381
222.41	2,864	2,750	222.94	3,148	3,393
222.42	2,869	2,762	222.95	3,153	3,405
222.43	2,874	2,774	222.96	3,159	3,417
222.44	2,880	2,787	222.97	3,164	3,428
222.45	2,885	2,799	222.98	3,169	3,440
222.46	2,891	2,812	222.99	3,175	3,452
222.47	2,896	2,824	223.00	3,180	3,464
222.48	2,901	2,836	223.01	3,185	3,475
222.49	2,907	2,849	223.02	3,191	3,487
222.50	2,912	2,861	223.03	3,196	3,498
222.51	2,917	2,873	223.04	3,201	3,510
222.52	2,923	2,886	223.05	3,207	3,522
222.53	2,928	2,898	223.06	3,212	3,533
222.54	2,933	2,910	223.07	3,218	3,545
222.55	2,939	2,922	223.08	3,223	3,556
222.56	2,944	2,935	223.09	3,228	3,568
222.57	2,950	2,947	223.10	3,234	3,579
222.58	2,955	2,959	223.11	3,239	3,591
222.59	2,960	2,972	223.12	3,244	3,602
222.60	2,966	2,984	223.13	3,250	3,614
222.61	2,971	2,996	223.14	3,255	3,625
222.62	2,976	3,008	223.15	3,260	3,637
222.63	2,982	3,020	223.16	3,266	3,648
222.64	2,987	3,033	223.17	3,271	3,659

CONTECH ENGINEERED SOLUTIONS

CONTECH Stormwater Solutions Inc. Engineer	JBS
Date Prepared:	**4/8/2021**

Site Information

Project Name	**Apple Hill Estates**
Project State	**MA**
Project City	**Sherborn**

Filter System

Filtration Brand	**Jelly Fish**
Cartridge Length	**54** in

Jelly Fish Sizing

Water Quality Flow (Orifice Controlled)	**2.41** cfs

Method to Use **FLOW BASED**

Summary		
Flow	Treatment Flow Rate	2.58 cfs
	Required Size	**JFPD0808-13-3**

Table 3- 9: Infiltration Trench (IR = 1.02 in/hr) BMP Performance Table

Infiltration Trench (IR = 1.02 in/hr) BMP Performance Table: Long-Term Phosphorus & Nitrogen Load Reduction								
BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	26.3%	44.6%	68.2%	81.0%	88.0%	92.1%	96.5%	98.3%
Cumulative Phosphorus Load Reduction	27%	47%	73%	86%	92%	96%	99%	100%
Cumulative Nitrogen Load Reduction	61%	78%	92%	97%	98%	99%	100%	100%

Figure 3- 4: BMP Performance Curve: Infiltration Trench (infiltration rate = 1.02 in/hr)

