**Drainage Report:**

**Estates at Bull Meadow**
**Definitive Subdivision**
**North Grafton, Massachusetts**

**Submitted to:**

**Town of Grafton**
**Planning Board**

October 11, 2016

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Estates at Bull Meadow
North Grafton, Massachusetts
STORMWATER MANAGEMENT DESIGN
June 10, 2016 (Revised October 11, 2016)

## INTRODUCTION

The proposed project site is a 33.4 acre parcel located east of 11 Appaloosa Drive in North Grafton, Massachusetts. The property is bounded by residential properties on Appaloosa Drive and Bridle Ridge Drive to the west, wetlands to the north, Mass DOT owned property to the south, and wetlands and residential property on Adams Road to the east. The existing site is currently undeveloped woodland. Refer to **Figure 1** for the Locus Plan.

The proposed project is a residential subdivision consisting of fifteen (15) single family residential units and two (2) roadways. Paddock Ridge Drive will connect Appaloosa Drive to Bridle Ridge Drive and is approximately 1,676 feet in length, and Carriage House Lane will be a cul-de-sac roadway off of Paddock Ridge Drive and is approximately 489 feet in length to the center of cul-de-sac.

The hydrologic study area is comprised of approximately 16.32 acres. Based on the USDA Natural Resources Conservation Service soil survey the majority of the site is comprised of Hinckley Loamy Sand and Canton Fine Sandy Loam, which are Hydrologic Soil Group (HSG) "A" Soils. Paxton and Woodbridge Fine Sandy Loams, which are Hydrologic Soil Group (HSG) "C" Soils are also present on site however they make up less than 5% of the hydrologic study area. Refer to **Appendix A** for the NRCS soil survey.

## EXISTING CONDITIONS

Under existing conditions, the study area is comprised of approximately 16.05 acres of pervious area (grass and woodland area), and 0.27 acres of impervious area (driveway, rooftop and wetlands) that slopes in a southwest to northeast direction from approximate elevation 510 feet to 434 feet. The existing site is made up of two watershed areas that sheet flow from southwest to northeast to offsite bordering vegetated wetlands (BVW). Area 1 is the northernmost drainage area and is comprised of 10.05 acres of grass, driveway, rooftop, wetlands and woodland area that sheet flows overland to the Northern Wetland System (Reach 1R). Area 2 is located southeast of Area 1 and is comprised of 6.27 acres of woodland that sheet flows to the Southern Wetland System (Reach 2R). The Northern and Southern Wetland Systems converge off site and shall be considered the Point of Analysis (Reach 3R) for this hydraulic study. Refer to **Figure 2** – Existing Watershed Plan.

**PROPOSED CONDITIONS – Analysis 1**

Under proposed conditions, the site is comprised of approximately 2.97 acres of impervious area (pavement and roof top), and 13.35 acres of pervious area (grass, trees and shrubs). The proposed site is comprised of 25 watershed areas where the same drainage pattern as existing will be maintained. Refer to **Figure 3** – Proposed Watershed Plan.

Area 1A is the central drainage area that is comprised of 1.53 acres of pavement, sidewalk and grass. Runoff from Rooftops within Area 1A are collected in roof leader systems and conveyed to drywell systems where it is recharged. The stormwater runoff from Area 1A is collected in the proposed drainage infrastructure and is discharged to proposed infiltration basin 1 (Pond 1P).

Area 2A is located northwest of Area 1A and is comprised of 3.57 acres of wetlands, woodland and grass. Runoff from this area flows overland to an existing wetland (Pond 1W). Runoff in this wetland is further conveyed through a 6’ x 25’ open bottom culvert under the proposed wetland crossing to the northern wetland system (Reach 1R) and is ultimately conveyed to the Point of Analysis (Reach 3R).

Area 2B is located east of area 2A and is comprised of 0.29 acres of pavement, sidewalk and landscaped area. Runoff from this area is collected in catch basins and conveyed to underground infiltration basin 2 (Pond 2P). The runoff discharged from the basin flows overland to the northern wetland system (Reach 1R) and is ultimately conveyed to the Point of Analysis (Reach 3R).

Area 2C is located east of area 2B and is comprised of 1.10 acres of grass. Runoff from this area flows overland to the northern wetland system (Reach 1R) and is ultimately conveyed to the Point of Analysis (Reach 3R).

Area 3A is located immediately south of Area 1A and is comprised of 3.78 acres of pavement, sidewalk and landscaped areas. Runoff from Rooftops within Area 3A are collected in roof leader systems and conveyed to drywell systems where it is recharged. Runoff from this area is collected in catch basins and is conveyed to a proposed swale (S2) on Lot 11. The runoff is then conveyed to proposed infiltration basin 3 (Pond 3P). The runoff discharged from the basin flows overland to the southern wetland system (Reach 2R) and is ultimately conveyed to the Point of Analysis (Reach 3R).

Area 4A is located southwest of 3A and is comprised of 1.36 acres of pavement, sidewalk and landscaped areas. Runoff from Rooftops within Area 1A are collected in roof leader systems and conveyed to drywell systems where it is recharged. Runoff from this area is collected in catch basins and is conveyed to proposed infiltration basin 4 (Pond 4P). The runoff discharged from the basin flows overland to the southern wetland system (Reach 2R) and is ultimately conveyed to the Point of Analysis (Reach 3R).

Area 4B is located southeast of Area 3A and is comprised of 0.59 acres of lawn area. Runoff from this area flows overland to a proposed infiltration basin 4 (Pond 4P). The runoff discharged from the basin flows overland to the southern wetland system (Reach 2R) and is ultimately conveyed to the Point of Analysis (Reach 3R).

Area 5A is located immediately south of Area 4A and is comprised of 2.03 acres of existing roof top and driveway, woodland and lawn area. Runoff from this area flows overland to a proposed swale (S1) and proposed raingarden on Lot 6 (Pond R6). Runoff from this area flows overland to the southern wetland system (Reach 2R) and is ultimately conveyed to the Point of Analysis (Reach 3R).

Area 6A is located immediately east of Area 5A and is comprised of 0.19 acres of lawn area. Runoff from this area flows overland to a proposed raingarden on Lot 7 (Pond R7). Runoff from this area flows overland to the southern wetland system (Reach 2R) and is ultimately conveyed to the Point of Analysis (Reach 3R).

Area 7A is located immediately east of Area 3A and 4B and is comprised of 0.80 acres of lawn area. Runoff from this area flows overland to the southern wetland system (Reach 2R) and is ultimately conveyed to the Point of Analysis (Reach 3R).

Lot 01 is comprised of 0.08 acres of rooftop and driveway on Lot 1. Runoff from this area will be collected via a roof leader system and drain inlet and conveyed to a drywell system designed to infiltrate the 100 year runoff volume.

Lot 02 is comprised of 0.21 acres of rooftop and driveway on Lot 2. Runoff from this area will be collected via a roof leader system and drain inlet and conveyed to a drywell system designed to infiltrate the 100 year runoff volume.

Lot 03 is comprised of 0.05 acres of rooftop on Lot 3. Runoff from this area will be collected via a roof leader system and conveyed to a drywell system designed to infiltrate the 100 year runoff volume.

Lot 04 is comprised of 0.05 acres of rooftop on Lot 4. Runoff from this area will be collected via a roof leader system and conveyed to a drywell system designed to infiltrate the 100 year runoff volume.

Lot 05 is comprised of 0.07 acres of rooftop and driveway on Lot 5. Runoff from this area will be collected via a roof leader system and drain inlet and conveyed to a drywell system designed to infiltrate the 100 year runoff volume.

Lot 06 is comprised of 0.05 acres of rooftop on Lot 6. Runoff from this area will be collected via a roof leader system and conveyed to a drywell system designed to infiltrate the 100 year runoff volume.

Lot 07 is comprised of 0.05 acres of rooftop on Lot 7. Runoff from this area will be collected via a roof leader system and conveyed to a drywell system designed to infiltrate the 100 year runoff volume.

Lot 08 is comprised of 0.05 acres of rooftop on Lot 8. Runoff from this area will be collected via a roof leader system and conveyed to a drywell system designed to infiltrate the 100 year runoff volume.

Lot 09 is comprised of 0.05 acres of rooftop on Lot 9. Runoff from this area will be collected via a roof leader system and conveyed to a drywell system designed to infiltrate the 100 year runoff volume.

Lot 10 is comprised of 0.08 acres of rooftop and driveway on Lot 10. Runoff from this area will be collected via a roof leader system and drain inlet and conveyed to a drywell system designed to infiltrate the 100 year runoff volume.

Lot 11 is comprised of 0.08 acres of rooftop and driveway on Lot 11. Runoff from this area will be collected via a roof leader system and drain inlet and conveyed to a drywell system designed to infiltrate the 100 year runoff volume.

Lot 12 is comprised of 0.08 acres of rooftop and driveway on Lot 12. Runoff from this area will be collected via a roof leader system and drain inlet and conveyed to a drywell system designed to infiltrate the 100 year runoff volume.

Lot 13 is comprised of 0.08 acres of rooftop and driveway on Lot 13. Runoff from this area will be collected via a roof leader system and drain inlet and conveyed to a drywell system designed to infiltrate the 100 year runoff volume.

Lot 14 is comprised of 0.08 acres of rooftop and driveway on Lot 14. Runoff from this area will be collected via a roof leader system and drain inlet and conveyed to a drywell system designed to infiltrate the 100 year runoff volume.

Lot 15 is comprised of 0.08 acres of rooftop and driveway on Lot 15. Runoff from this area will be collected via a roof leader system and drain inlet and conveyed to infiltration basin 2 (Pond 2P). The runoff discharged from the basin flows overland to the northern wetland system (Reach 1R) and is ultimately conveyed to the Point of Analysis 1 (Reach 3R).

## PROPOSED CONDITIONS – Analysis 2

The stormwater management design utilizes both proposed and existing stormwater Best Management Practices (BMP's) to meet the MassDEP Stormwater Management Guidelines. The majority of the proposed subdivision has been designed to discharge to the proposed BMP's, as detailed in the **Analysis 1** section above, however a portion of the proposed roadway that extends from the existing cul-de-sac on Appaloosa Drive through the existing access easement and up to the high point STA 13+81.02 on Paddock Ridge Drive could not be directed to the proposed peak flow attenuating BMP's. Therefore the runoff generated on that section is being directed to Existing Detention Basin 2 located in the drainage easement located on 11 Appaloosa Drive.

The proposed site discharging to Existing Detention Basin 2 is comprised on one watershed area, Area 4, where the same drainage pattern as existing will be maintained. Area 4 is located immediately west of Area 2B and is comprised of 0.43 acres of pavement, sidewalk and landscaped area (See **Figure 3**). Runoff from this area is collected in catch basins and conveyed to Existing Detention Basin 2 (Pond 2). The runoff discharged from the basin flows overland to the northern wetland system (Reach 1R) as detailed in Analysis 1 above.

## STORMWATER MANAGEMENT

The proposed drainage design was based on the revised Massachusetts Department of Environmental Protection (DEP) Stormwater Management Standards (Stormwater Policy). The standards have been revised to promote increased stormwater recharge, the treatment of more runoff from polluting land uses, Low Impact Development (LID) techniques, pollution prevention, the removal of illicit discharges to stormwater management systems, and improved operation and maintenance of stormwater BMP's. The following summarizes the proposed project's compliance with the revised Stormwater Management Standards.

**Standard #1 Untreated Stormwater:** No new stormwater conveyances have been proposed to discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth. LID techniques, such as grassed channels, rain gardens and dry wells are proposed in addition to at grade and below grade infiltration basins within the development to provide stormwater quality control prior to discharging to adjacent wetlands.

**Standard #2 Post-Development Peak Discharge Rates:** As a result of the increase in net impervious area from existing to proposed conditions, stormwater BMP's have been developed to attenuate the peak discharge rates for the 2, 10 and 100 year, 24-hour storm events. Refer to **Table 1** for the pre and post-development peak discharge rates.

**Standard #3 Recharge to Groundwater:** The project site is located within Hydrologic Soil Group (HSG) "A" and "C" classified soil. Per MA DEP standards, recharge is required to eliminate or minimize the loss of annual recharge to groundwater through the use of environmentally sensitive site design, BMP's and good operation and maintenance. The required recharge volume for the proposed project is 0.144 AC-FT. For the 2-year storm event, the infiltration basins, rain gardens and dry wells will provide approximately 0.423 AC-FT of recharge. Refer to the HydroCAD model in **Appendix B**. In addition, the project will provide approximately 0.83 AC-FT of volume (water quality volume) below the outlet to the infiltration basins. Because the basins are located within an "A" soil, the water quality volumes will draw down within 24 hours. Refer to **Appendix A** for the recharge calculations and drawdown analysis.

**Standard #4 80 Percent TSS Removal:** Based on the proposed stormwater management system design, BMP's the proposed subdivision will remove in excess of 97% of the Total Suspended Solids (TSS) from the stormwater runoff discharging from

the site. This will be achieved through the use of deep sump catch basins, water quality units and infiltration basins that are sized to capture in excess of the required water quality volume. The MA DEP Stormwater Management Standards require a water quality volume of 0.5 inches of runoff times the proposed impervious area. As noted above, the proposed infiltration basins will treat the required water quality volume, which will be provided below the outlets in the basins. Refer to **Appendix A** for the Water Quality Volume calculations and the TSS Removal Worksheet.

**Standard #5 Higher Potential Pollutant Loads:** The proposed project is not classified by the DEP as a source for higher pollutant loads.

**Standard #6 Protection of Critical Areas:** The project site is not considered a critical area as defined by the MA DEP.

**Standard #7 Redevelopment Project:** The project is not considered a redevelopment site.

**Standard #8 Erosion/Sediment Control:** Erosion and sediment controls are incorporated into the project design to prevent erosion, control sediment movement, and stabilize exposed soils during construction. During construction, control practices will be utilized such as the placement of straw wattles / bales barriers, silt fencing, and the implementation of soil stabilization practices. These control measures will be periodically checked and maintained as necessary throughout the entire construction duration. As the project is disturbing more than one acre, a Stormwater Pollution Prevention Plan (SWPPP) is required. A SWPPP will be developed and submitted to the Town of Grafton and the US EPA prior to the start of land disturbing activities.

**Standard #9 Operation/Maintenance Plan:** A long term operation and maintenance plan has been developed to ensure the stormwater management system will function as designed. See **Appendix A** for the Operation and Maintenance Plan.

**Standard #10 Illicit Discharges to Stormwater Management System:** The Stormwater Management System associated with the development of the Estates at Bull Meadow Subdivision has been designed such that prior to storm water runoff discharging from the site, it is treated through a series of best management practices. To the Engineer's knowledge, there are no known or designed non-storm water discharges that are or will be connected to the storm water collection system that would convey pollutants directly to groundwater or surface waters.

The proposed design meets **all** applicable DEP Stormwater Management Standards. Refer to **Appendix A** for the MADEP Stormwater Checklist.

## DRAINAGE COLLECTION SYSTEM DESIGN

The proposed drain pipe network is composed of deep sump catch basins and manholes that will collect runoff from the parking and landscaped areas within the proposed development and convey it to the proposed infiltration basins. Additionally, a 2'x3' and 6'x26' culvert are proposed to convey existing drainage courses across the proposed subdivision roadway. The pipe layout is depicted on the Grading and Drainage Plans and Roadway and Utility Profiles.

Pipe sizes were determined using the Rational Method to determine contributing flows to catch basins, as well as the Manning's Equation to calculate pipe flows (refer to **Appendix A** for pipe sizing calculations.)

The following criteria were used to design the pipe network:

- Manholes are provided at all changes in direction or changes in pipe size.
- Pipe sizes are based on flows for the 25-year storm frequency.
- Storm drain pipes shall be RCP.
- Culverts were sized to convey the 100-year storm event.

## STORMWATER QUANTITY – Analysis 1

Due to the proposed increase in impervious area, the project will require BMP's for infiltration and detention in order to comply with Standard # 2 of the DEP Stormwater Management Policy. The stormwater facilities proposed include rain gardens, a vegetated drainage channel, dry wells and infiltration basins. The proposed BMP's will infiltrate the stormwater runoff well in excess of the required water quality volume and required recharge volumes, in addition to attenuating the peak runoff rates for the 2-year, 10-year and 100-year, 24-hour storm events.

Hydrologic analyses were performed utilizing the computer program, HydroCAD©. In order to determine the peak rate of discharge for existing and proposed conditions, runoff hydrographs were generated for the 2-year, 10-year and 100-year, 24-hour storm events using the SCS TR-20 Method and Type III rainfall distribution. Precipitation amounts utilized in the analysis are as defined by NRCC Cornell Data (refer to **Appendix B** for the existing and proposed HydroCAD models). Under proposed conditions, the post development runoff hydrographs were flood routed through the proposed stormwater management facilities.

**Table 1** compares peak runoff rates for the 2-year, 10-year, and 100-year storm events for existing and proposed conditions.

**Table 1 Comparison of Peak Runoff Rates and Volumes**

| Storm Event | Existing | | Proposed | |
|---|---|---|---|---|
| | Flow (cfs) | Volume (af) | Flow (cfs) | Volume (af) |
| 2-Year | 0.00 | 0.000 | 0.00 | 0.000 |
| 10-Year | 0.09 | 0.061 | 0.05 | 0.028 |
| 100-Year | 7.35 | 1.290 | 6.38 | 1.020 |

As shown in Table 1, peak runoff rates and volumes under proposed conditions are less than existing conditions for the 2-, 10-, 25- and 100-year storm events. Therefore, the proposed stormwater design complies with Standard #2 of the MA DEP Stormwater Management Policy.

## STORMWATER QUANTITY – Analysis 2

The Drainage Analysis and Design from the North Grafton Estates II project, dated March 21st, 2002 was analyzed and it was determined that there was excess capacity in Detention Basin 2 to accommodate the runoff from this section of the proposed subdivision roadway. **Table 2** compares peak runoff rates for the 2-year, 10-year, and 100-year, 24-hour storm events for existing and proposed conditions as modeled in 2002. As shown in Table 2, Existing Detention Basin 2 was designed with excess capacity for the 2-, 10- and 100-year storm events.

**Table 2 Comparison of Peak Runoff Rates – Existing Basin 2**

| Storm Event | Existing Flow (cfs) | Proposed Flow (cfs) | Excess Capacity (cfs) |
|---|---|---|---|
| 2-Year | 5.07 | 3.00 | **2.07** |
| 10-Year | 19.47 | 15.46 | **4.01** |
| 100-Year | 39.55 | 28.37 | **11.18** |

The same methodology as in Analysis 1 above was used to model the runoff impacts from the development of Area 4. A HydroCAD analysis was created modeling the Existing Detention Basin 2 with the same input parameters as it was modeled in 2002. With an empty basin for the 100-year storm event, the runoff only staged 0.24 feet. As a second check, the basin volume was adjusted to only show the available storage above the original design 100-year flood elevation of 438.90 ft. This analysis accounts for a full detention basin and shows the resulting impact from Proposed Area 4 (refer to **Appendix B** for the Existing Basin 2 HydroCAD analysis). Refer to **Table 3** for the increase in peak runoff rates resulting from Proposed Area 4. The results show that the proposed Area 4 runoff will have no negative impact on the performance of Existing Detention Basin 2.