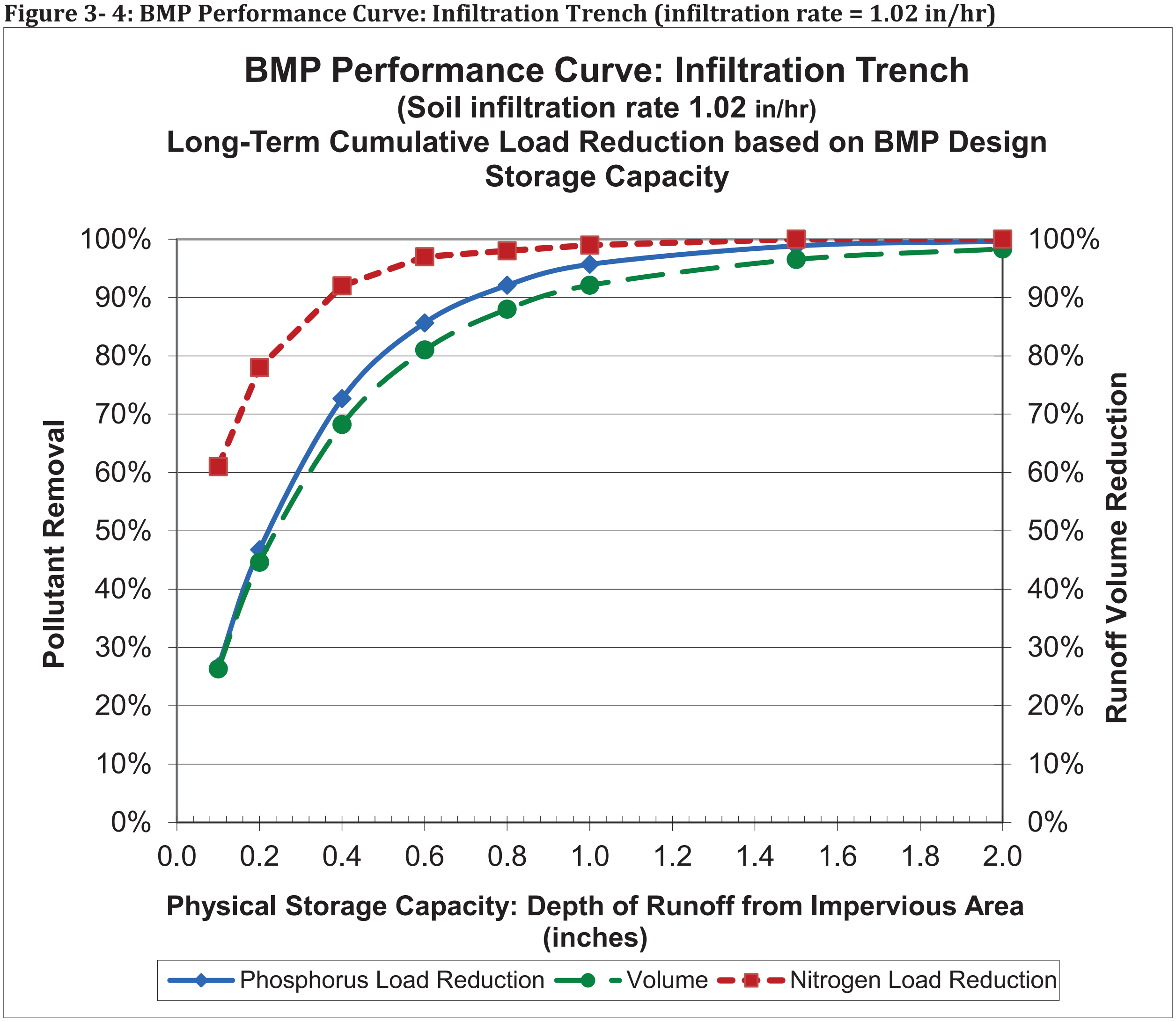


Table 3-15: Infiltration Basin (1.02 in/hr) BMP Performance Table

Surface Infiltration (1.02 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	24.5%	42.0%	65.6%	79.4%	86.8%	91.3%	96.2%	98.1%
Cumulative Phosphorus Load Reduction	41%	60%	81%	90%	94%	97%	99%	100%
Cumulative Nitrogen Load Reduction	59%	77%	92%	96%	98%	100%	100%	100%

Figure 3- 10: BMP Performance Curve: Surface Infiltration (Soil infiltration rate = 1.02 in/hr)

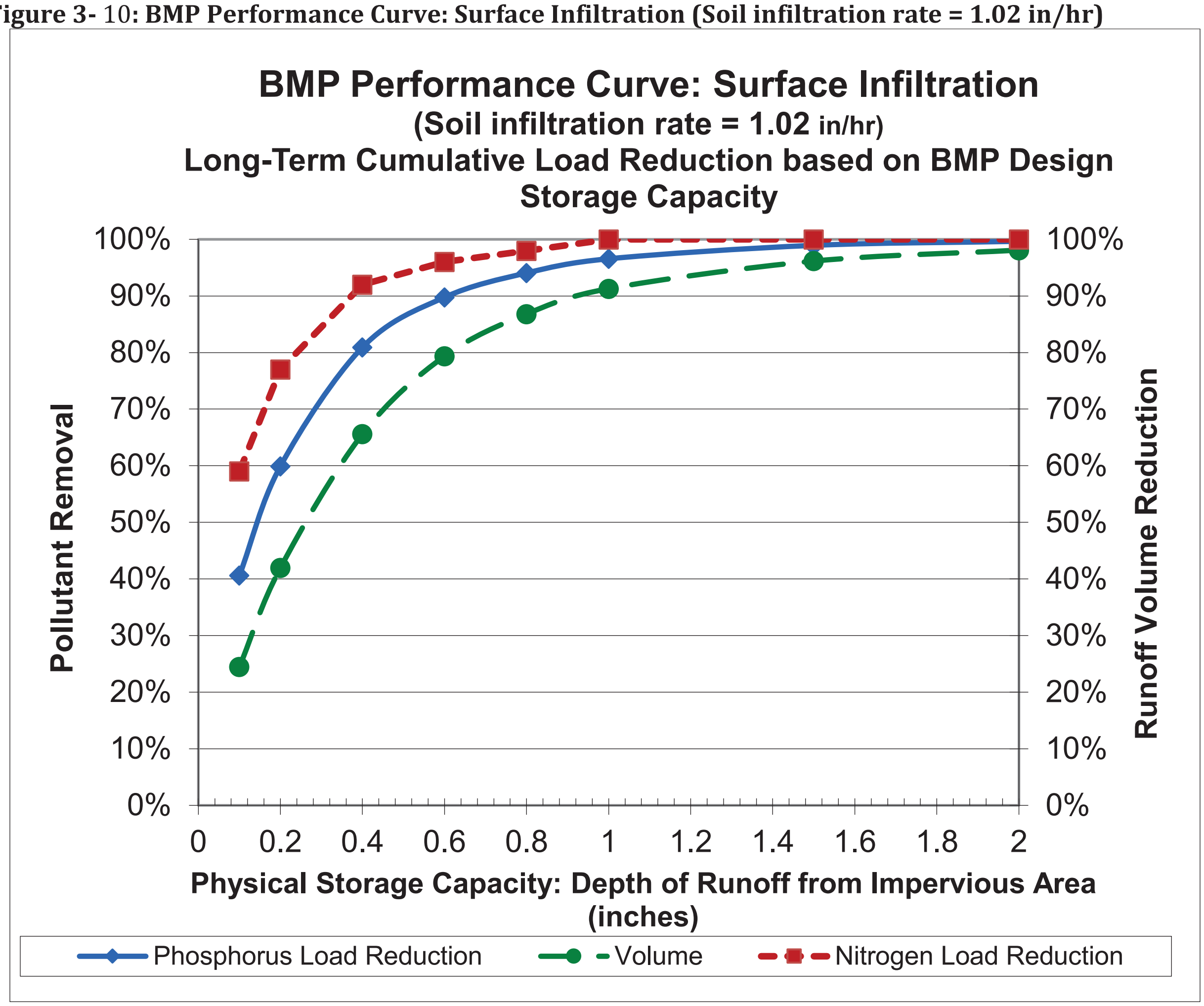
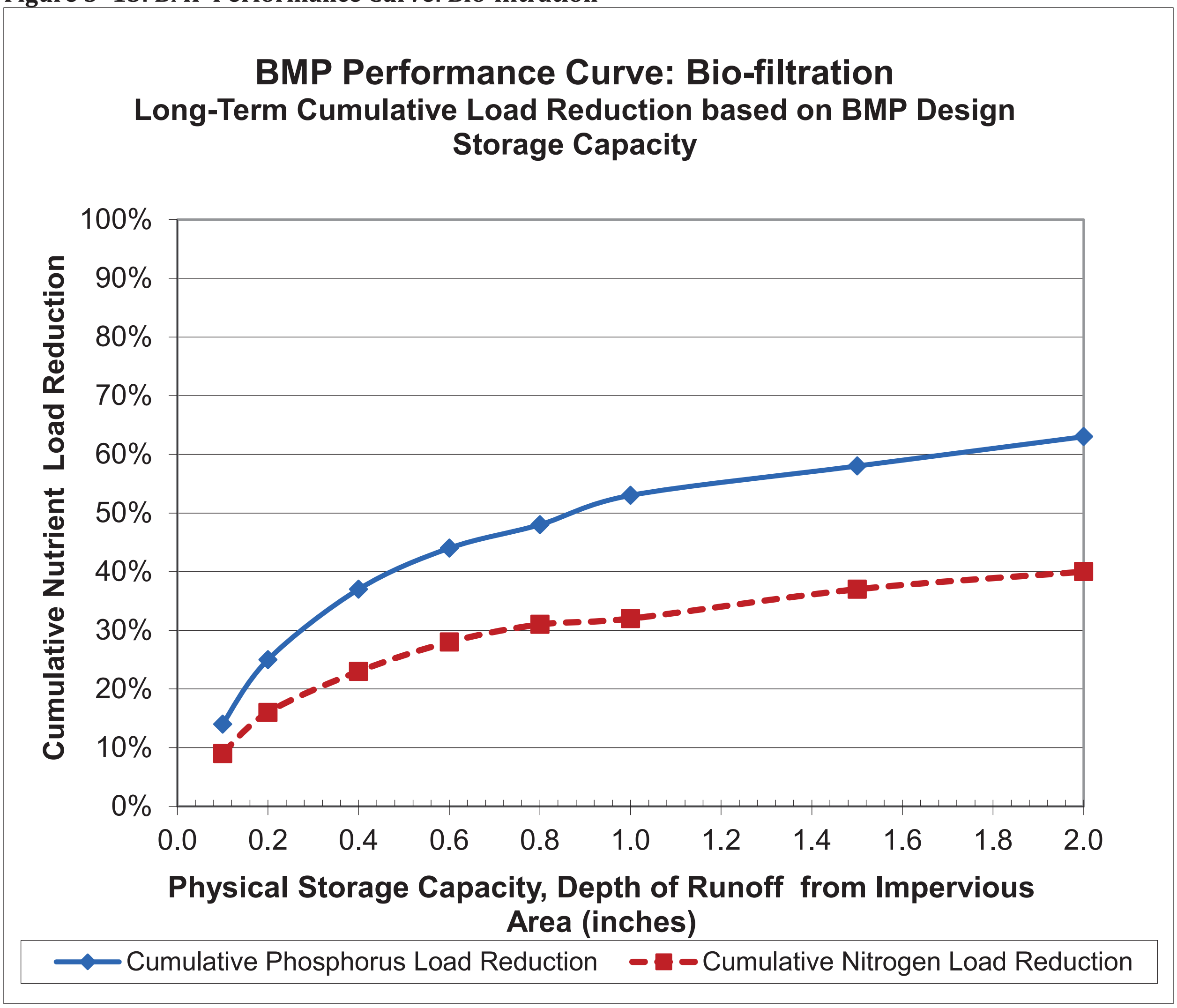