**Table 3 Peak Runoff Rates from Area 4**

| Storm Event | Proposed Flow (cfs) |
|---|---|
| 2-Year | 0.46 |
| 10-Year | 1.08 |
| 100-Year | 2.80 |

## CULVERT DESIGN

The proposed stormwater management design includes the use of 2 culverts to convey stormwater that would be impounded by the proposed subdivision roadway. The first culvert is a 2'x3' box culvert located at STA 15+27.5 that is required to convey the runoff from the existing subdivision west of the proposed project. In order to quantify the runoff to be conveyed by this culvert, the drainage analysis and design from the North Grafton Estates II project, dated March 21st, 2002 was analyzed. It was determined from the analysis that the 100-Year 24-hour peak flow rate to this culvert was 20.93 CFS. Utilizing 20.93 CFS as a base flow, a box culvert was analyzed with the computer model HydroCAD and it was determined that a 2'x3' box culvert would only stage 0.93' for the 100-Year 24-hour storm event, providing a factor of safety greater than 2 (refer to **Appendix B** for the 2'x3' culvert design).

The second culvert is a 6'x25' open bottom culvert located at STA 13+82.9 that is being installed at the elevated wetland crossing to maintain a natural connection to the BVW. In addition to being utilized as a hydraulic connection, the open bottom culvert is being used to maintain the natural wetland groundcover so as not to inhibit wildlife crossing. The size of the culvert was selected to support the wildlife crossing and minimize the wetland impact and is significantly oversized hydraulically. Additionally, although it is not a stream crossing, the proposed culvert will provide an openness ratio of 3.40 ft which significantly exceeds the U.S. Army Corps of Engineers openness ratio requirement of 0.82 ft (refer to the proposed HydroCAD analysis in **Appendix B** for the 6'x25' culvert performance).

## STORMWATER QUALITY

All stormwater runoff will be treated to address water quality concerns through the use of DEP approved BMP's. The following BMP's will be provided on-site and when combined will achieve in excess of 95% TSS removal: deep sump hooded catch basins, water quality units, sediment forebays and above and below grade infiltration basins. (See **Appendix A** for TSS Removal Worksheets)

***Deep Sump Catch Basins***

The catch basins on the proposed site will be deep sump/hooded catch basins, which will serve to trap sediment and floatables before entering the drainage system. The sump will be four-feet deep. A hood will be provided with a vacuum-break to avoid siphoning of floatables out of the catch basin. Inlets in the catch basin should be cleaned a minimum of four times per year and inspected monthly. All sediments and hydrocarbons should be properly handled and disposed, in accordance with local, state, and federal guidelines and regulations.

***Water Quality Units***

Water Quality Units on the site will provide treatment of stormwater runoff from paved parking areas prior to discharging to the municipal system in Whalon Street. Maintenance will be performed per the manufacturer's recommendations; however basic maintenance will consist of quarterly inspections and after each major storm event during the first year of installation to accurately establish the required maintenance schedule. The structures will be cleaned out upon the stored volume reaching 15% of the particle separator's capacity, or immediately in the event of a spill. Floatables and sediment will be removed through the 24-inch diameter outlet riser pipe and hydrocarbons will be removed through the 6-inch oil inspection port

***Sediment Forebay***

A sediment forebay will precede the above grade detention basin. It has been sized to capture in excess of 0.1" of runoff over the impervious area (175 cf required, 214 cf provided). This will provide both velocity dissipation and additional TSS removal. The forebay will be cleaned four times per year and inspected monthly. All sediments and hydrocarbons will be properly handled and disposed of off-site.

***Above Grade Infiltration Basin***

Once constructed, the infiltration basin will be inspected after several storm events to confirm drainage system functions, bank stability, and vegetation growth. Any problems will be addressed immediately. The basin will be inspected for proper operation at least once per year. Inspections will be conducted during wet weather to determine if the basin is functioning properly. At least twice during the growing season, the upper-stage, side slopes, embankment, and emergency spillway will be mowed. Accumulated trash and debris will be removed. Sediment will be removed from the basin as necessary, at least once every 10 years.

***Below Grade Infiltration Basin***

Once constructed, detention basins will be inspected at a minimum after several storm events for the first year and annually thereafter to confirm drainage system functions as designed. Problems will be addressed immediately. System shall be cleaned as required per the manufacturer's recommendations

***Vegetated Swale***

Proper maintenance of a vegetated swale is essential to its effectiveness. Once constructed, the swales should be inspected for erosion at a minimum after each storm event during the first year (establishment period) to ensure no washout has occurred. Any obvious washout should be repaired immediately. After the establishment period, inspections shall be conducted on a monthly basis. Mowing of the grassed swale should be conducted as required seasonally to maintain the desired height of vegetation at three to four inches.

***Rain Gardens***

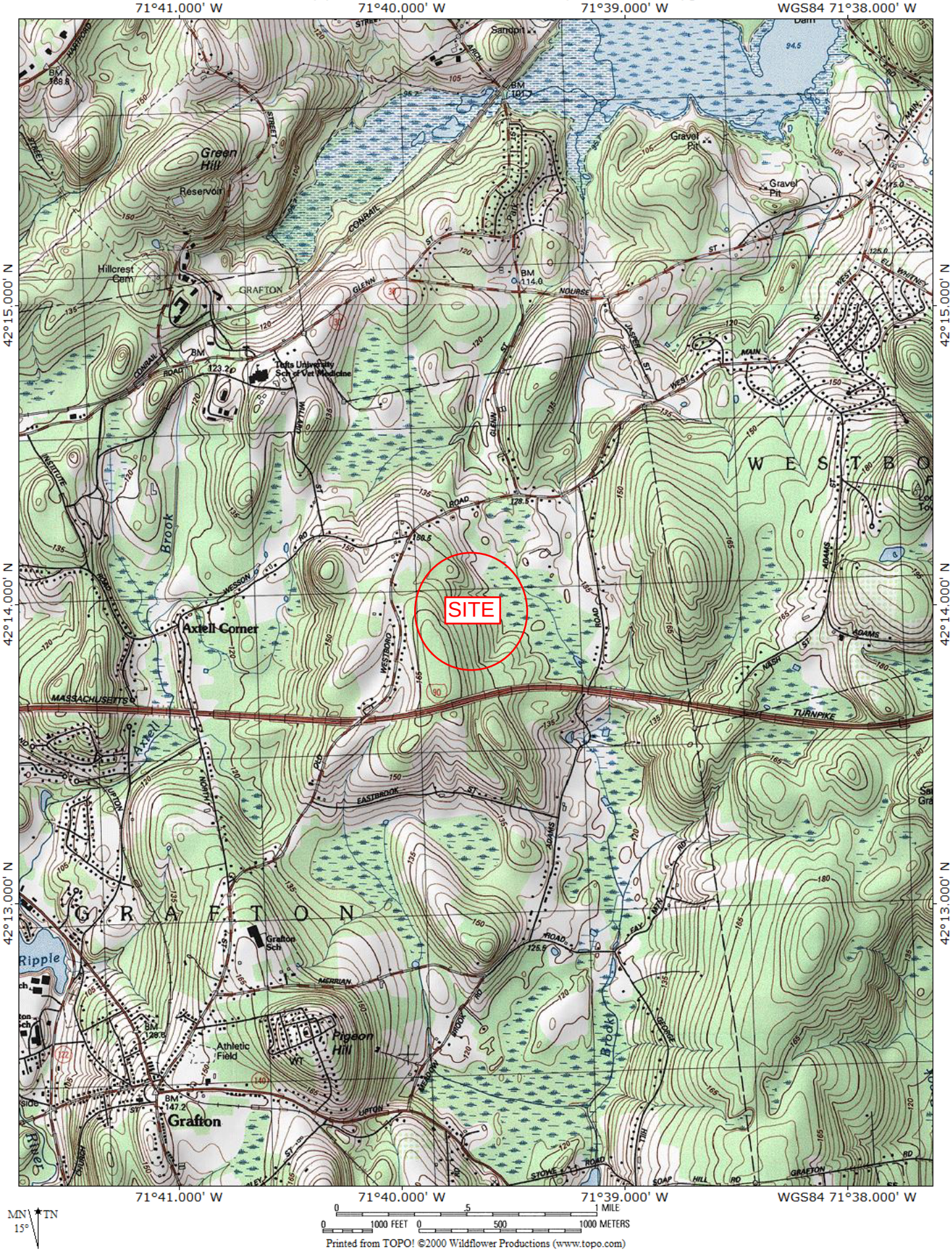
Rain gardens are stormwater treatment techniques located in shallow depressions that use porous media such as sandy soil and gravel topped with a thick layer of mulch and vegetation to filter and infiltrate stormwater runoff. They remove pollutants through filtration, microbial activity and uptake by vegetation. Native plant species should be selected for use in the bioretention basin, reducing fertilizer, pesticide, water, and overall maintenance requirements. Rain gardens should be inspected monthly for signs of erosion or trash accumulation. The Rain gardens should be mulched annually and mowed as necessary. The vegetation should be pruned once a year and any dead vegetation should be removed and replaced annually. See attached supplemental Rain Garden Operation and Maintenance Plan for additional details.

## CONCLUSION

The stormwater management plan for the project addresses both water quantity and quality issues, and conforms to the standards outlined in the revised DEP Stormwater Management Policy.

# Figures

TOPO! map printed on 06/09/16 from "Northeast.tpo" and "Untitled.tpg"



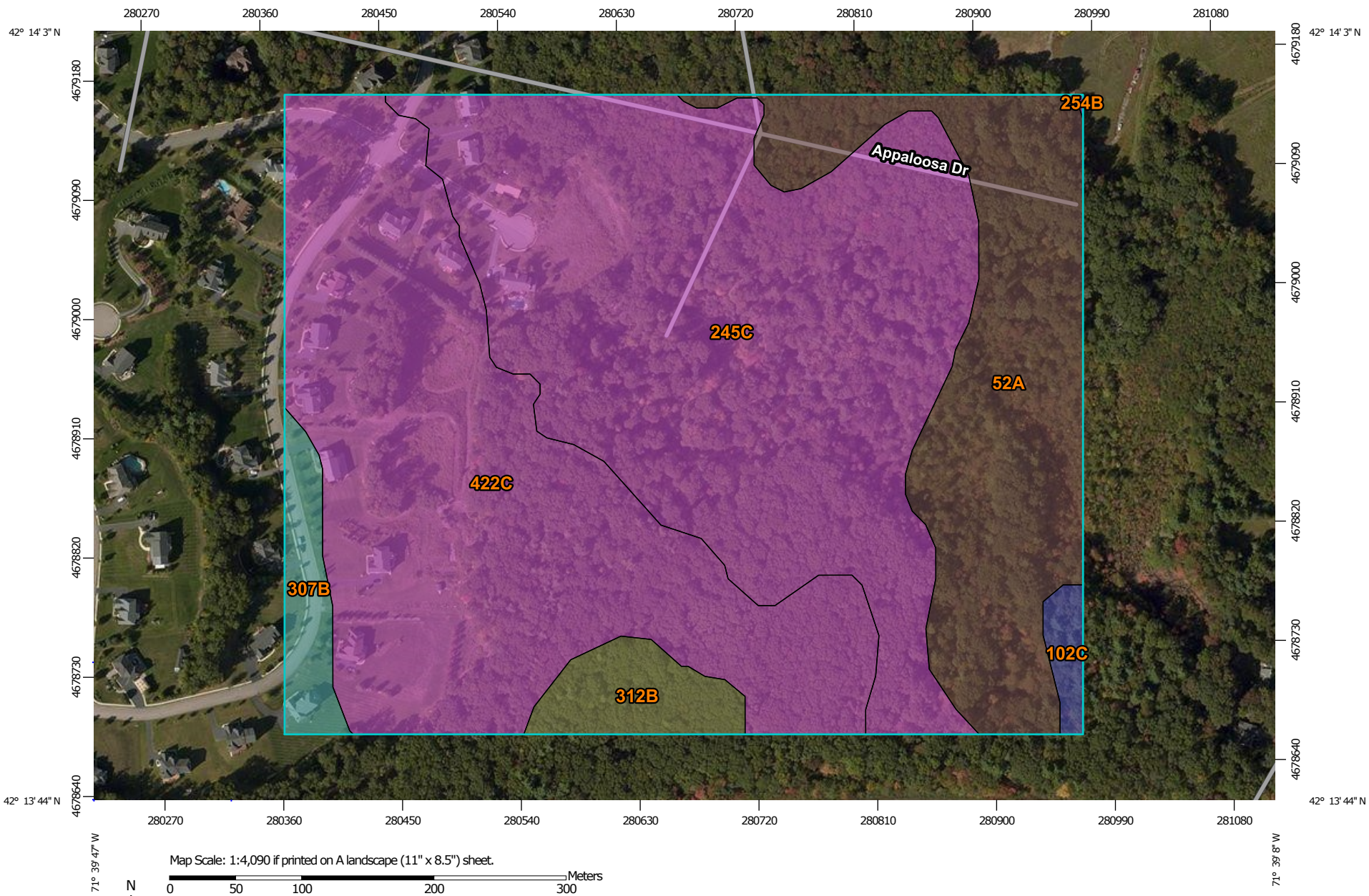

SITE LOCUS MAP

FIGURE 1

# Appendix A

# NRCS Soil Survey

Hydrologic Soil Group—Worcester County, Massachusetts, Southern Part
(Bull Meadow LLC. - Grafton MA)




Map Scale: 1:4,090 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

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 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: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Worcester County, Massachusetts, Southern Part
Survey Area Data: Version 8, Sep 28, 2015

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

Date(s) aerial images were photographed: Sep 12, 2014—Sep 28, 2014

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

# Hydrologic Soil Group

| Hydrologic Soil Group— Summary by Map Unit — Worcester County, Massachusetts, Southern Part (MA615) | | | | |
|---|---|---|---|---|
| **Map unit symbol** | **Map unit name** | **Rating** | **Acres in AOI** | **Percent of AOI** |
| 52A | Freetown muck, 0 to 1 percent slopes | B/D | 13.4 | 18.5% |
| 102C | Chatfield-Hollis-Rock outcrop complex, 3 to 15 percent slopes | B | 0.7 | 0.9% |
| 245C | Hinckley loamy sand, 8 to 15 percent slopes | A | 29.2 | 40.3% |
| 254B | Merrimac fine sandy loam, 3 to 8 percent slopes | A | 0.0 | 0.0% |
| 307B | Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony | C | 1.9 | 2.6% |
| 312B | Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony | C/D | 2.2 | 3.0% |
| 422C | Canton fine sandy loam, 8 to 15 percent slopes, extremely stony | A | 25.1 | 34.7% |
| **Totals for Area of Interest** | | | **72.5** | **100.0%** |

## Description

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

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

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

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

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

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

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

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* *None Specified*

*Tie-break Rule:* Higher

# Recharge Calculations

**McCarty Engineering, INC.** Project: Estates at Bull Meadow
***Stormwater Recharge***

Date: 8/11/16
Comp: BRM
City: North Grafton Check : PJM
State: MA

***Recharge Required***

| Hydrologic Soil Goup | Volume to Recharge (in) |
|---|---|
| A | 0.6 |

**Required Recharge Volume**

| Soil group | Impervious Area (ac) | Required Volume (ac-ft) |
|---|---|---|
| A | 2.87 | 0.144 |
| | ***Total*** | 0.144 |

***Recharge Provided***

***Total Recharge Provided in Infiltration Basins, Dry Wells and Rain Gardens during the 2-year storm= 0.423 AC-FT**

**All recharge is taking place through the bottom of the infiltration basins. Refer to the Proposed Conditions HydroCAD Model for the Recharge Volume for all storm events.*

# Drawdown Analysis

| | | | | |
|---|---|---|---|---|
| **McCarty Engineering, INC.** | Project: | Estates at Bull Meadow | Proj. No: | 66 |
| ***Drawdown Analysis*** | | | Date: | 10/11/16 |
| | City: | North Grafton | Comp: | BRM |
| | State: | MA | Check : | PJM |

**Infiltration Basin 1**

Storage Volume Below the Outlet = **8,924 CF**
Hydraulic Conductivity for an A Soil = **2.41 in/hr (Rawls Rate)**

**Drawdown Time = Storage Volume/(Saturated Hydraulic Conductivity x Bottom Area)**

**Drawdown Time = 8,924/(2.41in/hr(1ft/12in)(1,846 sf))**

**Dt = 24 Hours**

| | | | | |
|---|---|---|---|---|
| **McCarty Engineering, INC.** | Project: | Estates at Bull Meadow | Proj. No: | 66 |
| ***Drawdown Analysis*** | | | Date: | 10/11/16 |
| | City: | North Grafton | Comp: | BRM |
| | State: | MA | Check : | PJM |

**Infiltration Basin 2**

Storage Volume Below the Outlet = **2,342 CF**
Hydraulic Conductivity for an A Soil = **2.41 in/hr (Rawls Rate)**

**Drawdown Time = Storage Volume/(Saturated Hydraulic Conductivity x Bottom Area)**

**Drawdown Time = 2,342/(2.41in/hr(1ft/12in)(1,446 sf))**

**Dt = 8 Hours**

| | | | | |
|---|---|---|---|---|
| **McCarty Engineering, INC.** | Project: | Estates at Bull Meadow | Proj. No: | 66 |
| ***Drawdown Analysis*** | | | Date: | 10/11/16 |
| | City: | North Grafton | Comp: | BRM |
| | State: | MA | Check : | PJM |

**Infiltration Basin 3**

Storage Volume Below the Outlet = **11,131 CF**
Hydraulic Conductivity for an A Soil = **2.41 in/hr (Rawls Rate)**

**Drawdown Time = Storage Volume/(Saturated Hydraulic Conductivity x Bottom Area)**

**Drawdown Time = 11,131/(2.41in/hr(1ft/12in)(2,840 sf))**

**Dt = 19.5 Hours**

| | | | | |
|---|---|---|---|---|
| **McCarty Engineering, INC.** | Project: | Estates at Bull Meadow | Proj. No: | 66 |
| ***Drawdown Analysis*** | | | Date: | 10/11/16 |
| | City: | North Grafton | Comp: | BRM |
| | State: | MA | Check : | PJM |