Table 3-18: Bio-filtration BMP Performance Table

Bio-filtration BMP Performance Table: Long-Term Phosphorus & Nitrogen Load Reduction								
BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Cumulative Phosphorus Load Reduction	14%	25%	37%	44%	48%	53%	58%	63%
Cumulative Nitrogen Load Reduction	9%	16%	23%	28%	31%	32%	37%	40%

Figure 3- 13: BMP Performance Curve: Bio-filtration



(1) Enhanced Sweeping Program: The permittee may earn a phosphorus and/or nitrogen reduction credit(s) for conducting an enhanced sweeping program of impervious surfaces. Table 2-4 below outlines the default nutrient removal factors for enhanced sweeping programs. The credit shall be calculated by using the following equations:

Phosphorus $Credit_{P\ sweeping} = IA_{swept} \times PLER_{IC\text{-}land\ use} \times PRF_{sweeping} \times AF$ **(Equation 2-1)**

Nitrogen $Credit_{N\ sweeping} = IA_{swept} \times NLER_{IC\text{-}land\ use} \times NRF_{sweeping} \times AF$ **(Equation 2-2)**

Where:

$Credit_{sweeping}$	=	Amount of nutrient load removed by enhanced sweeping program (lb/year)
IA_{swept}	=	Area of impervious surface that is swept under the enhanced sweeping program (acres)
$PLER_{IC\text{-}land\ use}$	=	Phosphorus Load Export Rate for impervious cover and specified land use (lb/acre/yr) (see Table 2-1)
$NLER_{IC\text{-}land\ use}$	=	Nitrogen Load Export Rate for impervious cover and specified land use (lb./acre/yr.) (see Table 2-2)
$PRF_{sweeping}$	=	Phosphorus Reduction Factor for sweeping based on sweeper type and frequency (see Table 2-4).
$NRF_{sweeping}$	=	Nitrogen Reduction Factor for sweeping based on sweeper type and frequency (see Table 2-4).
AF	=	Annual Frequency of sweeping. For example, if sweeping does not occur in Dec/Jan/Feb, the AF would be 9 mo./12 mo. = 0.75. For year-round sweeping, AF=1.0[1]

As an alternative, the permittee may apply a credible sweeping model of the Watershed and perform continuous simulations reflecting build-up and wash-off of phosphorus or nitrogen using long-term local rainfall data.

Table 2-4: Nutrient reduction efficiency factors for sweeping impervious areas

Frequency[1]	Sweeper Technology	PRF sweeping	NFR sweeping
2/year (spring and fall)[2]	Mechanical Broom	0.01	0.01
2/year (spring and fall)[2]	Vacuum Assisted	0.02	0.02
2/year (spring and fall)[2]	High-Efficiency Regenerative Air-Vacuum	0.02	0.02
Monthly	Mechanical Broom	0.03	0.03
Monthly	Vacuum Assisted	0.04	0.04
Monthly	High Efficiency Regenerative Air-Vacuum	0.08	0.08
Weekly	Mechanical Broom	0.05	0.06
Weekly	Vacuum Assisted	0.08	0.07
Weekly	High Efficiency Regenerative Air-Vacuum	0.10	0.10

[1]For full credit for monthly and weekly frequency, sweeping must be conducted year round. Otherwise, the credit should be adjusted proportionally based on the duration of the sweeping season (using AF factor).

[2] In order to earn credit for semi-annual sweeping the sweeping must occur in the spring following snow-melt and road sand applications to impervious surfaces and in the fall after leaf-fall and prior to the onset to the snow season.