**Infiltration Basin 3**

Storage Volume Below the Outlet = **13,917**

Hydraulic Conductivity for an A Soil = **2.41 in/hr (Rawls Rate)**

**Drawdown Time = Storage Volume/(Saturated Hydraulic Conductivity x Bottom Area)**

**Drawdown Time = 13,917/(2.41in/hr(1ft/12in)(4,080 sf))**

**Dt = 17 Hours**

# Water Quality Volume Calculations

Water Quality Volume Calculation Basin 1



## Stage-Area-Storage for Pond 1P: Infiltration Basin 1

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 434.00 | 1,846 | 0 |
| 434.05 | 1,882 | 93 |
| 434.10 | 1,918 | 188 |
| 434.15 | 1,954 | 285 |
| 434.20 | 1,990 | 384 |
| 434.25 | 2,026 | 484 |
| 434.30 | 2,062 | |
| 434.35 | 2,098 | |
| 434.40 | 2,134 | 796 |
| 434.45 | 2,170 | 904 |
| 434.50 | 2,207 | 1,013 |
| 434.55 | 2,243 | 1,124 |
| 434.60 | 2,279 | 1,237 |
| 434.65 | 2,315 | 1,352 |
| 434.70 | 2,351 | 1,469 |
| 434.75 | 2,387 | 1,587 |
| 434.80 | 2,423 | 1,708 |
| 434.85 | 2,459 | 1,830 |
| 434.90 | 2,495 | 1,953 |
| 434.95 | 2,531 | 2,079 |
| 435.00 | 2,567 | 2,207 |
| 435.05 | 2,606 | 2,336 |
| 435.10 | 2,645 | 2,467 |
| 435.15 | 2,684 | 2,600 |
| 435.20 | 2,722 | 2,735 |
| 435.25 | 2,761 | 2,873 |
| 435.30 | 2,800 | 3,012 |
| 435.35 | 2,839 | 3,153 |
| 435.40 | 2,878 | 3,295 |
| 435.45 | 2,917 | 3,440 |
| 435.50 | 2,956 | 3,587 |
| 435.55 | 2,994 | 3,736 |
| 435.60 | 3,033 | 3,887 |
| 435.65 | 3,072 | 4,039 |
| 435.70 | 3,111 | 4,194 |
| 435.75 | 3,150 | 4,350 |
| 435.80 | 3,189 | 4,509 |
| 435.85 | 3,227 | 4,669 |
| 435.90 | 3,266 | 4,831 |
| 435.95 | 3,305 | 4,996 |
| 436.00 | 3,344 | 5,162 |
| 436.05 | 3,386 | 5,330 |
| 436.10 | 3,428 | 5,501 |
| 436.15 | 3,469 | 5,673 |
| 436.20 | 3,511 | 5,848 |
| 436.25 | 3,553 | 6,024 |
| 436.30 | 3,595 | 6,203 |
| 436.35 | 3,637 | 6,384 |
| 436.40 | 3,678 | 6,566 |
| 436.45 | 3,720 | 6,751 |
| 436.50 | 3,762 | 6,939 |
| 436.55 | 3,804 | 7,128 |
| 436.60 | 3,846 | 7,319 |
| 436.65 | 3,887 | 7,512 |
| 436.70 | 3,929 | 7,708 |
| 436.75 | 3,971 | 7,905 |
| 436.80 | 4,013 | 8,105 |
| 436.85 | 4,055 | 8,306 |
| 436.90 | 4,096 | 8,510 |
| 436.95 | 4,138 | 8,716 |
| 437.00 | 4,180 | 8,924 |
| 437.05 | 4,224 | 9,134 |
| 437.10 | 4,269 | 9,346 |
| 437.15 | 4,313 | 9,561 |
| 437.20 | 4,358 | 9,778 |
| 437.25 | 4,402 | 9,997 |
| 437.30 | 4,446 | 10,218 |
| 437.35 | 4,491 | 10,441 |
| 437.40 | 4,535 | 10,667 |
| 437.45 | 4,580 | 10,895 |
| 437.50 | 4,624 | 11,125 |
| 437.55 | 4,668 | 11,357 |
| 437.60 | 4,713 | 11,592 |
| 437.65 | 4,757 | 11,829 |
| 437.70 | 4,802 | 12,068 |
| 437.75 | 4,846 | 12,309 |
| 437.80 | 4,890 | 12,552 |
| 437.85 | 4,935 | 12,798 |
| 437.90 | 4,979 | 13,046 |
| 437.95 | 5,024 | 13,296 |
| 438.00 | 5,068 | 13,548 |
| 438.05 | 5,115 | 13,803 |
| 438.10 | 5,163 | 14,060 |
| 438.15 | 5,210 | 14,319 |
| 438.20 | 5,257 | 14,581 |
| 438.25 | 5,305 | 14,845 |
| 438.30 | 5,352 | 15,111 |
| 438.35 | 5,399 | 15,380 |
| 438.40 | 5,447 | 15,651 |
| 438.45 | 5,494 | 15,924 |
| 438.50 | 5,542 | 16,200 |
| 438.55 | 5,589 | 16,479 |
| 438.60 | 5,636 | 16,759 |
| 438.65 | 5,684 | 17,042 |
| 438.70 | 5,731 | 17,328 |
| 438.75 | 5,778 | 17,615 |
| 438.80 | 5,826 | 17,905 |
| 438.85 | 5,873 | 18,198 |
| 438.90 | 5,920 | 18,493 |
| 438.95 | 5,968 | 18,790 |
| 439.00 | **6,015** | **19,090** |

Outlet Invert =

WQv Provided

WQv Required=0.5in x Area Imp. ac x 1ft/12in x 43,560 sf/ac
WQv Required=0.5in x 0.56 ac x 1ft/12in x 43,560 sf/ac
WQv Required=1,016 cf

24,480 cf > 1,016 cf OK

Water Quality Volume Calculation Basin 2



## Stage-Area-Storage for Pond 2P: Infiltration Basin 2 (continued)

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|---|---|---|
| 438.12 | 1,455 | 2,138 | 438.65 | 1,455 | 2,622 |
| 438.13 | 1,455 | 2,148 | 438.66 | 1,455 | 2,630 |
| 438.14 | 1,455 | 2,158 | 438.67 | 1,455 | 2,638 |
| 438.15 | 1,455 | 2,168 | 438.68 | 1,455 | 2,646 |
| 438.16 | 1,455 | 2,178 | 438.69 | 1,455 | 2,654 |
| 438.17 | 1,455 | 2,188 | 438.70 | 1,455 | 2,661 |
| 438.18 | 1,455 | 2,198 | 438.71 | 1,455 | 2,669 |
| 438.19 | 1,455 | 2,208 | 438.72 | 1,455 | 2,676 |
| 438.20 | 1,455 | 2,218 | 438.73 | 1,455 | 2,684 |
| 438.21 | 1,455 | 2,227 | 438.74 | 1,455 | 2,691 |
| 438.22 | 1,455 | 2,237 | 438.75 | 1,455 | 2,698 |
| 438.23 | 1,455 | 2,247 | 438.76 | 1,455 | 2,705 |
| 438.24 | 1,455 | 2,256 | 438.77 | 1,455 | 2,712 |
| 438.25 | 1,455 | 2,266 | [illegible] | 1,455 | 2,719 |
| 438.26 | 1,455 | 2,276 | 438.79 | 1,455 | 2,726 |
| 438.27 | 1,455 | 2,285 | 438.80 | 1,455 | 2,733 |
| 438.28 | 1,455 | 2,295 | 438.81 | 1,455 | 2,739 |
| 438.29 | 1,455 | 2,304 | 438.82 | 1,455 | 2,746 |
| 438.30 | 1,455 | 2,314 | 438.83 | 1,455 | 2,752 |
| 438.31 | 1,455 | 2,323 | 438.84 | 1,455 | 2,759 |
| 438.32 | 1,455 | 2,333 | 438.85 | 1,455 | 2,765 |
| 438.33 | 1,455 | 2,342 | 438.86 | 1,455 | 2,772 |
| 438.34 | 1,455 | 2,351 | 438.87 | 1,455 | 2,778 |
| 438.35 | 1,455 | 2,361 | 438.88 | 1,455 | 2,784 |
| 438.36 | 1,455 | 2,370 | 438.89 | 1,455 | 2,791 |
| 438.37 | 1,455 | 2,379 | 438.90 | 1,455 | 2,797 |
| 438.38 | 1,455 | 2,389 | 438.91 | 1,455 | 2,803 |
| 438.39 | 1,455 | 2,398 | 438.92 | 1,455 | 2,809 |
| 438.40 | 1,455 | 2,407 | 438.93 | 1,455 | 2,815 |
| 438.41 | 1,455 | 2,416 | 438.94 | 1,455 | 2,821 |
| 438.42 | 1,455 | 2,425 | 438.95 | 1,455 | 2,827 |
| 438.43 | 1,455 | 2,434 | 438.96 | 1,455 | 2,833 |
| 438.44 | 1,455 | 2,443 | 438.97 | 1,455 | 2,839 |
| 438.45 | 1,455 | 2,452 | 438.98 | 1,455 | 2,845 |
| 438.46 | 1,455 | 2,461 | 438.99 | 1,455 | 2,851 |
| 438.47 | 1,455 | 2,470 | 439.00 | 1,455 | 2,857 |
| 438.48 | 1,455 | 2,479 | 439.01 | 1,455 | 2,863 |
| 438.49 | 1,455 | 2,488 | 439.02 | 1,455 | 2,869 |
| 438.50 | 1,455 | 2,497 | 439.03 | 1,455 | 2,875 |
| 438.51 | 1,455 | 2,505 | 439.04 | 1,455 | 2,880 |
| 438.52 | 1,455 | 2,514 | 439.05 | 1,455 | 2,886 |
| 438.53 | 1,455 | 2,523 | 439.06 | 1,455 | 2,892 |
| 438.54 | 1,455 | 2,531 | 439.07 | 1,455 | 2,898 |
| 438.55 | 1,455 | 2,540 | 439.08 | 1,455 | 2,904 |
| 438.56 | 1,455 | 2,548 | 439.09 | 1,455 | 2,909 |
| 438.57 | 1,455 | 2,557 | 439.10 | 1,455 | 2,915 |
| 438.58 | 1,455 | 2,565 | 439.11 | 1,455 | 2,921 |
| 438.59 | 1,455 | 2,574 | 439.12 | 1,455 | 2,927 |
| 438.60 | 1,455 | 2,582 | 439.13 | 1,455 | 2,933 |
| 438.61 | 1,455 | 2,590 | 439.14 | 1,455 | 2,939 |
| 438.62 | 1,455 | 2,598 | 439.15 | 1,455 | 2,944 |
| 438.63 | 1,455 | 2,606 | 439.16 | 1,455 | 2,950 |
| 438.64 | 1,455 | 2,614 | 439.17 | 1,455 | 2,956 |

Outlet Invert = 438.33

WQv Provided

WQv Required=0.5in x Area Imp. ac x 1ft/12in x 43,560 sf/ac
WQv Required=0.5in x 0.28 ac x 1ft/12in x 43,560 sf/ac
WQv Required=508 cf

2,324 cf > 508 cf

Water Quality Volume Calculation Basin 3



## Stage-Area-Storage for Pond 3P: Infiltration Basin 3

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 439.00 | 2,840 | 0 |
| 439.05 | 2,873 | 143 |
| 439.10 | 2,906 | 287 |
| 439.15 | 2,939 | 433 |
| 439.20 | 2,972 | |
| 439.25 | 3,005 | |
| 439.30 | 3,038 | 882 |
| 439.35 | 3,071 | 1,034 |
| 439.40 | 3,104 | 1,189 |
| 439.45 | 3,137 | 1,345 |
| 439.50 | 3,170 | 1,503 |
| 439.55 | 3,203 | 1,662 |
| 439.60 | 3,236 | 1,823 |
| 439.65 | 3,269 | 1,985 |
| 439.70 | 3,302 | 2,150 |
| 439.75 | 3,335 | 2,316 |
| 439.80 | 3,368 | 2,483 |
| 439.85 | 3,401 | 2,652 |
| 439.90 | 3,434 | 2,823 |
| 439.95 | 3,467 | 2,996 |
| 440.00 | 3,500 | 3,170 |
| 440.05 | 3,536 | 3,346 |
| 440.10 | 3,571 | 3,524 |
| 440.15 | 3,607 | 3,703 |
| 440.20 | 3,643 | 3,884 |
| 440.25 | 3,678 | 4,067 |
| 440.30 | 3,714 | 4,252 |
| 440.35 | 3,750 | 4,439 |
| 440.40 | 3,785 | 4,627 |
| 440.45 | 3,821 | 4,817 |
| 440.50 | 3,857 | 5,009 |
| 440.55 | 3,892 | 5,203 |
| 440.60 | 3,928 | 5,398 |
| 440.65 | 3,963 | 5,596 |
| 440.70 | 3,999 | 5,795 |
| 440.75 | 4,035 | 5,996 |
| 440.80 | 4,070 | 6,198 |
| 440.85 | 4,106 | 6,403 |
| 440.90 | 4,142 | 6,609 |
| 440.95 | 4,177 | 6,817 |
| 441.00 | 4,213 | 7,027 |
| 441.05 | 4,252 | 7,238 |
| 441.10 | 4,290 | 7,452 |
| 441.15 | 4,329 | 7,667 |
| 441.20 | 4,367 | 7,885 |
| 441.25 | 4,406 | 8,104 |
| 441.30 | 4,445 | 8,325 |
| 441.35 | 4,483 | 8,548 |
| 441.40 | 4,522 | 8,773 |
| 441.45 | 4,560 | 9,001 |
| 441.50 | 4,599 | 9,230 |
| 441.55 | 4,638 | 9,460 |
| 441.60 | 4,676 | 9,693 |

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 441.65 | 4,715 | 9,928 |
| 441.70 | 4,753 | 10,165 |
| 441.75 | 4,792 | 10,403 |
| 441.80 | 4,831 | 10,644 |
| 441.85 | 4,869 | 10,886 |
| 441.90 | 4,908 | 11,131 |
| 441.95 | 4,946 | 11,377 |
| 442.00 | 4,985 | 11,626 |
| 442.05 | 5,026 | 11,876 |
| 442.10 | 5,068 | 12,128 |
| 442.15 | 5,109 | 12,383 |
| 442.20 | 5,151 | 12,639 |
| 442.25 | 5,192 | 12,898 |
| 442.30 | 5,233 | 13,158 |
| 442.35 | 5,275 | 13,421 |
| 442.40 | 5,316 | 13,686 |
| 442.45 | 5,358 | 13,953 |
| 442.50 | 5,399 | 14,222 |
| 442.55 | 5,440 | 14,492 |
| 442.60 | 5,482 | 14,766 |
| 442.65 | 5,523 | 15,041 |
| 442.70 | 5,565 | 15,318 |
| 442.75 | 5,606 | 15,597 |
| 442.80 | 5,647 | 15,878 |
| 442.85 | 5,689 | 16,162 |
| 442.90 | 5,730 | 16,447 |
| 442.95 | 5,772 | 16,735 |
| 443.00 | **5,813** | **17,025** |

Outlet Invert =

WQv Provided

WQv Required=0.5in x Area Imp. ac x 1ft/12in x 43,560 sf/ac
WQv Required=0.5in x 0.39 ac x 1ft/12in x 43,560 sf/ac
WQv Required=708 cf

11,131 cf > 708 cf OK

Water Quality Volume Calculation Basin 4



## Stage-Area-Storage for Pond 4P: Infiltration Basin 4

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 459.00 | 4,080 | 0 |
| 459.05 | 4,119 | 205 |
| 459.10 | 4,157 | 412 |
| 459.15 | 4,195 | 621 |
| 459.20 | 4,234 | 831 |
| 459.25 | 4,273 | 1,044 |
| 459.30 | 4,311 | 1,259 |
| 459.35 | 4,350 | 1,475 |
| 459.40 | 4,388 | 1,694 |
| 459.45 | 4,426 | 1,914 |
| 459.50 | 4,465 | 2,136 |
| 459.55 | 4,504 | 2,360 |
| 459.60 | 4,542 | 2,587 |
| 459.65 | 4,580 | 2,815 |
| 459.70 | 4,619 | 3,045 |
| 459.75 | 4,658 | 3,277 |
| 459.80 | 4,696 | 3,510 |
| 459.85 | 4,735 | 3,746 |
| 459.90 | 4,773 | 3,984 |
| 459.95 | 4,811 | 4,223 |
| 460.00 | 4,850 | 4,465 |
| 460.05 | 4,891 | 4,709 |
| 460.10 | 4,933 | 4,954 |
| 460.15 | 4,974 | 5,202 |
| 460.20 | 5,015 | 5,451 |
| 460.25 | 5,056 | 5,703 |
| 460.30 | 5,098 | 5,957 |
| 460.35 | 5,139 | 6,213 |
| 460.40 | 5,180 | 6,471 |
| 460.45 | 5,221 | 6,731 |
| 460.50 | 5,263 | 6,993 |
| 460.55 | 5,304 | 7,257 |
| 460.60 | 5,345 | 7,524 |
| 460.65 | 5,386 | 7,792 |
| 460.70 | 5,427 | 8,062 |
| 460.75 | 5,469 | 8,335 |
| 460.80 | 5,510 | 8,609 |
| 460.85 | 5,551 | 8,886 |
| 460.90 | 5,592 | 9,164 |
| 460.95 | 5,634 | 9,445 |
| 461.00 | 5,675 | 9,728 |
| 461.05 | 5,719 | 10,012 |
| 461.10 | 5,764 | 10,299 |
| 461.15 | 5,808 | 10,589 |
| 461.20 | 5,852 | 10,880 |
| 461.25 | 5,896 | 11,174 |
| 461.30 | 5,941 | 11,470 |
| 461.35 | 5,985 | 11,768 |
| 461.40 | 6,029 | 12,068 |
| 461.45 | 6,073 | 12,371 |
| 461.50 | 6,118 | 12,676 |
| 461.55 | 6,162 | 12,983 |
| 461.60 | 6,206 | 13,292 |
| 461.65 | 6,250 | 13,603 |
| 461.70 | 6,294 | 13,917 |
| 461.75 | 6,339 | 14,233 |
| 461.80 | 6,383 | 14,551 |
| 461.85 | 6,427 | 14,871 |
| 461.90 | 6,471 | 15,193 |
| 461.95 | 6,516 | 15,518 |
| 462.00 | **6,560** | **15,845** |

Outlet Invert =

WQv Provided

WQv Required=0.5in x Area Imp. ac x 1ft/12in x 43,560 sf/ac
WQv Required=0.5in x 0.62 ac x 1ft/12in x 43,560 sf/ac
WQv Required=1,016 cf

8,062 cf > 1,125 cf OK

# TSS Removal Worksheets

INSTRUCTIONS:

*Non-automated: Mar. 4, 2008*

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 1

**TSS Removal Calculation Worksheet**

| A<br>BMP[1] | B<br>TSS Removal Rate[1] | C<br>Starting TSS Load* | D<br>Amount Removed (B*C) | E<br>Remaining Load (C-D) |
|---|---|---|---|---|
| Deep Sump Hooded Catch Basins | 0.25 | **1.00** | 0.25 | 0.75 |
| Stormceptor Water Quality Unit STC 900 | 0.84 | 0.75 | 0.63 | 0.12 |
| Infiltration Basin | 0.80 | 0.12 | 0.09 | 0.03 |
| | | | | |
| | | | | |

**Total TSS Removal =** 97%

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

Project: Bull Meadow Estates

Prepared By: McCarty Engineering

Date: 10/11/2016

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

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

*1. From MassDEP Stormwater Handbook Vol. 1*

*Mass. Dept. of Environmental Protection*

INSTRUCTIONS:

*Non-automated: Mar. 4, 2008*

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 2

**TSS Removal Calculation Worksheet**

| A<br>BMP[1] | B<br>TSS Removal Rate[1] | C<br>Starting TSS Load* | D<br>Amount Removed (B*C) | E<br>Remaining Load (C-D) |
|---|---|---|---|---|
| Deep Sump Hooded Catch Basins | 0.25 | **1.00** | 0.25 | 0.75 |
| Stormceptor Water Quality Inlet STC 450i | 0.92 | 0.75 | 0.69 | 0.06 |
| Infiltration Basin | 0.80 | 0.06 | 0.05 | 0.01 |
| | | | | |
| | | | | |

**Total TSS Removal =** 99%

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

Project: Bull Meadow Estates

Prepared By: McCarty Engineering

Date: 10/11/2016

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

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

*1. From MassDEP Stormwater Handbook Vol. 1*

*Mass. Dept. of Environmental Protection*

INSTRUCTIONS:

*Non-automated: Mar. 4, 2008*

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 3

**TSS Removal Calculation Worksheet**

| A<br>BMP[1] | B<br>TSS Removal Rate[1] | C<br>Starting TSS Load* | D<br>Amount Removed (B*C) | E<br>Remaining Load (C-D) |
|---|---|---|---|---|
| Deep Sump Hooded Catch Basins | 0.25 | **1.00** | 0.25 | 0.75 |
| Stormceptor Water Quality Unit STC 450 | 0.85 | 0.75 | 0.64 | 0.11 |
| Infiltration Basin | 0.80 | 0.11 | .09 | 0.02 |
| | | | | |
| | | | | |

**Total TSS Removal =** 98%

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

Project: Bull Meadow Estates

Prepared By: McCarty Engineering

Date: 10/11/2016

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

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

*1. From MassDEP Stormwater Handbook Vol. 1*

*Mass. Dept. of Environmental Protection*

INSTRUCTIONS:

*Non-automated: Mar. 4, 2008*

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2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 4

**TSS Removal Calculation Worksheet**

| A<br>BMP[1] | B<br>TSS Removal Rate[1] | C<br>Starting TSS Load* | D<br>Amount Removed (B*C) | E<br>Remaining Load (C-D) |
|---|---|---|---|---|
| Deep Sump Hooded Catch Basins | 0.25 | **1.00** | 0.25 | 0.75 |
| Stormceptor Water Quality Unit STC 450 | 0.82 | 0.75 | 0.62 | 0.13 |
| Infiltration Basin | 0.80 | 0.13 | 0.10 | 0.03 |
| | | | | |
| | | | | |

**Total TSS Removal =** 97%

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

Project: Bull Meadow Estates

Prepared By: McCarty Engineering

Date: 10/11/2016

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

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

*1. From MassDEP Stormwater Handbook Vol. 1*

*Mass. Dept. of Environmental Protection*

# Operation and Maintenance Plan

**Estates at Bull Meadow**
**Definitive Subdivision**
**North Grafton, Massachusetts**
**Operation and Maintenance Plan**
**10/11/2016**

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The proponent is responsible for the maintenance and operation of the proposed stormwater collection system including deep sump catch basins, water quality units, sediment forebays, above grade infiltration basins, an below grade infiltration basin, vegetated swales and rain gardens. The following long term Operation and Maintenance Plan for the project is proposed in accordance with DEP Stormwater Management Standard No. 9 to ensure that the stormwater collection and treatment system operates in accordance with the MADEP Stormwater Management Policy.

Schedule for Inspection and Maintenance after Construction:

*Water Quality Units and Deep Sump Catch Basins*

- Inlets / Manholes should be cleaned a minimum of four times per year and inspected monthly.
- All sediments and hydrocarbons should be properly handled and disposed, in accordance with local, state, and federal guidelines and regulations.
- Structures should be inspected and maintained according to the manufacturer's recommendation.

*Sediment Forebay*

- The forebay will be cleaned four times per year and inspected monthly.
- All sediments and hydrocarbons will be properly handled and disposed of off-site, in accordance with local, state, and federal guidelines and regulations.

*At Grade Infiltration Basin*

- Once constructed, the basin will be inspected at a minimum after several storm events to confirm drainage system functions, bank stability, and vegetation growth. Problems will be addressed immediately.
- During the first six months of operation, the basin will be inspected immediately after significant storm events and cleaned to remove sediment buildup.
- The inlet pipe will be inspected and cleaned out where sediment appears to have clogged the invert.

- A stake shall be placed at the bottom of the pond with marks at 1” increments to measure the sediment accumulation. Sediment will be removed from ponds at a minimum when accumulation is at 4”, but as often as necessary, and at least once every 10 years.

- At least twice during the growing season, the side slopes will be mowed, and accumulated trash and debris removed. Accumulated sediment in forebay will also be removed at this time

*Below Grade Infiltration Basin*

- Once constructed, basin will be inspected at a minimum after several storm events for the first year and annually thereafter to confirm drainage system functions as designed. Problems will be addressed immediately.

- System shall be cleaned as required per the manufacturer’s recommendations.

*Vegetated Swale*

- Once constructed, the vegetated swales will be inspected at a minimum after each storm event during the first year (establishment period) to ensure no washout has occurred. Inspections shall be monthly thereafter. Repair eroded areas as needed.

- At least monthly during the growing season, the side slopes and channel bottom will be mowed, and accumulated trash and debris removed.

- Any collected sand / sediment from winter time sanding and roadway maintenance shall be removed on a yearly basis.

*Rain Gardens*

- Once constructed, the rain garden will be inspected at a minimum after several storm events for the first year and annually thereafter to confirm system functions as designed. Problems will be addressed immediately.

- Rain gardens shall be inspected monthly for trash removal.

- Banks of the raingarden shall ne mowed monthly at a minimum.

- At least once a year, rain gardens shall be mulched, fertilized and pruned and all dead vegetation removed and disposed of.

A site maintenance log will be kept. This log will record the dates when maintenance tasks were completed, the person who completed the task, and any observations of malfunctions in components of the stormwater management system. A sample maintenance log form is attached.

**Estates at Bull Meadow**
**Definitive Subdivision**
**North Grafton, Massachusetts**
**Operation and Maintenance Schedule**

| **BMP** | **Frequency** | **Date Performed** | **Comments** | **Cleaning/ Repair Needed? Yes/No** | **Date of Cleaning/ Repair** | **Performed By** |
|---|---|---|---|---|---|---|
| Catch Basins | -Monthly Inspections<br>-Quarterly cleaning | | | | | |
| | | | | | | |
| Water Quality Units | -Monthly Inspections<br>-Quarterly cleaning | | | | | |
| | | | | | | |
| Sediment Forebay | -Monthly Inspections<br>-Quarterly cleaning | | | | | |
| | | | | | | |
| Above Grade Infiltration Basin | -Annual Inspections and after each major storm event.<br>-Banks mowed twice a year.<br>-Cleaning as needed (Min once every 10 years) | | | | | |
| | | | | | | |
| Below Grade Infiltration Basin | -Annual Inspections and after each major storm event.<br>-Banks mowed twice a year.<br>-Cleaning as needed (Min once every 10 years) | | | | | |
| | | | | | | |
| Vegetated Swales | -Monthly Inspections and after each major storm event.<br>-Banks mowed monthly<br>-Repair erosion as needed<br>-Remove sediment annually | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| Rain Gardens | -Inspection after each major storm event for the first year<br>-Monthly Cleaning<br>-Monthly Mowing<br>-Annual mulching, fertilizing and pruning<br>-Annual removal of dead vegetation | | | | | |
| | | | | | | |

Site Maintenance Supervisor:_____ Date:_____

# Rain Garden Operation and Maintenance Plan

## Introduction

A bioretention device is stormwater management facility used to remove sediment and other stormwater pollutants from runoff and may infiltrate runoff into soil. A bioretention device consists of an excavated area that is backfilled with an engineered soil, covered with a mulch layer and planted with a diversity of woody and herbaceous vegetation. Bioretention devices are designed to pond runoff after rainfall events and gradually allow water to infiltrate into the engineered soil. The engineered soil is a mixture of sand, compost and topsoil designed to allow sufficient infiltration of runoff as well as provide an appropriate planting medium. Bioretention devices have an overflow pipe to discharge water that cannot be adequately stored and treated in the facility. Bioretention devices generally have a perforated underdrain pipe beneath the engineered soil to remove water from the facility after treatment. Bioretention devices generally have a pretreatment area to capture and remove larger sediment particles. The pretreatment area consists of grass filter strips, grass channels, sumps or forebays.

A rain garden is low spot or depression that is planted with grasses and flowers. Runoff is stored in the rain garden before infiltration into the soil. Rain gardens are similar to bioretention devices but are much simpler and do not have overflow pipes, underdrain pipes or pretreatment areas.

## Maintenance

**Typical Maintenance Activities for Bioretention Areas**

| Activity | Frequency |
|---|---|
| Water plants | As necessary during first growing season |
| Water plants during dry periods | As needed after first growing season |
| Re-mulch void areas | As needed |
| Treat diseased trees and shrubs | As needed |
| Inspect soil and repair eroded areas | Monthly |
| Remove litter and debris | Monthly |
| Add additional mulch | Once per year |

**Access**

Sufficient access shall be provided to the facility to allow all necessary inspection and maintenance activities to be completed. Maintenance of access areas shall include removal of tree seedlings and woody vegetation, repair of eroded areas and removal of litter and debris.

**Erosion**
The soil and mulch in the facility and in areas draining to the facility shall be inspected for eroded areas. Eroded areas shall be filled with soil or mulch and vegetated.

**Sediment Accumulation & Clogging**
Sediment accumulation within the facility may reduce the infiltration capacity and impair proper performance of the facility. The facility shall be inspected for accumulation of sediment annually. Excessive sediment accumulation shall be removed with the area re-mulched and replanted.

**Outlet Structure Maintenance**
The Owner will be responsible for outlet structure maintenance. Periodically, the orifice on the outlet pipe may clog with debris. Debris should be removed and appropriately disposed of off-site.

**Riprap**
The facility may have riprap at points where runoff enters or leaves the facility. The riprap is used to prevent erosion of soils from stormwater flows. The facility shall be checked to make sure that an adequate amount of riprap exists to prevent erosion and additional riprap added if necessary.

**Debris & Litter**
A bioretention device is expected to accumulate debris and litter. Debris and litter should be removed on a monthly basis to maintain appearance and public acceptance of the bioretention device.

**Engineered Soil**
Longevity of the engineered soil is decreased by clogging, reduced cation exchange capacity and accumulation of sodium. Clogging problems can be reduced by limiting the input of sediment. Cation exchange capacity can be rejuvenated by the replacement of the engineered soil. Sodium accumulation can be countered by adding gypsum to the soil and/or by allowing about 1” of clean water to percolate through the planting bed 3 to 4 times in the spring.

**Plant Maintenance**
The vegetation type and amount are important to ensure that the facility operates correctly. Bioretention devices typically have a vegetation plan that specifies plant type, location, planting time of year, fertilizing, watering and other specifications. Proper vegetation maintenance includes watering plants during dry periods, re-mulching void areas, treating diseased trees and shrubs and mowing turf areas.

**Standing Water**
The facility owner shall contact the [Municipality] whenever the facility has standing water more than three days after a rain event. The engineered soils may become clogged preventing proper infiltration of stormwater. The facility will need to have the mulch removed, the soil scarified around the plants and new mulch added.

**Snow Storage**
Snow shall not be dumped directly onto the bioretention area. Vegetated pretreatment areas may be used for snow storage but heavy machinery should not be driven onto or across the vegetated area. If no vegetated pretreatment area is provided, snow may be piled upgradient of the bioretention device, preferably upgradient of the pretreatment forebay or sump.

**Chlorides**
The facility is not suitable for treating chlorides. Chloride use on source areas tributary to the bioretention device should be reduced or eliminated if possible. Chloride use can be reduced or eliminated by minimizing the amount of compound used, using alternative de-icers or using clean sand. Aggressive sweeping in these areas, along with pretreatment sumps and filter strips, will reduce the impact of the sand on the bioretention device.

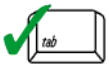
# MADEP Stormwater Checklist

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

# Checklist for Stormwater Report

## A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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

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

# Checklist for Stormwater Report

## B. Stormwater Checklist and Certification

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

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

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

## Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature

B. Marchetti 10/11/16
Signature and Date

## Checklist

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

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

# Checklist for Stormwater Report

## Checklist (continued)

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

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

**Standard 1: No New Untreated Discharges**

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

# Checklist for Stormwater Report

## Checklist (continued)

**Standard 2: Peak Rate Attenuation**

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

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

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

**Standard 3: Recharge**

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

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

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

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

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

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

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

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

# Checklist for Stormwater Report

## Checklist (continued)

**Standard 3: Recharge** (continued)

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

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

**Standard 4: Water Quality**

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

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

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

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

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

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

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

# Checklist for Stormwater Report

## Checklist (continued)

**Standard 4: Water Quality** (continued)

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

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

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

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

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

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

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

☒ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

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

☐ All exposure has been eliminated.

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

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

**Standard 6: Critical Areas**

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

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

# Checklist for Stormwater Report

## Checklist (continued)

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

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

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

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

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

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

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

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

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

# Checklist for Stormwater Report

## Checklist (continued)

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

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

☐ The project is ***not*** covered by a NPDES Construction General Permit.

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

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

**Standard 9: Operation and Maintenance Plan**

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

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

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

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

**Standard 10: Prohibition of Illicit Discharges**

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

☒ An Illicit Discharge Compliance Statement is attached;

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

# Pipe Sizing (Culvert) Calculations

**McCarty Engineering, Inc.**
***Culvert Flows***

Project: Estates at Bull Meadow
City: North Grafton
State: MA

Proj. No: 66
Date: 6/10/16
Revised:
Comp: BRM
Check : PJM

*Shaded columns indicate input values

| | Paved | | Unpaved | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Culvert ID** | AREA (sq. ft) | C FACTOR | AREA (sq. ft) | C FACTOR | COMPOSITE C | TOTAL AREA (sq. ft) | TOTAL AREA (acres) | Q | Double Grate |
| 1 | 8420 | 0.9 | 5299 | 0.3 | 0.67 | 13719 | 0.31 | 1.3 | NO |
| 2 | 9228 | 0.9 | 3219 | 0.3 | 0.74 | 12447 | 0.29 | 1.3 | NO |
| 3 | 4417 | 0.9 | 2405 | 0.3 | 0.69 | 6821 | 0.16 | 0.7 | NO |
| 4 | 2875 | 0.9 | 8517 | 0.3 | 0.45 | 11391 | 0.26 | 0.7 | NO |
| 5 | 9176 | 0.9 | 24725 | 0.3 | 0.46 | 33901 | 0.78 | 2.2 | YES |
| 6 | 7981 | 0.9 | 51067 | 0.3 | 0.38 | 59048 | 1.36 | 3.2 | YES |
| 7 | 9959 | 0.9 | 24819 | 0.3 | 0.47 | 34778 | 0.80 | 2.3 | YES |
| 8 | 4035 | 0.9 | 3719 | 0.3 | 0.61 | 7754 | 0.18 | 0.7 | NO |
| 9 | 6894 | 0.9 | 3388 | 0.3 | 0.70 | 10282 | 0.24 | 1.0 | NO |
| 10 | 5912 | 0.9 | 4789 | 0.3 | 0.63 | 10702 | 0.25 | 1.0 | NO |
| 11 | 6093 | 0.9 | 2300 | 0.3 | 0.74 | 8392 | 0.19 | 0.9 | NO |
| 12 | 2704 | 0.9 | 2645 | 0.3 | 0.60 | 5349 | 0.12 | 0.5 | NO |
| 13 | 5640 | 0.9 | 2493 | 0.3 | 0.72 | 8133 | 0.19 | 0.8 | NO |
| 14 | 4720 | 0.9 | 3799 | 0.3 | 0.63 | 8519 | 0.20 | 0.8 | NO |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

## Pipe Design Worksheet

**Project # /Name:** Estates at Bull Meadow
**Calculated By:** BRM **Date:** 6/10/2016 **Revised:** 10/11/2016
**Checked By:** PJM **Date:** 6/10/2016