(2) Catch Basin Cleaning: The permittee may earn phosphorus and/or nitrogen reduction credit(s) by removing accumulated materials from catch basins (i.e., catch basin cleaning) in the Watershed such that a minimum sump storage capacity of 50% is maintained throughout the year. The credits shall be calculated by using the following equations:

$$\text{Credit}_{P\ CB} = IA_{CB} \text{ x } PLER_{IC\text{-land use}} \text{ x } PRF_{CB} \qquad \textbf{(Equation 2-3)}$$

$$\text{Credit}_{N\ CB} = IA_{CB} \text{ x } NLER_{IC\text{-land use}} \text{ x } NRF_{CB} \qquad \textbf{(Equation 2-4)}$$

Where:

Credit $_{CB}$ = Amount of nutrient load removed by catch basin cleaning (lb/year)
IA $_{CB}$ = Impervious drainage area to catch basins (acres)
PLER $_{IC\text{-and use}}$ = Phosphorus Load Export Rate for impervious cover and specified land use (lb/acre/yr) (see Table 2-1)
NLER $_{IC\text{-land use}}$ = Nitrogen Load Export Rate for impervious cover and specified land use (lb./acre/yr.) (see Table 2-2)
PRF $_{CB}$ = Phosphorus Reduction Factor for catch basin cleaning (see Table 2-5)
NRF $_{CB}$ = Nitrogen Reduction Factor for catch basin cleaning (See Table 2-5)

Table 2-5: Nutrient reduction efficiency factors for semi-annual catch basin cleaning

Frequency	Practice	PRF $_{CB}$	NRF $_{CB}$
Semi-annual	Catch Basin Cleaning	0.02	0.06

Example 2-2: Calculation for catch basin cleaning credit (Credit $_{CB}$):

Commonwealth of Massachusetts
City/Town of Sherborn

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Barsky Esate Realty Trust
Owner Name

31 Hunting Lane
Street Address

Map 1 / Lot 3C
Map/Lot #

Sherborn
City

MA
State

01770
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: USDA NRCS (Source) 307C (Soil Map Unit)

   Paxton Fine Sandy Loam (Soil Name) None (Soil Limitations)

   Compact Till (Soil Parent material) Hill (Landform)

3. Surficial Geological Report Available? ☐ Yes ☒ No If yes: ______ Year Published/Source ______ Map Unit

   Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: N/A (Wetland Type)

7. Current Water Resource Conditions (USGS): March/31/2021 (Month/Day/ Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed: Topographic survey performed by Allen & Major Associates, July 2020

Commonwealth of Massachusetts
City/Town of Sherborn

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP1 (Hole #) 03-31-21 (Date) 8:30 a.m. (Time) Clear, 50 degrees (Weather) 42.249835 (Latitude) -71.3741393 (Longitude:)

1. Land Use Residential Property (e.g., woodland, agricultural field, vacant lot, etc.) Lawn (Vegetation) Few (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 4% (Slope (%))

   Description of Location: __________

2. Soil Parent Material: Compact Till Hill (Landform) __________ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >200 feet Drainage Way >100 feet Wetlands >100 feet
   Property Line 52 feet Drinking Water Well >100 feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 24" Depth Weeping from Pit 60" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10"	Ap	Loamy Sand	10YR 2/1						Massive Friable	Dry	
10-18"	Bw	Loamy Sand	10YR 4/6						Massive Friable	Dry	
18-66"	C	Loamy Sand	2.5Y 5/4	18"	7.5YR 5/6 2.5Y 7/2	5%			Massive Friable	Dry to Moist	

Additional Notes:

Commonwealth of Massachusetts
City/Town of Sherborn

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # TP1	Obs. Hole # _____
☒ Depth observed standing water in observation hole	60 inches	_____ inches
☒ Depth weeping from side of observation hole	24 inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	18 inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

Index Well Number ____________ Reading Date ____________

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: 18 inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 10 inches Lower boundary: 66 inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Sherborn

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

	03-31-2021
Signature of Soil Evaluator	Date
Brian D. Jones, P.E., S.E. #2731	06-30-2022
Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License
No witness, performed for stormwater management	Performed for stormwater management
Name of Approving Authority Witness	Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Test pit locations shown on Apple Hill Estates Grading & Drainage Plan

Commonwealth of Massachusetts
City/Town of Sherborn

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Barsky Esate Realty Trust
Owner Name

31 Hunting Lane
Street Address

Map 1 / Lot 3C
Map/Lot #

Sherborn
City

MA
State

01770
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Soil Survey Available? ☒ Yes ☐ No If yes: USDA NRCS (Source) 307C (Soil Map Unit)

   Paxton Fine Sandy Loam (Soil Name) None (Soil Limitations)

   Compact Till (Soil Parent material) Hill (Landform)

3. Surficial Geological Report Available? ☐ Yes ☒ No If yes: ______ Year Published/Source ______ Map Unit

   ______ Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: N/A (Wetland Type)

7. Current Water Resource Conditions (USGS): March/31/2021 (Month/Day/ Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed: Topographic survey performed by Allen & Major Associates, July 2020