**n= 0.013** **RCP Pipe**

| Culvert | Q | Qsum | Length | Slope | Dia. | Full-Flow Velocity[1] | Full-Flow Capacity[2] | |
|---|---|---|---|---|---|---|---|---|
| (ID) | (cfs) | (cfs) | (ft.) | (ft./ft.) | (in.) | (fps) | (cfs) | |
| | | | | | | | | |
| Detention Basin | | | | | | | | |
| CB 9 to DMH 11 | 1.00 | | 30 | 0.01 | 12 | 4.55 | 3.57 | O.K |
| CB 10 to DMH 11 | 1.00 | | 14.6 | 0.01 | 12 | 4.55 | 3.57 | O.K |
| DMH 11 to DMH 10 | | 2.00 | 192.4 | 0.04 | 12 | 9.10 | 7.14 | O.K |
| DMH 10 to DMH 9 | 2.00 | | 75.4 | 0.04 | 12 | 9.10 | 7.14 | O.K |
| CB 8 to DMH 9 | 0.70 | | 14.2 | 0.01 | 12 | 4.55 | 3.57 | O.K |
| DCB 7 to DMH 9 | 2.30 | | 7.1 | 0.01 | 12 | 4.55 | 3.57 | O.K |
| DMH 9 to DMH 8 | | 5.00 | 89 | 0.01 | 18 | 5.96 | 10.53 | O.K |
| DMH 8 to FES 5 | 5.00 | | 161 | 0.01 | 18 | 5.96 | 10.53 | O.K |
| DCB 6 to DMH 7 | 3.20 | | 14.6 | 0.01 | 12 | 4.55 | 3.57 | O.K |
| DCB 5 to DMH 7 | 2.20 | | 7.1 | 0.01 | 12 | 4.55 | 3.57 | O.K |
| DMH 7 to DMH 7A | | 5.40 | 57 | 0.005 | 18 | 4.21 | 7.45 | O.K |
| DMH 7A to FES 4 | 5.40 | | 60 | 0.01 | 18 | 5.96 | 10.53 | O.K |
| CB 4 to DMH 6 | 0.70 | | 12.6 | 0.01 | 12 | 4.55 | 3.57 | O.K |
| CB 3 to DMH 6 | 2.20 | | 15.8 | 0.01 | 12 | 4.55 | 3.57 | O.K |
| DMH 6 to DMH 5 | | 2.90 | 168.2 | 0.005 | 18 | 4.21 | 7.45 | O.K |
| DMH 5 to DMH 4 | 2.90 | | 72.7 | 0.005 | 18 | 4.21 | 7.45 | O.K |
| DMH 4 to DMH 3 | 2.90 | | 124.4 | 0.005 | 18 | 4.21 | 7.45 | O.K |
| CB 2 to DMH 3 | 1.30 | | 14.1 | 0.005 | 12 | 3.22 | 2.53 | O.K |
| CB 1 to DMH 3 | 1.30 | | 3.5 | 0.005 | 12 | 3.22 | 2.53 | O.K |
| DMH 3 to DMH 2 | | 5.50 | 136.9 | 0.005 | 18 | 4.21 | 7.45 | O.K |
| DMH 2 to DMH 1 | 5.50 | | 143.3 | 0.005 | 18 | 4.21 | 7.45 | O.K |
| DMH 1 to FES 1 | 5.50 | | 22.5 | 0.005 | 18 | 4.21 | 7.45 | O.K |
| | | | | | | | | |
| CB 12 to DMH 12 | 0.50 | | 13.8 | 0.01 | 12 | 4.55 | 3.57 | O.K |
| CB 11 to DMH 12 | 0.80 | | 5.7 | 0.01 | 12 | 4.55 | 3.57 | O.K |
| DMH 12 to DMH 19 | | 1.30 | 34.5 | 0.01 | 12 | 4.55 | 3.57 | O.K |
| DMH 20 to FES 3 | | 1.10 | 22 | 0.015 | 8 | 4.25 | 1.48 | O.K |
| | | | | | | | | |
| CB 14 to DMH 13 | 0.80 | | 14.4 | 0.01 | 12 | 4.55 | 3.57 | O.K |
| CB 13 to DMH 13 | 0.80 | | 6.7 | 0.01 | 12 | 4.55 | 3.57 | O.K |
| DMH 13 to FES 2 | | 1.60 | 62 | 0.01 | 12 | 4.55 | 3.57 | O.K |
| | | | | | | | | |
| DMH 14 to DMH 15** | 15.42 | | 40.2 | 0.07 | 18 | 15.77 | 27.87 | O.K |
| DMH 15 to DMH 16** | 15.42 | | 127.2 | 0.092 | 18 | 18.08 | 31.95 | O.K |
| DMH 16 to DMH 17** | 15.42 | | 287.5 | 0.046 | 18 | 12.78 | 22.59 | O.K |
| DMH 17 to DMH 18** | 15.42 | | 190.9 | 0.01 | 21 | 6.61 | 15.89 | O.K |
| DMH 18 to FES 6** | 15.42 | | 35.2 | 0.01 | 21 | 6.61 | 15.89 | O.K |
| | | | | | | | | |
| 2'x3' Culvert | See Drainage Analysis | | | | | | | |
| 6'x25' Culvert | See Drainage Analysis | | | | | | | |
| | | | | | | | | |

** Flows form the 100-year storm event were utilized from HydroCAD to size the headwall outlets.*
***Flows from the 100-year storm event from the "North Grafton Estates II" Stormwater Management Analysis, Dated March 21, 2002 were used as design flows. Waivers requested for pipe flow velocity.*

[1] $V=1.49/n \times R^{2/3} \times S^{1/2}$
[2] $Q=VA$

# NRCC Cornell Rainfall Data

# 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** | 71.661 degrees West |
| **Latitude** | 42.234 degrees North |
| **Elevation** | Unknown/Unavailable |
| **Date/Time** | Tue, 17 May 2016 11:31:33 -0400 |

Data Utilized in Hydraulic Analysis

## Extreme Precipitation Estimates

| | 5min | 10min | 15min | 30min | 60min | 120min | | 1hr | 2hr | 3hr | 6hr | 12hr | 24hr | 48hr | | 1day | 2day | 4day | 7day | 10day | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1yr** | 0.28 | 0.43 | 0.54 | 0.70 | 0.88 | 1.11 | **1yr** | 0.76 | 1.06 | 1.29 | 1.63 | 2.07 | 2.65 | 2.89 | **1yr** | 2.35 | 2.78 | 3.20 | 3.89 | 4.50 | **1yr** |
| **2yr** | 0.35 | 0.54 | 0.67 | 0.88 | 1.11 | 1.40 | **2yr** | 0.96 | 1.28 | 1.62 | 2.04 | 2.57 | 3.23 | 3.50 | **2yr** | 2.86 | 3.37 | 3.87 | 4.59 | 5.23 | **2yr** |
| **5yr** | 0.41 | 0.64 | 0.80 | 1.08 | 1.38 | 1.75 | **5yr** | 1.19 | 1.59 | 2.04 | 2.58 | 3.24 | 4.08 | 4.45 | **5yr** | 3.61 | 4.28 | 4.91 | 5.77 | 6.47 | **5yr** |
| **10yr** | 0.46 | 0.73 | 0.92 | 1.25 | 1.62 | 2.09 | **10yr** | 1.40 | 1.88 | 2.44 | 3.09 | 3.88 | 4.87 | 5.34 | **10yr** | 4.31 | 5.14 | 5.87 | 6.86 | 7.61 | **10yr** |
| **25yr** | 0.55 | 0.87 | 1.11 | 1.52 | 2.02 | 2.62 | **25yr** | 1.74 | 2.33 | 3.07 | 3.90 | 4.92 | 6.16 | 6.80 | **25yr** | 5.45 | 6.54 | 7.46 | 8.64 | 9.44 | **25yr** |
| **50yr** | 0.61 | 0.98 | 1.26 | 1.77 | 2.39 | 3.13 | **50yr** | 2.06 | 2.76 | 3.69 | 4.69 | 5.89 | 7.36 | 8.17 | **50yr** | 6.51 | 7.86 | 8.94 | 10.28 | 11.11 | **50yr** |
| **100yr** | 0.70 | 1.14 | 1.47 | 2.07 | 2.82 | 3.72 | **100yr** | 2.44 | 3.25 | 4.39 | 5.60 | 7.05 | 8.79 | 9.82 | **100yr** | 7.78 | 9.44 | 10.72 | 12.24 | 13.07 | **100yr** |
| **200yr** | 0.80 | 1.30 | 1.69 | 2.42 | 3.34 | 4.44 | **200yr** | 2.88 | 3.84 | 5.25 | 6.70 | 8.44 | 10.51 | 11.81 | **200yr** | 9.30 | 11.35 | 12.86 | 14.59 | 15.40 | **200yr** |
| **500yr** | 0.96 | 1.57 | 2.05 | 2.98 | 4.17 | 5.59 | **500yr** | 3.60 | 4.79 | 6.64 | 8.50 | 10.71 | 13.32 | 15.08 | **500yr** | 11.79 | 14.50 | 16.36 | 18.39 | 19.12 | **500yr** |

## Lower Confidence Limits

| | 5min | 10min | 15min | 30min | 60min | 120min | | 1hr | 2hr | 3hr | 6hr | 12hr | 24hr | 48hr | | 1day | 2day | 4day | 7day | 10day | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1yr** | 0.21 | 0.33 | 0.40 | 0.54 | 0.67 | 0.95 | **1yr** | 0.58 | 0.93 | 1.09 | 1.43 | 1.87 | 2.42 | 2.64 | **1yr** | 2.14 | 2.54 | 2.77 | 3.52 | 4.17 | **1yr** |
| **2yr** | 0.34 | 0.53 | 0.65 | 0.88 | 1.08 | 1.26 | **2yr** | 0.93 | 1.24 | 1.44 | 1.90 | 2.43 | 3.15 | 3.39 | **2yr** | 2.78 | 3.26 | 3.76 | 4.45 | 5.07 | **2yr** |
| **5yr** | 0.38 | 0.59 | 0.73 | 1.00 | 1.28 | 1.51 | **5yr** | 1.10 | 1.48 | 1.72 | 2.24 | 2.85 | 3.76 | 4.13 | **5yr** | 3.33 | 3.97 | 4.56 | 5.31 | 6.02 | **5yr** |
| **10yr** | 0.42 | 0.65 | 0.80 | 1.12 | 1.45 | 1.72 | **10yr** | 1.25 | 1.68 | 1.94 | 2.54 | 3.22 | 4.30 | 4.78 | **10yr** | 3.81 | 4.59 | 5.28 | 6.06 | 6.83 | **10yr** |
| **25yr** | 0.49 | 0.74 | 0.92 | 1.31 | 1.73 | 2.05 | **25yr** | 1.49 | 2.00 | 2.30 | 3.01 | 3.79 | 5.14 | 5.79 | **25yr** | 4.55 | 5.57 | 6.42 | 7.18 | 8.06 | **25yr** |
| **50yr** | 0.54 | 0.82 | 1.02 | 1.47 | 1.97 | 2.33 | **50yr** | 1.70 | 2.28 | 2.62 | 3.42 | 4.29 | 5.87 | 6.72 | **50yr** | 5.20 | 6.47 | 7.47 | 8.17 | 9.17 | **50yr** |
| **100yr** | 0.60 | 0.91 | 1.14 | 1.64 | 2.25 | 2.65 | **100yr** | 1.94 | 2.59 | 2.98 | 3.88 | 4.87 | 6.72 | 7.82 | **100yr** | 5.95 | 7.52 | 8.70 | 9.31 | 10.42 | **100yr** |
| **200yr** | 0.66 | 1.00 | 1.27 | 1.83 | 2.56 | 3.03 | **200yr** | 2.21 | 2.96 | 3.39 | 4.43 | 5.52 | 7.68 | 9.09 | **200yr** | 6.80 | 8.74 | 10.14 | 10.59 | 11.86 | **200yr** |
| **500yr** | 0.77 | 1.14 | 1.47 | 2.13 | 3.03 | 3.62 | **500yr** | 2.62 | 3.54 | 4.02 | 5.28 | 6.55 | 9.19 | 11.13 | **500yr** | 8.14 | 10.71 | 12.45 | 12.52 | 14.10 | **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 | 0.59 | 0.80 | 0.98 | 1.19 | **1yr** | 0.85 | 1.16 | 1.37 | 1.75 | 2.29 | 2.92 | 3.18 | **1yr** | 2.59 | 3.06 | 3.49 | 4.23 | 4.82 | **1yr** |
| **2yr** | 0.36 | 0.56 | 0.69 | 0.93 | 1.15 | 1.35 | **2yr** | 0.99 | 1.32 | 1.55 | 2.02 | 2.58 | 3.37 | 3.64 | **2yr** | 2.98 | 3.50 | 4.01 | 4.77 | 5.40 | **2yr** |
| **5yr** | 0.44 | 0.68 | 0.85 | 1.17 | 1.48 | 1.77 | **5yr** | 1.28 | 1.73 | 2.02 | 2.59 | 3.26 | 4.40 | 4.80 | **5yr** | 3.89 | 4.62 | 5.28 | 6.23 | 6.96 | **5yr** |
| **10yr** | 0.52 | 0.80 | 1.00 | 1.39 | 1.80 | 2.16 | **10yr** | 1.55 | 2.12 | 2.48 | 3.13 | 3.91 | 5.40 | 5.96 | **10yr** | 4.78 | 5.73 | 6.50 | 7.64 | 8.46 | **10yr** |
| **25yr** | 0.66 | 1.00 | 1.24 | 1.78 | 2.34 | 2.83 | **25yr** | 2.02 | 2.77 | 3.23 | 4.01 | 4.97 | 7.11 | 7.91 | **25yr** | 6.29 | 7.61 | 8.56 | 10.03 | 10.94 | **25yr** |
| **50yr** | 0.78 | 1.18 | 1.48 | 2.12 | 2.85 | 3.47 | **50yr** | 2.46 | 3.40 | 3.96 | 4.84 | 5.94 | 8.75 | 9.80 | **50yr** | 7.74 | 9.42 | 10.54 | 12.33 | 13.31 | **50yr** |
| **100yr** | 0.93 | 1.41 | 1.76 | 2.54 | 3.49 | 4.26 | **100yr** | 3.01 | 4.17 | 4.86 | 5.85 | 7.12 | 10.76 | 12.15 | **100yr** | 9.52 | 11.69 | 12.98 | 15.17 | 16.18 | **100yr** |
| **200yr** | 1.11 | 1.67 | 2.11 | 3.06 | 4.27 | 5.24 | **200yr** | 3.68 | 5.12 | 5.97 | 7.06 | 8.53 | 13.23 | 15.06 | **200yr** | 11.71 | 14.48 | 15.98 | 18.68 | 19.63 | **200yr** |
| **500yr** | 1.41 | 2.10 | 2.70 | 3.93 | 5.58 | 6.88 | **500yr** | 4.82 | 6.73 | 7.83 | 9.07 | 10.82 | 17.41 | 20.00 | **500yr** | 15.40 | 19.24 | 21.02 | 24.59 | 25.39 | **500yr** |

Powered by ACIS
Northeast Regional Climate Center

# Rip Rap Sizing Calculations

**McCarty Engineering, INC.** Project: Estates at Bull Meadow Proj. No: 66
***Rip Rap Sizing*** Date: 10/6/16

City: North Grafton Comp: JLL
State: MA Check : BRM

**All Flared End Sections (FES) are designed base on Tables 11.11, 11-12.1, and 11-14.1 of ConnDOT Drainage Manual (see attached reference)**

| | Q 25 Year Flow (cfs) | Full-Flow Capacity (cfs) | Full-Flow Velocity (fps) | Pipe Sizing (in) | Appron Type | Rip Rap Specification | La (ft) | X (ft) | W1 (ft) | W2 (ft) |
|---|---|---|---|---|---|---|---|---|---|---|
| **FES 1** | 5.5 | 7.45 | 4.21 | 18 | A | Modified | 12 | 3 | 4.5 | 12.9 |
| **FES 2** | 1.6 | 3.57 | 4.55 | 12 | A | Modified | 10 | 3 | 3 | 10 |
| **FES 3*** | 1.1 | 1.30 | 3.64 | 8 | A | Modified | 10 | 3 | 2 | 9 |
| **FES 4** | 5.4 | 10.53 | 5.96 | 18 | A | Modified | 16 | 3 | 4.5 | 15.7 |
| **FES 5** | 5 | 10.53 | 5.96 | 18 | A | Modified | 16 | 3 | 4.5 | 15.7 |

## 11.13 Outlet Protection

### 11.13.1 Assessment of Erosion Potential

A field investigation of all proposed outlet locations or existing outlets to be used in a drainage design of a proposed project should be conducted to determine the erosion resistance of the soils at the outlet, the character of the downstream flow path, and any other site constraints that must be addressed by the proposed design.

Barring any unusual conditions, as determined during the field investigation, the criteria outlined in this section should be used to determine the level of outlet protection required. When severe conditions are present, it is the responsibility of the designer to provide outlet protection as needed to safeguard against erosion damage.

Pipe outlets are points of critical erosion potential. Stormwater which is transported through closed conveyance systems at design capacity generally reaches a velocity which exceeds the permissible or erosion resistant velocity of the receiving channel or overland area. To prevent scour at stormwater system outlets, a flow transition structure is needed which will absorb the initial impact of the flow and reduce the flow velocity to a level which will not erode the receiving channel or overland area.

### 11.13.2 Types of Outlet Protection

The most commonly used device for outlet protection is a riprap lined apron. Where practical, they are constructed at a zero grade or minimum slope to slow the outlet velocity. The type and length of the riprap lined apron is related to the outlet flow rate and the tailwater level and whether there is a defined channel downstream.

If the tailwater depth is less than half the outlet pipe rise, it shall be classified as a **Minimum Tailwater Condition**. If the tailwater depth is greater than or equal to half the outlet pipe rise, it shall be classified as a **Maximum Tailwater Condition**.

There are three types of riprap aprons to be used for outlet protection. They are designated as Type A, B and C. Type A riprap aprons would be used under minimum tailwater conditions while Type B riprap aprons would be used for maximum tailwater conditions as defined above, where the pipe outlets overland with no defined channel. Type C riprap aprons would be used when there is a well defined channel downstream of the outlet. The use of a Type C riprap apron on channels that are designated as watercourses or wetlands is discouraged due to potential wetland and fisheries impacts. See Section 11.13.3, Design Criteria, and Section 11.13.5 for the design of riprap aprons.

Where the flow rate proves to be excessive for the economical or practical use of an apron, preformed scour holes may be used. There are two types of preformed scour holes. Type 1 preformed scour holes are depressed one-half the pipe rise and Type 2 preformed scour holes are depressed the full pipe rise. See Section 11.13.3, Design Criteria and Section 11.13.6 for the design of preformed scour holes.

In most cases, a riprap apron or preformed scour hole will provide adequate outlet protection, however where design and site conditions warrant, structurally lined outlet protection or energy dissipators can be investigated. In such instances, coordination with the Hydraulics and Drainage Section early in the design phase is recommended. The design of energy dissipators is presented in HEC-14, “Hydraulic Design of Energy Dissipators For Culverts and Channels.”

### 11.13.3 Design Criteria

The design of riprap outlet protection applies to the immediate area or reach downstream of the pipe outlet and does not apply to continuous rock linings of channels or streams. For pipe outlets at the top of exit slopes or on slopes greater than 10%, the designer should assure that suitable safeguards are provided beyond the limits of the localized outlet protection to counter the highly erosive velocities caused by the reconcentration of flow beyond the initial riprap apron. Outlet protection shall be designed according to the following criteria:

- Riprap outlet protection shall be used at all outlets not flowing over exposed rock or into deep watercourses and ponds.
- In situations not covered by the above noted criteria and where the exit velocity is $\leq$ 4.27 mps (14 fps), a riprap apron shall also be used. For Type A and B riprap aprons, the type of riprap specified is dependent on the outlet velocity (see Section 11.13.6) and can be determined from Table 11.5. For Type C aprons, the type of riprap specified is determined by the procedures in HEC-15 and HEC-11 depending on the design discharge. See Chapter 7, Channels.
- The type of riprap apron and dimensions are determined by the guidelines outlined in Sections 11.13.2 and 11.13.5, respectively.
- When the outlet velocity is > 4.27 mps (14 fps), the designer should first investigate methods to reduce the outlet velocity. This may be accomplished by any one or combination of the following: increasing the pipe roughness, increasing the pipe size and/or decreasing the culvert slope. When this is not possible or economical, a number of outlet protection or energy dissipation design options are available. These are presented in detail in HEC-14. In most instances, however, a preformed scour hole design should be used, as it generally can provide the necessary degree of protection at an economical cost. The design of a preformed scour hole is presented in Section 11.13.6.