Commonwealth of Massachusetts
City/Town of Sherborn

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP2 (Hole #) | 03-31-21 (Date) | 9:30 a.m. (Time) | Clear, 50 degrees (Weather) | 42.2487096 (Latitude) | -71.3750758 (Longitude:)

1. Land Use: Residential Property (e.g., woodland, agricultural field, vacant lot, etc.) | wooded (Vegetation) | Few (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 10% (Slope (%))

   Description of Location: ______

2. Soil Parent Material: Compact Till | Hill (Landform) | ______ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >200 feet | Drainage Way >100 feet | Wetlands >100 feet
   Property Line 48 feet | Drinking Water Well >100 feet | Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No | If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No | If yes: 50" Depth Weeping from Pit | None Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10"	Ap	Loamy Sand	10YR 2/1						Massive Friable	Dry	
10-18"	Bw	Loamy Sand	10YR 4/6						Massive Friable	Dry	
18-44"	C1	Loamy Sand	2.5Y 5/4	42"	7.5YR 5/6 2.5Y 7/2	5%			Massive Friable	Dry	
44"-72"	C2	Sandy Loam	2.5Y 5/3					10%	Massive Firm	Dry to Moist	Compact in Place

Additional Notes:
Test pit performed for stormwater management

Commonwealth of Massachusetts
City/Town of Sherborn

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP3 (Hole #) | 03-31-21 (Date) | 10:00 a.m. (Time) | Clear, 55 degrees (Weather) | 42.2487096 (Latitude) | -71.3750758 (Longitude:)

1. Land Use: Residential Property (e.g., woodland, agricultural field, vacant lot, etc.) | wooded (Vegetation) | Few (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | 10% (Slope (%))

   Description of Location: See Apple Tree Esates Grading & Drainage Plan

2. Soil Parent Material: Compact Till | Hill (Landform) | ______ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >200 feet; Drainage Way >100 feet; Wetlands >100 feet; Property Line 80 feet; Drinking Water Well >100 feet; Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No   If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No   If yes: 60" Depth Weeping from Pit   None Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10"	Ap	Loamy Sand	10YR 2/1						Massive Friable	Dry	
10-18"	Bw	Loamy Sand	10YR 4/6						Massive Friable	Dry	
18-50"	C1	Loamy Sand	2.5Y 5/4	48"	7.5YR 5/6 2.5Y 7/2	5%		10%	Massive Friable	Dry	
50-76"	C2	Sandy Loam	2.5Y 5/3						Massive Firm	Dry to Moist	Compact in place

Additional Notes:
Test pit performed for stormwater management

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used: Obs. Hole # TP2 Obs. Hole # TP3

Method	Obs. Hole # TP2	Obs. Hole # TP3
☒ Depth observed standing water in observation hole	None inches	None inches
☒ Depth weeping from side of observation hole	50 inches	60 inches
☒ Depth to soil redoximorphic features (mottles)	42 inches	48 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

Index Well Number ______ Reading Date ______

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: 42 inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: 10 inches Lower boundary: 72 inches

c. If no, at what depth was impervious material observed? Upper boundary: ______ inches Lower boundary: ______ inches

Commonwealth of Massachusetts
City/Town of Sherborn

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

	03-31-2021
Signature of Soil Evaluator	Date
Brian D. Jones, P.E., S.E. #2731	06-30-2022
Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License
No witness, performed for stormwater management	None, performed for stormwater management
Name of Approving Authority Witness	Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Test pit locations shown on Apple Hill Estates Grading & Drainage Plan

SECTION 6.0

WATERSHED PLANS

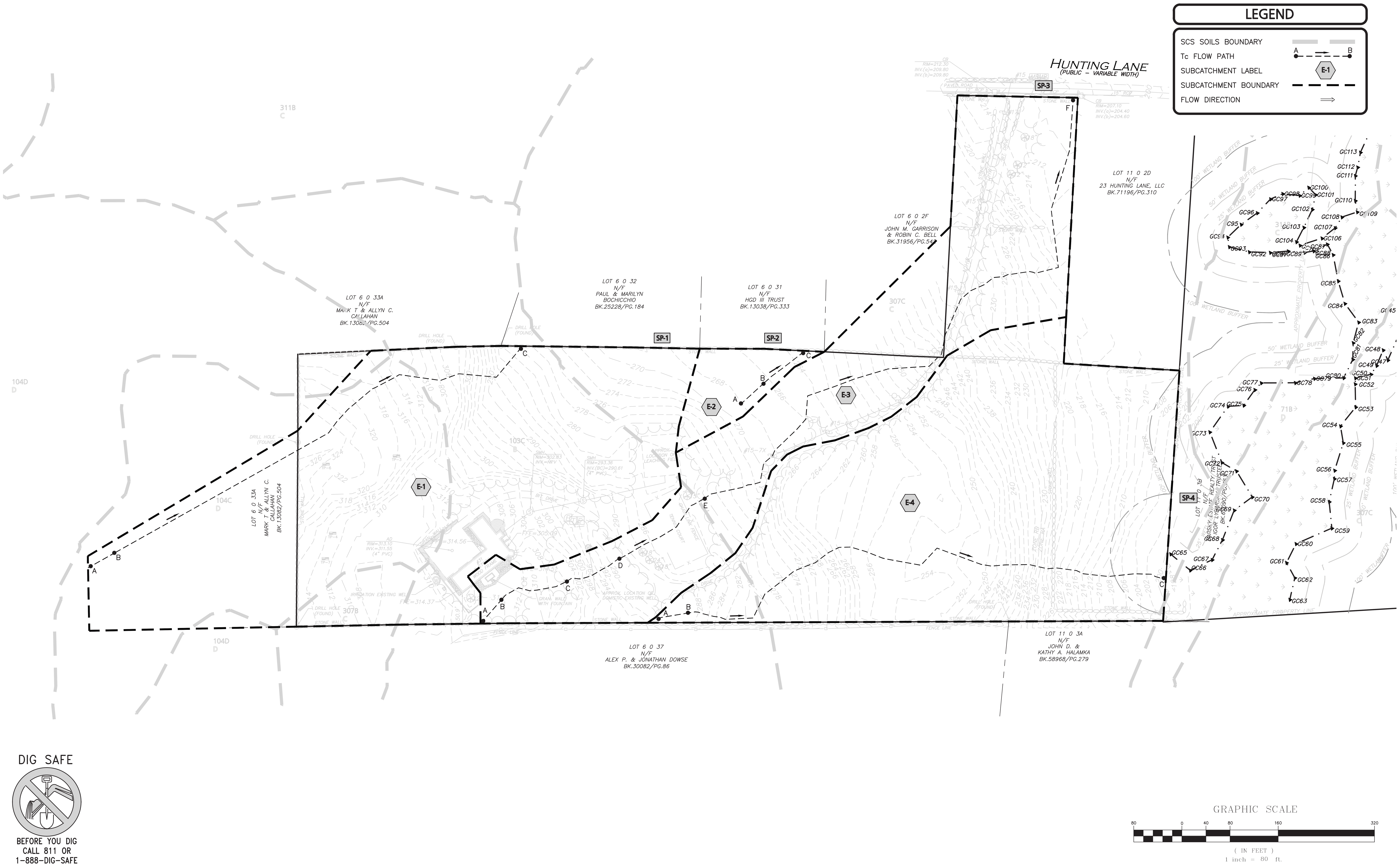
NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

2. THE CONTRACTOR SHALL CONTACT "DIGSAFE" AND THE TOWN OF SHERBORN DEPARTMENT OF PUBLIC WORKS AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION WORK TO REQUEST THE LOCATION OF THE EXISTING UTILITIES.

   DIGSAFE: 1-800-344-7233
   SHERBORN DEPARTMENT OF PUBLIC WORKS: 508-651-7878

3. THE INFORMATION SHOWN ON THIS PLAN IS THE SOLE PROPERTY OF ALLEN & MAJOR ASSOCIATES, INC. ITS INTENDED USE IS TO PROVIDE INFORMATION. ANY ALTERATION, MISUSE, OR RECALCULATION OF INFORMATION OR DATA WITHOUT THE EXPRESSED, WRITTEN CONSENT OF ALLEN & MAJOR ASSOCIATES, INC. IS STRICTLY PROHIBITED.



DIG SAFE

BEFORE YOU DIG
CALL 811 OR
1-888-DIG-SAFE
1-888-344-7233

R:\PROJECTS\2513-02\CIVIL\DRAWINGS\CURRENT\C-2513-02_WATERSHED-EXISTING.DWG

REV	DATE	DESCRIPTION

APPLICANT\OWNER:

BARSKY ESTATE REALTY TRUST
23 HUNTING LANE
SHERBORN, MA 01770

PROJECT:

APPLE HILL ESTATES
31 HUNTING LANE
SHERBORN, MA 01770

PROJECT NO.	2513-02	DATE:	11-09-20
SCALE:	1" = 80'	DWG. NAME:	C2513-02
DESIGNED BY:	SM	CHECKED BY:	MAM

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
100 COMMERCE WAY
WOBURN MA 01801
TEL: (781) 935-6889
FAX: (781) 935-2896

WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:	SHEET No.
EXISTING WATERSHED PLAN	WS-1