**The design criteria of this section should be applicable to most outlet situations. However, recognizing that design and site conditions can vary significantly depending on the project or location on a particular project, it is the responsibility of the designer to ensure that the criteria is suitable to the site or to provide an alternate design which will adequately protect the outlet area from scour and erosion. These situations should be documented in the drainage design report.**

**Table 11.11 Allowable Outlet Velocities for Type A and B Riprap Aprons**

| Outlet Velocity - mps (fps) | Riprap Specification |
|---|---|
| 0-2.44 (0-8) | Modified |
| 2.44-3.05 (8-10) | Intermediate |
| 3.05-4.27 (10-14) | Standard |

### 11.13.4 Tailwater Depth

The depth of tailwater immediately at the pipe outlet is required for the design of outlet protection and must be determined for the design flow rate. Manning's equation may be used to determine tailwater depth. See Sections 8.3.5 and 8.3.6 for additional information on how to determine the tailwater depth.

### 11.13.5 Apron Dimensions

**Length**

The length of an apron ($L_a$) is determined using the following empirical relationships (Equations 11.9 and 11.10) that were developed for the U.S. Environmental Protection Agency (1976) and modified by ConnDOT for use in Connecticut. Tables 11-12 and 11-13 show the various lengths of Type A, B and C riprap aprons based on discharge and pipe size. The tables also show the minimum and maximum lengths of aprons to be computed using Equations 11.31 and 11.32. When the table indicates that the required apron length would exceed the maximum shown, a preformed scour hole should be used in lieu of the riprap apron. As previously stated, the design of a preformed scour hole is presented in Section 11.13.6.

**Type A Riprap Apron (Minimum Tailwater Condition)** **TW < 0.5 $R_p$**

$$L_a = \frac{3.26(Q-0.142)}{S_P^{1.5}} + 3.05 \qquad \left( L_a = \frac{1.80(Q-5)}{S_P^{1.5}} + 10 \right) \qquad \textbf{(11.31)}$$

**Type B Apron (Maximum Tailwater Condition)** **TW ≥ 0.5 $R_p$**

$$L_a = \frac{5.44(Q-0.142)}{S_P^{1.5}} + 3.05 \qquad \left( L_a = \frac{3.0(Q-5)}{S_P^{1.5}} + 10 \right) \qquad \textbf{(11.32)}$$

**Type C Riprap Apron - The length of a Type C Riprap Apron shall be determined using the formula for a Type B Riprap Apron.**

$L_a$ = length of apron, m (ft)
$S_p$ = inside diameter for circular sections or maximum inside pipe span for non-circular sections, m (ft)
Q = pipe (design) discharge, cms (cfs)
TW = tailwater depth, m (ft)
$R_p$ = maximum inside pipe rise, m (ft)
Note: $S_p = R_p$ = inside diameter for circular sections

**Width**

For Type A or B Riprap Aprons, when there is no well defined channel downstream of the apron, the width of the apron at the pipe outlet, $W_1$, should be at least three times the maximum inside pipe span and the width, $W_2$ of the outlet end of the apron, as shown in Figure 11-13, should be as follows:

**Type A Riprap Apron (Minimum Tailwater Condition)**

$W_1 = 3S_p$ (min.)

$W_2 = 3S_p + 0.7L_a$ for TW < 0.5 $R_p$ **(11.33)**

and

**Type B Riprap Apron (Maximum Tailwater Condition)**

$W_1 = 3S_p$ (min.)
$W_2 = 3S_p + 0.4L_a$ for TW $\geq$ 0.5 $R_p$ **(11.34)**

$W_1$ = width of apron at pipe outlet or upstream apron limit
$W_2$ = width of apron at terminus or downstream apron limit

**Type C Riprap Apron**

For a Type C Riprap Apron when there is a well defined channel downstream of the outlet, the bottom width of the apron should be at least equal to the bottom width of the channel and the lining should extend on the channel side slopes at least 0.3m (1 ft) above the tailwater depth (TW) or at least two-thirds of the vertical conduit dimension (0.7 $R_p$) above the invert, whichever is greater. (In all cases, the overall width of the apron shall be a minimum of $3S_p$). See Figure 11-13.

**Additional guidelines:**

- The type of apron to be used and length should be called out on the construction plans.
- The side slopes of the Type C riprap apron should be 2H:1V or flatter.
- The bottom grade should be level or minimum slope, where practical, for energy dissipation. Where the use of a flat apron is impractical, a preformed scour hole should be considered.
- Granular fill shall be placed between the riprap and the underlying soil to prevent soil movement into and through the riprap. Additionally, an appropriately sized geotextile (separation) can be used when field conditions dictate as determined by the engineer.
- The location of outlets and outlet protection should be carefully considered to minimize rights-of-way and wetland impacts.

### 11.13.6 Preformed Scour Hole

The preformed scour hole is an excavated hole or depression which is lined with rock riprap of a stable size to prevent scouring. The depression (F) provides both vertical and lateral expansion downstream of the culvert outlet to permit dissipation of excessive energy and turbulence. Equations 11.35 and 11.36 are used to determine the median stone size ($d_{50}$) required for the lining of the two types of preformed scour holes presented below. The first type, Type 1, represented by Equation 11.35, is depressed one-half the pipe rise and the second type, Type 2, represented by Equation 11.36, is depressed the full pipe rise. A significant reduction in stone size is achieved by the excavation. Therefore, the scour hole depressed the full pipe rise would require a smaller stone size, however the dimensions of the hole would be larger. The type that provides the most economical and practical design given the site conditions should be selected. The dimensions of a preformed scour hole are determined by the set of Equations 11.37 and Figure 11-15.

Empirical Preformed Scour Hole Equations:

Type 1: Scour Hole Depression = one-half pipe rise, m (ft)

$d_{50} = (0.0276\ R_p^2 / TW)\ (Q/R_p^{2.5})^{1.333}$ **(** $d_{50} = (0.0125 R_p^2/TW)\ (Q/R_p^{2.5})^{1.333}$ **)** **(11.35)**

Type 2: Scour Hole Depression = full pipe rise, m (ft)

$d_{50} = (0.0181\ R_p^2 / TW)\ (Q/R_p^{2.5})^{1.333}$ **(** $d_{50} = (0.0082 R_p^2/TW)\ (Q/R_p^{2.5})^{1.333}$**)** **(11.36)**

$d_{50}$ = median stone size required, m (ft)

For variables $S_p$, $R_p$, TW and Q, see Section 11.13.5.

Type 1 and 2 preformed scour hole dimensions (See Figure 11-15)

| | | |
|---|---|---|
| $C = 3S_p + 6F$ | Basin Length m (ft) | |
| $B = 2S_p + 6F$ | Basin Inlet and Outlet Width m (ft) | **(11.37)** |
| $F = 0.5R_p$ (Type 1) or $R_p$ (Type 2) | Basin Depression m (ft) | |

Table 11-14 solves the above set of equations for Type 1 and 2 preformed scour holes for various pipe sizes.

The type of riprap required is as follows:

| | |
|---|---|
| Modified | $d_{50}$ < 0.13m (0.42 ft) |
| Intermediate | 0.13m (0.42 ft) < $d_{50}$ < 0.20m (0.67 ft) |
| Standard | 0.20m (0.67 ft) < $d_{50}$ < 0.38m (1.25 ft) |
| Special Design | 0.38m (1.25 ft) < $d_{50}$ |

Reference: Report No. FHWA-RD-75-508 ("Culvert Outlet Protection Design: Computer Program Documentation")

**OUTLET PROTECTION - OUTLET VELOCITY ≤ 4.27 meters/sec**

| | OUTLET PIPE DIAMETER OR SPAN (mm) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **DISCHARGE** | 300 | 375 | 450 | 600 | 750 | 900 | 1050 | 1200 | 1350 | 1500 |
| **(cms)** | | | | | | | | | | |
| 0-0.142 | ***3.0*** | ***3.0*** | | ***USE*** | | | | | | |
| 0.170 | 3.6 | 3.4 | | | | | | | | |
| 0.180 | | 3.6 | ***3.5*** | | | | | | | |
| 0.190 | | 3.7 | 3.6 | | | ***MINIMUM*** | | | | |
| 0.210 | | 4.0 | 3.8 | ***3.5*** | | | | | | |
| 0.250 | | 4.5 | 4.2 | 3.8 | | | | | | |
| 0.275 | | | 4.5 | 4.0 | | | | | | |
| 0.300 | | | 4.7 | 4.1 | | | | ***LENGTH*** | | |
| 0.325 | | | 5.0 | 4.3 | | | | | | |
| 0.340 | | | | 4.4 | ***4.0*** | | | | | |
| 0.350 | | | | 4.5 | 4.1 | | | | | |
| 0.400 | | ***USE*** | | 4.8 | 4.3 | ***4.0*** | | | ***OUTLINED*** | |
| 0.450 | | | | 5.2 | 4.6 | 4.2 | ***4.0*** | | | |
| 0.500 | | | | 5.5 | 4.8 | 4.4 | 4.1 | | | |
| 0.550 | | | | | 5.0 | 4.6 | 4.3 | ***4.0*** | | |
| 0.600 | | | | | 5.3 | 4.8 | 4.4 | 4.2 | | |
| 0.650 | | | | | 5.5 | 4.9 | 4.6 | 4.3 | | |
| 0.800 | | | ***PREFORMED*** | | | 5.5 | 5.0 | 4.6 | | |
| 0.940 | | | | | | 6.0 | 5.4 | 5.0 | | |
| 1.000 | | | | | | | 5.6 | 5.1 | | |
| 1.100 | | | | | | | 5.9 | 5.4 | ***5.0*** | |
| 1.250 | | | | | | | 6.3 | 5.7 | 5.3 | ***5.0*** |
| 1.300 | | | | | | | 6.5 | 5.9 | 5.4 | 5.1 |
| 1.500 | | | | | ***SCOUR*** | | | 6.3 | 5.8 | 5.4 |
| 1.700 | | | | | | | | 6.8 | 6.2 | 5.7 |
| 1.900 | | | | | | | | 7.3 | 6.6 | 6.1 |
| 2.200 | | | | | | | | 8.0 | 7.2 | 6.6 |
| 2.500 | | | | | | | | | 7.8 | 7.1 |
| 2.850 | | | | | | | | | 8.5 | 7.7 |
| 3.250 | | | | | | | ***HOLE*** | | | 8.4 |
| 3.600 | | | | | | | | | | 9.0 |

**Table 11-12 - Length - $L_a$ (meters)**
**Type A Riprap Apron**

Notes: 1. Bold face outlined boxes indicate minimum $L_a$ to be used for a given pipe diameter or span.
2. Rounding and interpolating are acceptable.

**OUTLET PROTECTION - OUTLET VELOCITY ≤ 14 feet/sec**

| | OUTLET PIPE DIAMETER OR SPAN (in) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **DISCHARGE (cfs)** | 12 | 15 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 |
| 0-5 | ***10*** | ***10*** | | ***USE*** | | | | | | |
| 6 | 12 | 11 | | | | | | | | |
| 7 | | 13 | ***12*** | | | | | | | |
| 8 | | 14 | 13 | ***12*** | | ***MINIMUM*** | | | | |
| 9 | | | 14 | 13 | | | | | | |
| 10 | | | 15 | 13 | | | | | | |
| 11 | | | 16 | 14 | | | | ***LENGTH*** | | |
| 12 | | | | 14 | | | | | | |
| 14 | | | | 16 | ***14*** | | | | | |
| 16 | | | | 17 | 15 | ***14*** | | | ***OUTLINED*** | |
| 18 | | | | 18 | 16 | 15 | | | | |
| 20 | | | | | 17 | 15 | ***14*** | | | |
| 22 | | ***USE*** | | | 18 | 16 | 15 | | | |
| 24 | | | | | | 17 | 15 | ***14*** | | |
| 26 | | | | | | 17 | 16 | 15 | | |
| 28 | | | | | | 18 | 16 | 15 | | |
| 30 | | | | | | 19 | 17 | 16 | | |
| 35 | | | | | | 20 | 18 | 17 | ***16*** | |
| 40 | | | ***PREFORMED*** | | | | 20 | 18 | 17 | ***16*** |
| 45 | | | | | | | 21 | 19 | 18 | 16 |
| 50 | | | | | | | 22 | 20 | 18 | 17 |
| 55 | | | | | | | | 21 | 19 | 18 |
| 60 | | | | | | | | 22 | 20 | 19 |
| 65 | | | | | | | | 24 | 21 | 20 |
| 70 | | | | | ***SCOUR*** | | | 25 | 22 | 20 |
| 75 | | | | | | | | 26 | 23 | 21 |
| 80 | | | | | | | | | 24 | 22 |
| 90 | | | | | | | | | 26 | 24 |
| 100 | | | | | | | | | 28 | 25 |
| 110 | | | | | | | | | | 27 |
| 125 | | | | | | | ***HOLE*** | | | 29 |
| 130 | | | | | | | | | | 30 |

**Table 11-12.1 - Length - $L_a$ (feet)**
**Type A Riprap Apron**

Notes: 1. Bold face outlined boxes indicate minimum $L_a$ to be used for a given pipe diameter or span.
2. Rounding and interpolating are acceptable.

**OUTLET PROTECTION - OUTLET VELOCITY ≤ 4.27 meters/sec**

| | OUTLET PIPE DIAMETER OR SPAN (mm) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **DISCHARGE (cms)** | 300 | 375 | 450 | 600 | 750 | 900 | 1050 | 1200 | 1350 | 1500 |
| 0-0.142 | ***3.0*** | ***3.0*** | | | ***USE*** | | | | | |
| 0.170 | 4.0 | 3.7 | ***3.5*** | | | | | | | |
| 0.180 | | 3.9 | 3.7 | ***3.5*** | | ***MINIMUM*** | | | | |
| 0.190 | | 4.2 | 3.9 | 3.6 | | | | | | |
| 0.200 | | 4.4 | 4.1 | 3.7 | **3.5** | | | | | |
| 0.205 | | 4.5 | 4.2 | 3.8 | 3.6 | | | | | |
| 0.227 | | | 4.5 | 4.0 | 3.7 | | | ***LENGTH*** | | |
| 0.250 | | | 5.0 | 4.3 | 3.9 | | | | | |
| 0.275 | | | | 4.6 | 4.1 | | | | | |
| 0.300 | | | | 4.9 | 4.3 | ***4.0*** | | | | |
| 0.320 | | | | 5.1 | 4.5 | 4.2 | | | ***OUTLINED*** | |
| 0.340 | | | | 5.3 | 4.7 | 4.3 | ***4.0*** | | | |
| 0.360 | | ***USE*** | | 5.5 | 4.8 | 4.4 | 4.1 | | | |
| 0.380 | | | | | 5.0 | 4.5 | 4.2 | ***4.0*** | | |
| 0.410 | | | | | 5.2 | 4.7 | 4.4 | 4.1 | | |
| 0.440 | | | | | 5.5 | 4.9 | 4.5 | 4.3 | | |
| 0.500 | | | | | | 5.3 | 4.8 | 4.5 | | |
| 0.560 | | | | | | 5.7 | 5.1 | 4.7 | | |
| 0.620 | | | ***PREFORMED*** | | | 6.0 | 5.4 | 5.0 | | |
| 0.660 | | | | | | | 5.6 | 5.1 | | |
| 0.730 | | | | | | | 6.0 | 5.4 | ***5.0*** | |
| 0.800 | | | | | | | 6.3 | 5.7 | 5.3 | ***5.0*** |
| 0.850 | | | | | | | 6.5 | 5.9 | 5.4 | 5.1 |
| 1.000 | | | | | | | | 6.5 | 6.0 | 5.5 |
| 1.120 | | | | | ***SCOUR*** | | | 7.0 | 6.4 | 5.9 |
| 1.250 | | | | | | | | 7.5 | 6.8 | 6.3 |
| 1.370 | | | | | | | | 8.0 | 7.2 | 6.6 |
| 1.500 | | | | | | | | | 7.6 | 7.0 |
| 1.630 | | | | | | | | | 8.1 | 7.4 |
| 1.750 | | | | | | | | | 8.5 | 7.7 |
| 1.975 | | | | | | | ***HOLE*** | | | 8.4 |
| 2.200 | | | | | | | | | | 9.0 |

**Table 11-13 - Length - $L_a$ (meters)**
**Type B or C Riprap Apron**

Notes: 1. Bold face outlined boxes indicate minimum $L_a$ to be used for a given pipe diameter or span.
2. Rounding and interpolating are acceptable.

**OUTLET PROTECTION - OUTLET VELOCITY ≤ 14 feet/sec**

| | OUTLET PIPE DIAMETER OR SPAN (in) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **DISCHARGE (cfs)** | 12 | 15 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 |
| 0-5 | ***10*** | ***10*** | | ***USE*** | | | | | | |
| 5.5 | 12 | 11 | | | | | | | | |
| 6 | | 12 | ***12*** | | | ***MINIMUM*** | | | | |
| 7 | | 14 | 13 | **12** | | | | | | |
| 8 | | | 15 | 13 | | | | | | |
| 8.5 | | | 16 | 14 | | | | ***LENGTH*** | | |
| 9 | | | | 14 | | | | | | |
| 10 | | | | 15 | ***14*** | | | | | |
| 11 | | | | 16 | 15 | | | | | |
| 12 | | | | 17 | 15 | ***14*** | | | ***OUTLINED*** | |
| 13 | | | | 18 | 16 | 15 | | | | |
| 14 | | | | | 17 | 15 | ***14*** | | | |
| 16 | | ***USE*** | | | 18 | 16 | 15 | ***14*** | | |
| 18 | | | | | | 18 | 16 | 15 | | |
| 20 | | | | | | 19 | 17 | 16 | | |
| 22 | | | | | | 20 | 18 | 16 | | |
| 24 | | | | | | | 19 | 17 | ***16*** | |
| 26 | | | | | | | 20 | 18 | 17 | ***16*** |
| 28 | | | ***PREFORMED*** | | | | 21 | 19 | 17 | 16 |
| 30 | | | | | | | 21 | 19 | 18 | 17 |
| 32 | | | | | | | 22 | 20 | 18 | 17 |
| 35 | | | | | | | | 21 | 19 | 18 |
| 40 | | | | | | | | 23 | 21 | 19 |
| 45 | | | | | | | | 25 | 23 | 21 |
| 48 | | | | | ***SCOUR*** | | | 26 | 24 | 22 |
| 50 | | | | | | | | | 24 | 22 |
| 55 | | | | | | | | | 26 | 23 |
| 60 | | | | | | | | | 27 | 25 |
| 63 | | | | | | | | | 28 | 26 |
| 65 | | | | | | | | | | 26 |
| 75 | | | | | | | ***HOLE*** | | | 29 |
| 80 | | | | | | | | | | 30 |

**Table 11-13.1 - Length - $L_a$ (feet)**
**Type B or C Riprap Apron**

Notes: 1. Bold face outlined boxes indicate minimum $L_a$ to be used for a given pipe diameter or span.
2. Rounding and interpolating are acceptable.