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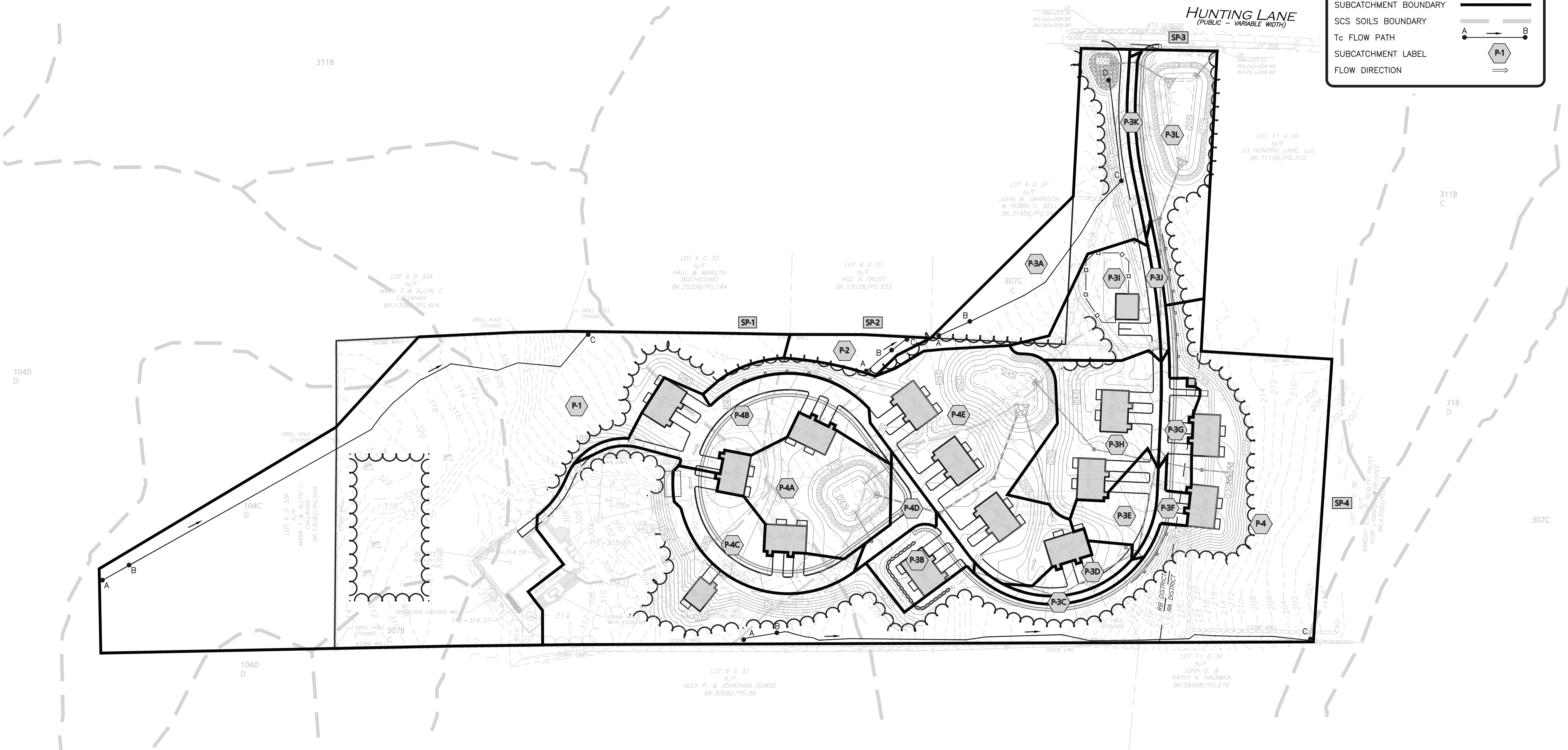
LEGEND

EXISTING SUBCATCHMENT	
SUBCATCHMENT BOUNDARY	
SCS SOILS BOUNDARY	
Tc FLOW PATH	A — B
SUBCATCHMENT LABEL	P-1
FLOW DIRECTION	



GRAPHIC SCALE
80 0 40 80 160 320
(IN FEET)
1 inch = 80 ft.

DIG SAFE
BEFORE YOU DIG
CALL 811 OR
1-888-DIG-SAFE
1-888-344-7233

R:\PROJECTS\2513-02\CIVIL\DRAWINGS\CURRENT\C-2513-02_WATERSHED-PROPOSED.DWG

REV	DATE	DESCRIPTION

APPLICANT\OWNER:
BARSKY ESTATE REALTY TRUST
23 HUNTING LANE
SHERBORN, MA 01770

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APPLE HILL ESTATES
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DRAWING TITLE:	SHEET No.
PROPOSED WATERSHED PLAN	WS-2