**OUTLET PROTECTION**
**OUTLET VELOCITY > 4.27 meters/sec or Length of Apron exceeds limits shown on Tables 11-12 and 11-13**

| Preformed Scour Hole | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| (See Figure 11-15) | PIPE DIAMETER OR SPAN (mm) | | | | | | | | | |
| | 300 | 375 | 450 | 600 | 750 | 900 | 1050 | 1200 | 1350 | 1500 |
| **Type 1** | | | | | | | | | | |
| **B** | 1.5 | 1.9 | 2.3 | 3.0 | 3.8 | 4.6 | 5.3 | 6.1 | 6.9 | 7.6 |
| **C** | 1.8 | 2.3 | 2.7 | 3.7 | 4.6 | 5.5 | 6.4 | 7.3 | 8.2 | 9.1 |
| **d** | Depends on riprap type (see Figure 11-15) | | | | | | | | | |
| **$2S_p$** | 0.6 | 0.8 | 1.0 | 1.2 | 1.6 | 1.8 | 2.2 | 2.4 | 2.8 | 3.0 |
| **$F = 0.5\ S_p$** | 0.2 | 0.2 | 0.2 | 0.3 | 0.4 | 0.5 | 0.5 | 0.6 | 0.7 | 0.8 |
| **$3S_p$** | 0.9 | 1.2 | 1.5 | 1.8 | 2.4 | 2.7 | 3.3 | 3.6 | 4.2 | 4.5 |
| **Type 2** | | | | | | | | | | |
| **B** | 2.4 | 3.0 | 3.7 | 4.9 | 6.1 | 7.3 | 8.5 | 9.8 | 11.0 | 12.2 |
| **C** | 2.7 | 3.4 | 4.1 | 5.5 | 6.9 | 8.2 | 9.6 | 11.0 | 12.3 | 13.7 |
| **d** | Depends on riprap type (see Figure 11-15) | | | | | | | | | |
| **$2S_p$** | 0.6 | 0.8 | 1.0 | 1.2 | 1.6 | 1.8 | 2.2 | 2.4 | 2.8 | 3.0 |
| **$F = S_p$** | 0.3 | 0.4 | 0.5 | 0.6 | 0.8 | 0.9 | 1.1 | 1.2 | 1.4 | 1.5 |
| **$3S_p$** | 0.9 | 1.2 | 1.5 | 1.8 | 2.4 | 2.7 | 3.3 | 3.6 | 4.2 | 4.5 |

**Table 11-14 - Dimensions of Preformed Scour Hole (Meters)**

**OUTLET PROTECTION**
**OUTLET VELOCITY > 14 feet/sec or Length of Apron exceeds limits shown on Tables 11-12.1 and 11-13.1**

| Preformed Scour Hole | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| (See Figure 11-15) | PIPE DIAMETER OR SPAN (in) | | | | | | | | | |
| | 12 | 15 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 |
| **Type 1** | | | | | | | | | | |
| **B** | 5 | 6 | 8 | 10 | 13 | 15 | 18 | 20 | 23 | 25 |
| **C** | 6 | 8 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 |
| **d** | Depends on riprap type(see Figure 11-15) | | | | | | | | | |
| **$2S_p$** | 2.0 | 2.6 | 3.0 | 4.0 | 5.0 | 6.0 | 7.0 | 8.0 | 9.0 | 10.0 |
| **$3S_p$** | 3.0 | 3.9 | 4.5 | 6.0 | 7.5 | 9.0 | 10.5 | 12.0 | 13.5 | 15.0 |
| **$F = 0.5\ S_p$** | 0.5 | 0.625 | 0.75 | 1 | 1.25 | 1.5 | 1.75 | 2 | 2.25 | 2.5 |
| **Type 2** | | | | | | | | | | |
| **B** | 8 | 10 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 |
| **C** | 9 | 11 | 14 | 18 | 23 | 27 | 32 | 36 | 41 | 45 |
| **d** | Depends on riprap size (see Figure 11-15) | | | | | | | | | |
| **$2S_p$** | 2.0 | 2.6 | 3.0 | 4.0 | 5.0 | 6.0 | 7.0 | 8.0 | 9.0 | 10.0 |
| **$3S_p$** | 3.0 | 3.9 | 4.5 | 6.0 | 7.5 | 9.0 | 10.5 | 12.0 | 13.5 | 15.0 |
| **$F = S_p$** | 1.0 | 1.3 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | 5.0 |

**Table 11-14.1 - Dimensions of Preformed Scour Hole (Feet)**

### 11.13.7 Design Procedure for Riprap Outlet Protection

Outlet protection consists of the construction of an erosion resistant section between a conduit outlet and a stable downstream channel. Erosion at an outlet is chiefly a function of soil type and the velocity of the conduit discharge. Therefore, in order to mitigate erosion, an adequate design must stabilize the area at the conduit outlet and reduce the outlet velocity to a velocity consistent with a stable condition in the downstream channel.

This section presents a generalized procedure for the design of riprap outlet protection. Although each project will be unique, the design outlined below will normally be applicable.

**Step 1. Assess the Erosion Potential at the Outlet and other Critical Site Factors**

For all proposed outlet locations including existing outlet locations to be used on the project:

A. A field investigation should be conducted to determine the erosion resistance of the soils at the outlet, the character of the downstream flow path, and any other site constraints that must be addressed by the proposed design.

B. Prepare a site description and a sketch (channel cross section, where appropriate) for the outlet location.

C. Ensure that field survey limits extend far enough to adequately show the proposed outlet protection design, downstream flow path, drainage right-of-way and any other important topographic features on the design plans

**Step 2. Determine Tailwater Conditions at the Outlet**

A. See Section 11.13.4 and Sections 8.3.5 and 8.3.6 for further information on how to determine the tailwater depth.

B. If the pipe outlet discharges into a well-defined channel, estimate the existing velocity in the receiving channel using Manning's Equation (Equation 7.6, Section 7.4.11). See Section 8.3.8 regarding Maximum Velocity.

**Step 3. Calculate the Outlet Velocity for the Design Discharge**

Culvert outlet velocity is one of the primary indicators of erosion potential and will serve in most instances to define the outlet protection required.

The continuity equation Q=AV (Equation 7.5, Section 7.4.11) can be utilized in all situations to compute the average velocity at any point within a conduit. For conduits flowing partly full, however, the location of the water surface and consequently the area of flow cannot always be easily determined.

The following procedure for the calculation of outlet velocity will produce results, which, though approximate, will be adequate for most design purposes.

A. Determine the design discharge for the conduit based on the design return frequency.

B. See Step 2 A. for the tailwater (TW) acting at the outlet pipe.

C. Calculate the outlet velocity.

**Step 4. Evaluate the Outlet Velocity**

If the outlet velocity is considered excessive for site conditions or exceeds 4.27 mps (14 fps), the designer should investigate methods to reduce the outlet velocity. These may include any one or combination of the following:

- increasing the pipe roughness
- increasing the pipe size
- decreasing the culvert slope

It should also be noted that the above methods may be employed at velocities less than 4.27 mps (14 fps) when it desired to reduce the size of riprap required at the outlet.

For instance, a 450-mm (18-inch) pipe has a design discharge of 0.3 cms (10 cfs) and an outlet velocity of 3.66 mps (12 fps). Table 11.11 indicates that standard riprap would be required at the outlet, however, it may be more practical to employ the above methods for reducing the exit velocity, so that modified or intermediate riprap can be used in lieu of standard riprap.

**Step 5. Select an Appropriate Type of Outlet Protection Design**

Review Section 11.13.2 describing the Types of Outlet Protection and the Design Criteria in Section 11.13.3, which will be used in the selection of the type and size of the outlet protection. The type of outlet protection and design criteria presented in these Sections are summarized below:

| TYPE | OUTLET VELOCITY mps (fps) | TAILWATER DEPTH | COMMENT |
|---|---|---|---|
| Type A Riprap Apron | ≤ 4.27 (14) | ≤ ½ pipe rise (minimum condition) | Outlet has no well-defined channel downstream |
| Type B Riprap Apron | ≤ 4.27 (14) | ≥ ½ pipe rise (maximum condition) | Outlet has no well-defined channel downstream |
| Type C Riprap Apron | ≤ 4.27 (14) | all | Outlet has a well-defined channel downstream |
| Preformed Scour Hole | ≥ 4.27 (14) | all | May be used for lower exit velocities as dictated by Tables 8-6 and 8-7 |
| Structurally Lined Energy Dissipaters | ≥ 4.27 (14) | all | See HEC-14<br>To be used only with prior approval from Hydraulics and Drainage Section. |

**Table 11-15 Summary of Outlet Protection Types and Selection Criteria**

A. If the outlet velocity, tailwater depth and site conditions indicate that a Type A, B or C Riprap Apron may be used, check Tables 11-12 and 11-13 to see if a Riprap Apron can be used based on the pipe size and discharge.

B. If a Riprap Apron is adequate, Tables 11-12 and 11-13 will specify the length of apron required. Proceed to **Step 6**.

C. If the Tables do not show an apron length, this indicates that the designer should proceed to **Step 7,** using a preformed scour hole design instead of a riprap apron.

For example, a project has two outlets.

Outlet No.1 is a 450-mm (18-inch) RCP with an outlet velocity of 2.74 mps (9 fps) and a design discharge of 0.275 cms (9.7 cfs) that outlets onto a flat area with a tailwater depth (TW) less than 200 mm (8 in).

Outlet No.2 is a 600-mm (24-inch) RCP with an outlet velocity of 3.35 mps (11 fps) and a design discharge of 0.500 cms (17.7 cfs) that outlets into a drainage channel with a tailwater depth (TW) of 500 mm (20 in).

Initially, the design parameters indicate that a Type A Riprap Apron and a Type C Riprap Apron would be appropriate for Outlet No. 1 and 2, respectively.

Next, Table 11-12 is checked for Outlet No. 1 with the design discharge and shows that a Type A Riprap Apron could be used with a required length of 4.5-m (15-ft.). Table 11-13 is checked for Outlet No. 2 and shows that the design discharge falls outside the limit for the use of a Type C Riprap Apron and that a preformed scour hole design should be used.

**Step 6. Riprap Apron Dimensions**

The designer has determined in **Step 5** that a riprap apron is appropriate at the outlet location. Riprap apron dimensions are discussed in Section 11.13.5 and are determined as follows:

A. The length of apron ($L_a$) is determined from Tables 11-12 and 11-13 or Equations 11.31 and 11.32. **It should be noted, however, that the Tables are required to determine the minimum and maximum length of apron that can be used for a given pipe size and discharge.** The length of apron is shown on Figures 11-13 and 11-14.

B. The width of the upstream ($W_1$) and downstream $W_2$) apron limit for the Type A and B Riprap Apron are computed using Equations 11.33 and 11.34, respectively, or as shown on Figure 11-13. The width of a Type C Riprap Apron ($W_3$) is determined as described in Section 11.13.5 or as shown on Figure 11-14.

**Step 7. Preformed Scour Hole Design**

The designer has determined in **Step 5** that the outlet velocity, Tables 11-12 and 11-13 or site conditions dictate that a preformed scour hole is required for outlet protection. The design is discussed in Section 11.13.6 and summarized as follows:

A. Compute the median stone size ($d_{50}$) required for both the Type 1 and 2 Preformed Scour Holes using Equations 11.35 and 11.36, respectively.

B. Compute the scour hole dimensions for both types using the set of equations labeled 11.37 or Figure 11-15.

C. Compare the values computed in Steps 7A and 7B for the two preformed scour hole types and select the one that provides the most economical and practical design given the site conditions.

**Step 8. Special Design**

In unusual cases where neither a riprap apron nor preformed scour hole can be used, and a special design is required, HEC-14 can be used to design an alternative energy dissipater. These designs, however, require prior approval from the Hydraulics and Drainage Section.

**Step 9. Prepare Outlet Protection Computation Form**

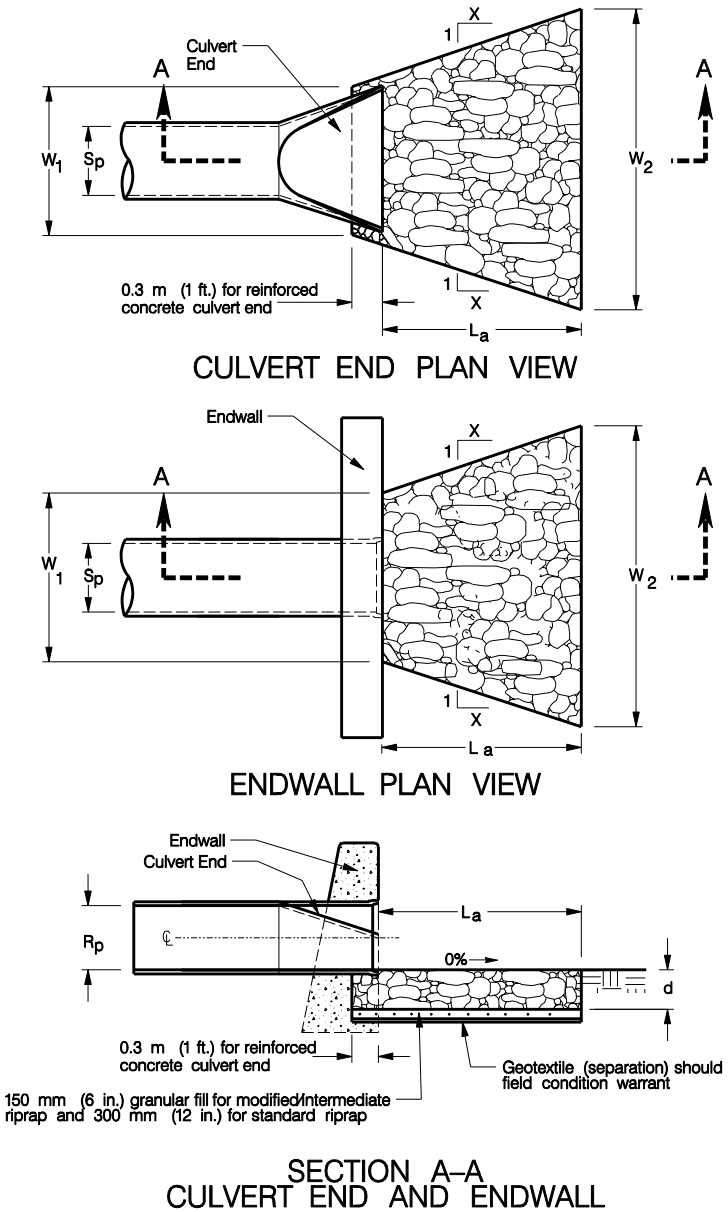
See Appendix A for form.

**Step 10. Project Plans**

The following information is required on the project plans for outlet protection:

| TYPE | PLANS | DETAILS |
|---|---|---|
| Type A, B & C Riprap Apron | Call out apron type (A,B,C), riprap type & length of apron ($L_a$). Show apron limits. | Include detail(s) similar to Figures 11-13 & 11-14 |
| Preformed Scour Hole Type 1 & Type 2 | Call out type & riprap size. Show limits. | Include a detail similar to Figure 11-15. |

**Table 11-16 Outlet Protection Plan Requirements**




## LEGEND

$S_p$ = { Max. inside pipe span (non–circular sections); Inside pipe diameter (circular sections) }

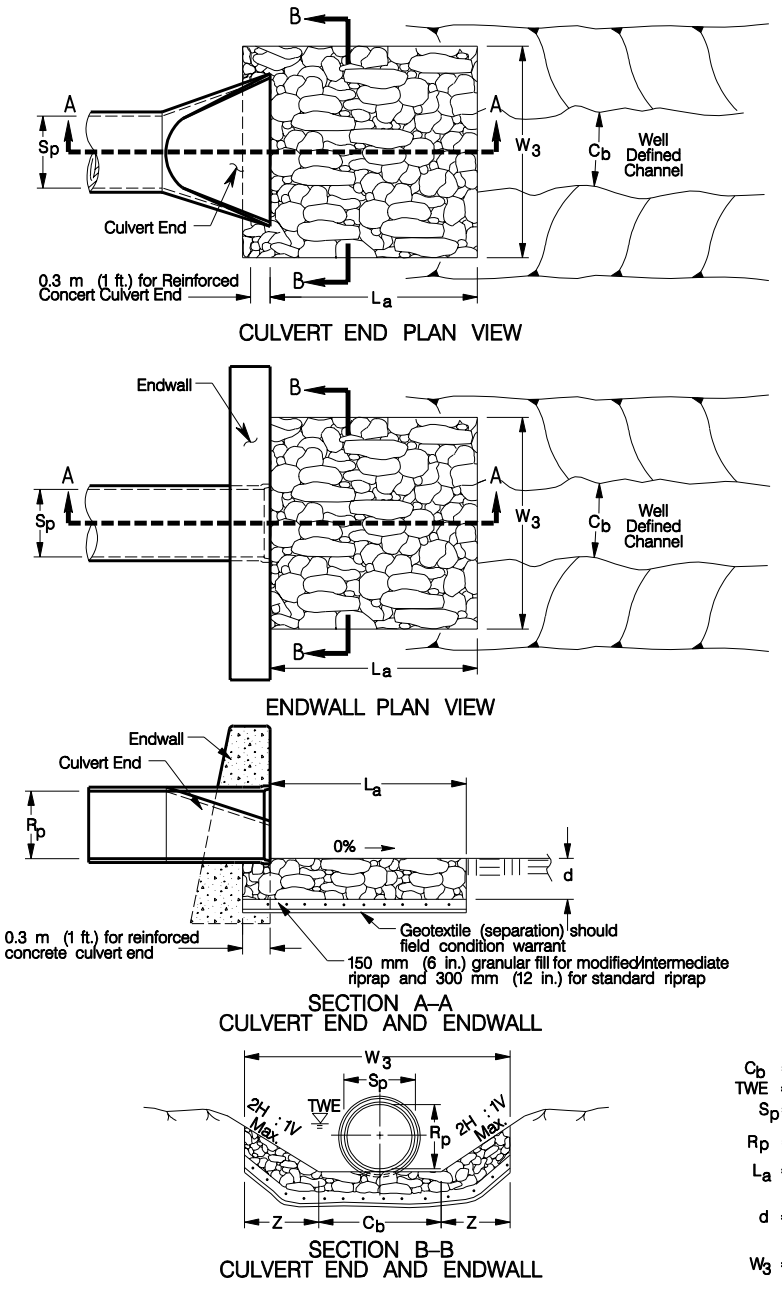
$R_p$ = { Max. inside pipe rise (non–circular sections); Inside pipe diameter (circular sections) }

$L_a$ = Length of riprap apron measured from the end of culvert end section or face of endwall

d = { 300 mm (12 in.) Modified Riprap; 450 mm (18 in.) Intermediate Riprap; 900 mm (36 in.) Standard Riprap }

| | X | $W_1$ | $W_2$ |
|---|---|---|---|
| Type A Riprap Apron | 3 | $3S_p$ | $3S_p+0.7$ La |
| Type B Riprap Apron | 5 | $3S_p$ | $3S_p+0.4$ La |

**Figure 11-13 Type A and B Riprap Apron**
**(to be used where there is no defined channel downstream of the outlet)**




LEGEND

| Z | Channel Side Slope |
|---|---|
| 2 | 2H : 1V |
| 3 | 3H : 1V |
| 4 | 4H : 1V |
| 5 | 5H : 1V |
| 6 | 6H : 1V |

$C_b$ = Channel Bottom

TWE = Tailwater elevation

$S_p$ = Max. Inside Pipe Span (Non–Circular Sections); Inside Pipe Diameter (Circular Sections)

$R_p$ = Max. Inside Pipe Rise (Non–Circular Sections); Inside Pipe Diameter (Circular Sections)

$L_a$ = Length of riprap apron measured from the end of culvert end section or face of endwall

d = 300 mm (12 in.) Modified Riprap; 450 mm (18 in.) Intermediate Riprap; 900 mm (36 in.) Standard Riprap

$W_3$ = Use Whichever is Greater: 3S; 2(Z) (TWE + 0.3 m) + $C_b$; 2(Z) (0.7 Rp) + $C_b$

**Figure 11-14 Type C Riprap Apron**
**(to be used where there is a well defined channel downstream of the outlet)**

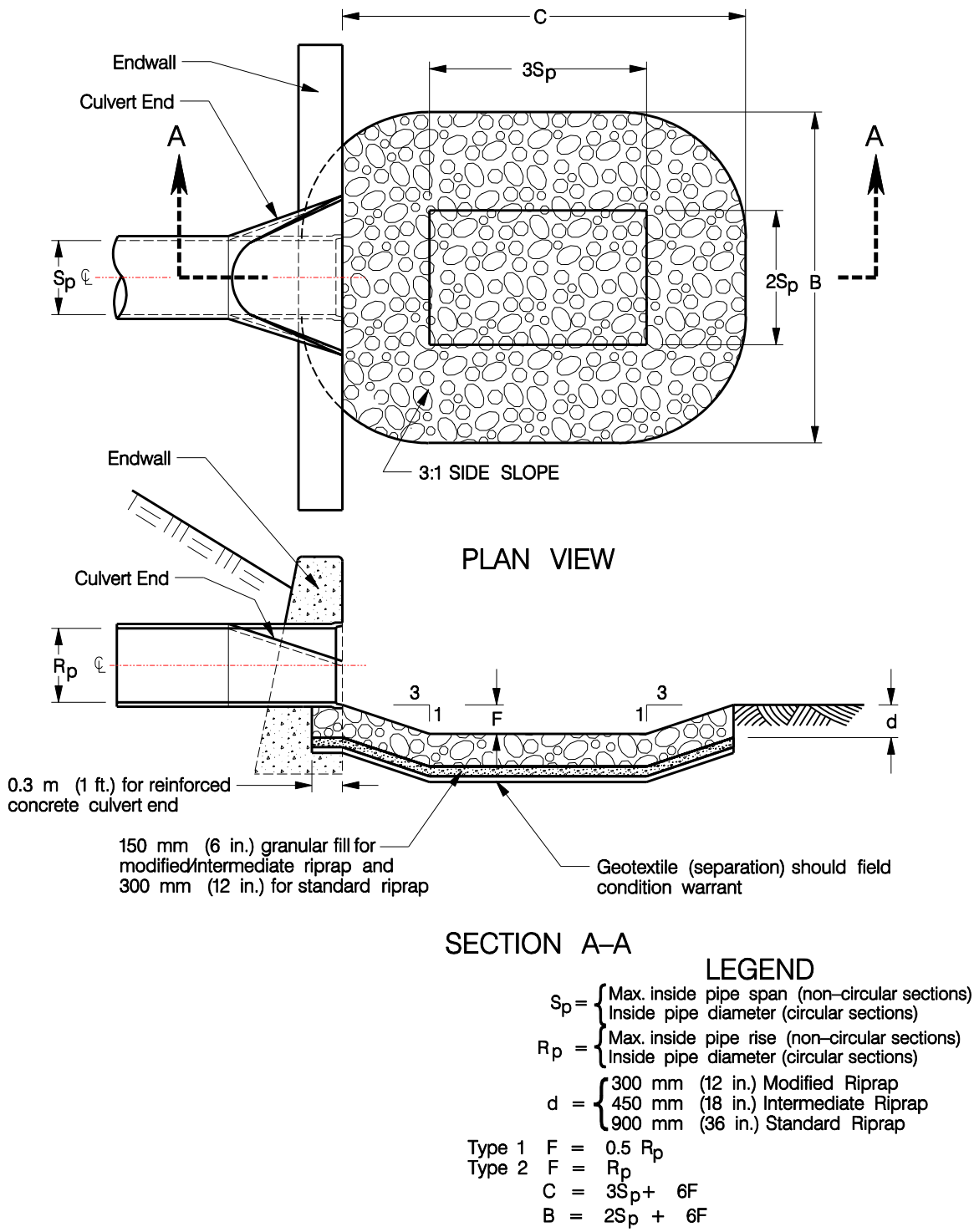



**Figure 11-15 Preformed Scour Hole Type 1 and Type 2**

# Stormceptor Sizing Calculations

# Brief Stormceptor Sizing Report - DMH 8

| Project Information & Location | | | |
|---|---|---|---|
| **Project Name** | Estates at Bull Meadow | **Project Number** | 066 |
| **City** | Grafton | **State/ Province** | Massachusetts |
| **Country** | United States of America | **Date** | 10/5/2016 |
| **Designer Information** | | **EOR Information (optional)** | |
| **Name** | Justin LeClair | **Name** | |
| **Company** | McCarty Engineering | **Company** | |
| **Phone #** | 978-833-9055 | **Phone #** | |
| **Email** | jleclair@mccartydb.com | **Email** | |

**Stormwater Treatment Recommendation**
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

| | |
|---|---|
| **Site Name** | DMH 8 |
| **Target TSS Removal (%)** | 80 |
| **TSS Removal (%) Provided** | 82 |
| **Recommended Stormceptor Model** | STC 450i |

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

| Stormceptor Sizing Summary | |
|---|---|
| **Stormceptor Model** | **% TSS Removal Provided** |
| STC 450i | 82 |
| STC 900 | 88 |
| STC 1200 | 88 |
| STC 1800 | 88 |
| STC 2400 | 91 |
| STC 3600 | 91 |
| STC 4800 | 93 |
| STC 6000 | 94 |
| STC 7200 | 95 |
| STC 11000 | 96 |
| STC 13000 | 96 |
| STC 16000 | 97 |
| StormceptorMAX | Custom |

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## Sizing Details

| Drainage Area | |
|---|---|
| Total Area (acres) | 1.5 |
| Imperviousness % | 42.2 |

| Rainfall | |
|---|---|
| Station Name | WORCESTER WSO AP |
| State/Province | Massachusetts |
| Station ID # | 9923 |
| Years of Records | 58 |
| Latitude | 42°16'2"N |
| Longitude | 71°52'34"W |

| Water Quality Objective | |
|---|---|
| TSS Removal (%) | 80.0 |
| Runoff Volume Capture (%) | |
| Oil Spill Capture Volume (Gal) | |
| Peak Conveyed Flow Rate (CFS) | |
| Water Quality Flow Rate (CFS) | |

| Up Stream Storage | |
|---|---|
| Storage (ac-ft) | Discharge (cfs) |
| 0.000 | 0.000 |

| Up Stream Flow Diversion | |
|---|---|
| Max. Flow to Stormceptor (cfs) | |

**Particle Size Distribution (PSD)**
**The selected PSD defines TSS removal**

| Fine Distribution | | |
|---|---|---|
| Particle Diameter (microns) | Distribution % | Specific Gravity |
| 20.0 | 20.0 | 1.30 |
| 60.0 | 20.0 | 1.80 |
| 150.0 | 20.0 | 2.20 |
| 400.0 | 20.0 | 2.65 |
| 2000.0 | 20.0 | 2.65 |

## Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

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**http://www.imbriumsystems.com/technical-specifications**

# Brief Stormceptor Sizing Report - CB 11

| Project Information & Location | | | |
|---|---|---|---|
| **Project Name** | Estates at Bull Meadow | **Project Number** | 066 |
| **City** | Grafton | **State/ Province** | Massachusetts |
| **Country** | United States of America | **Date** | 10/5/2016 |
| **Designer Information** | | **EOR Information (optional)** | |
| **Name** | Justin LeClair | **Name** | |
| **Company** | McCarty Engineering | **Company** | |
| **Phone #** | 978-833-9055 | **Phone #** | |
| **Email** | jleclair@mccartydb.com | **Email** | |

**Stormwater Treatment Recommendation**
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

| | |
|---|---|
| **Site Name** | CB 11 |
| **Target TSS Removal (%)** | 80 |
| **TSS Removal (%) Provided** | 92 |
| **Recommended Stormceptor Model** | STC 450i |

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

| Stormceptor Sizing Summary | |
|---|---|
| **Stormceptor Model** | **% TSS Removal Provided** |
| STC 450i | 92 |
| STC 900 | 95 |
| STC 1200 | 96 |
| STC 1800 | 96 |
| STC 2400 | 97 |
| STC 3600 | 97 |
| STC 4800 | 98 |
| STC 6000 | 98 |
| STC 7200 | 98 |
| STC 11000 | 99 |
| STC 13000 | 99 |
| STC 16000 | 99 |
| StormceptorMAX | Custom |

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## Sizing Details

| Drainage Area | |
|---|---|
| Total Area (acres) | 0.2 |
| Imperviousness % | 72.6 |

| Rainfall | |
|---|---|
| Station Name | WORCESTER WSO AP |
| State/Province | Massachusetts |
| Station ID # | 9923 |
| Years of Records | 58 |
| Latitude | 42°16'2"N |
| Longitude | 71°52'34"W |

| Water Quality Objective | |
|---|---|
| TSS Removal (%) | 80.0 |
| Runoff Volume Capture (%) | |
| Oil Spill Capture Volume (Gal) | |
| Peak Conveyed Flow Rate (CFS) | |
| Water Quality Flow Rate (CFS) | |

| Up Stream Storage | |
|---|---|
| Storage (ac-ft) | Discharge (cfs) |
| 0.000 | 0.000 |

| Up Stream Flow Diversion | |
|---|---|
| Max. Flow to Stormceptor (cfs) | |

**Particle Size Distribution (PSD)**
**The selected PSD defines TSS removal**

| Fine Distribution | | |
|---|---|---|
| Particle Diameter (microns) | Distribution % | Specific Gravity |
| 20.0 | 20.0 | 1.30 |
| 60.0 | 20.0 | 1.80 |
| 150.0 | 20.0 | 2.20 |
| 400.0 | 20.0 | 2.65 |
| 2000.0 | 20.0 | 2.65 |

## Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

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# Brief Stormceptor Sizing Report - CB 12

| Project Information & Location | | | |
|---|---|---|---|
| **Project Name** | Estates at Bull Meadow | **Project Number** | 066 |
| **City** | Grafton | **State/ Province** | Massachusetts |
| **Country** | United States of America | **Date** | 10/5/2016 |
| **Designer Information** | | **EOR Information (optional)** | |
| **Name** | Justin LeClair | **Name** | |
| **Company** | McCarty Engineering | **Company** | |
| **Phone #** | 978-833-9055 | **Phone #** | |
| **Email** | jleclair@mccartydb.com | **Email** | |

**Stormwater Treatment Recommendation**
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

| | |
|---|---|
| **Site Name** | CB 12 |
| **Target TSS Removal (%)** | 80 |
| **TSS Removal (%) Provided** | 96 |
| **Recommended Stormceptor Model** | STC 450i |

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

| Stormceptor Sizing Summary | |
|---|---|
| **Stormceptor Model** | **% TSS Removal Provided** |
| STC 450i | 96 |
| STC 900 | 98 |
| STC 1200 | 98 |
| STC 1800 | 98 |
| STC 2400 | 99 |
| STC 3600 | 99 |
| STC 4800 | 99 |
| STC 6000 | 99 |
| STC 7200 | 99 |
| STC 11000 | 100 |
| STC 13000 | 100 |
| STC 16000 | 100 |
| StormceptorMAX | Custom |

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## Sizing Details

| Drainage Area | |
|---|---|
| Total Area (acres) | 0.1 |
| Imperviousness % | 50.6 |

| Rainfall | |
|---|---|
| Station Name | WORCESTER WSO AP |
| State/Province | Massachusetts |
| Station ID # | 9923 |
| Years of Records | 58 |
| Latitude | 42°16'2"N |
| Longitude | 71°52'34"W |

| Water Quality Objective | |
|---|---|
| TSS Removal (%) | 80.0 |
| Runoff Volume Capture (%) | |
| Oil Spill Capture Volume (Gal) | |
| Peak Conveyed Flow Rate (CFS) | |
| Water Quality Flow Rate (CFS) | |

| Up Stream Storage | |
|---|---|
| Storage (ac-ft) | Discharge (cfs) |
| 0.000 | 0.000 |

| Up Stream Flow Diversion | |
|---|---|
| Max. Flow to Stormceptor (cfs) | |

**Particle Size Distribution (PSD)**
**The selected PSD defines TSS removal**

| Fine Distribution | | |
|---|---|---|
| Particle Diameter (microns) | Distribution % | Specific Gravity |
| 20.0 | 20.0 | 1.30 |
| 60.0 | 20.0 | 1.80 |
| 150.0 | 20.0 | 2.20 |
| 400.0 | 20.0 | 2.65 |
| 2000.0 | 20.0 | 2.65 |

## Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

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# Brief Stormceptor Sizing Report - CB 13

| Project Information & Location | | | |
|---|---|---|---|
| **Project Name** | Estates at Bull Meadow | **Project Number** | 066 |
| **City** | Grafton | **State/ Province** | Massachusetts |
| **Country** | United States of America | **Date** | 10/5/2016 |
| **Designer Information** | | **EOR Information (optional)** | |
| **Name** | Justin LeClair | **Name** | |
| **Company** | McCarty Engineering | **Company** | |
| **Phone #** | 978-833-9055 | **Phone #** | |
| **Email** | jleclair@mccartydb.com | **Email** | |

**Stormwater Treatment Recommendation**
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

| | |
|---|---|
| **Site Name** | CB 13 |
| **Target TSS Removal (%)** | 80 |
| **TSS Removal (%) Provided** | 93 |
| **Recommended Stormceptor Model** | STC 450i |

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

| Stormceptor Sizing Summary | |
|---|---|
| **Stormceptor Model** | **% TSS Removal Provided** |
| STC 450i | 93 |
| STC 900 | 96 |
| STC 1200 | 96 |
| STC 1800 | 96 |
| STC 2400 | 97 |
| STC 3600 | 97 |
| STC 4800 | 98 |
| STC 6000 | 98 |
| STC 7200 | 99 |
| STC 11000 | 99 |
| STC 13000 | 99 |
| STC 16000 | 99 |
| StormceptorMAX | Custom |

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## Sizing Details

| Drainage Area | |
|---|---|
| Total Area (acres) | 0.2 |
| Imperviousness % | 63.3 |

| Rainfall | |
|---|---|
| Station Name | WORCESTER WSO AP |
| State/Province | Massachusetts |
| Station ID # | 9923 |
| Years of Records | 58 |
| Latitude | 42°16'2"N |
| Longitude | 71°52'34"W |

| Water Quality Objective | |
|---|---|
| TSS Removal (%) | 80.0 |
| Runoff Volume Capture (%) | |
| Oil Spill Capture Volume (Gal) | |
| Peak Conveyed Flow Rate (CFS) | |
| Water Quality Flow Rate (CFS) | |

| Up Stream Storage | |
|---|---|
| Storage (ac-ft) | Discharge (cfs) |
| 0.000 | 0.000 |

| Up Stream Flow Diversion | |
|---|---|
| Max. Flow to Stormceptor (cfs) | |

**Particle Size Distribution (PSD)**
**The selected PSD defines TSS removal**

| Fine Distribution | | |
|---|---|---|
| Particle Diameter (microns) | Distribution % | Specific Gravity |
| 20.0 | 20.0 | 1.30 |
| 60.0 | 20.0 | 1.80 |
| 150.0 | 20.0 | 2.20 |
| 400.0 | 20.0 | 2.65 |
| 2000.0 | 20.0 | 2.65 |

## Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

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# Brief Stormceptor Sizing Report - CB 14

| Project Information & Location | | | |
|---|---|---|---|
| **Project Name** | Estates at Bull Meadow | **Project Number** | 066 |
| **City** | Grafton | **State/ Province** | Massachusetts |
| **Country** | United States of America | **Date** | 10/5/2016 |
| **Designer Information** | | **EOR Information (optional)** | |
| **Name** | Justin LeClair | **Name** | |
| **Company** | McCarty Engineering | **Company** | |
| **Phone #** | 978-833-9055 | **Phone #** | |
| **Email** | jleclair@mccartydb.com | **Email** | |

**Stormwater Treatment Recommendation**
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

| | |
|---|---|
| **Site Name** | CB 14 |
| **Target TSS Removal (%)** | 80 |
| **TSS Removal (%) Provided** | 93 |
| **Recommended Stormceptor Model** | STC 450i |

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

| Stormceptor Sizing Summary | |
|---|---|
| **Stormceptor Model** | **% TSS Removal Provided** |
| STC 450i | 93 |
| STC 900 | 96 |
| STC 1200 | 96 |
| STC 1800 | 97 |
| STC 2400 | 98 |
| STC 3600 | 98 |
| STC 4800 | 98 |
| STC 6000 | 98 |
| STC 7200 | 99 |
| STC 11000 | 99 |
| STC 13000 | 99 |
| STC 16000 | 99 |
| StormceptorMAX | Custom |

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## Sizing Details

| Drainage Area | |
|---|---|
| Total Area (acres) | 0.2 |
| Imperviousness % | 55.4 |

| Rainfall | |
|---|---|
| Station Name | WORCESTER WSO AP |
| State/Province | Massachusetts |
| Station ID # | 9923 |
| Years of Records | 58 |
| Latitude | 42°16'2"N |
| Longitude | 71°52'34"W |

| Water Quality Objective | |
|---|---|
| TSS Removal (%) | 80.0 |
| Runoff Volume Capture (%) | |
| Oil Spill Capture Volume (Gal) | |
| Peak Conveyed Flow Rate (CFS) | |
| Water Quality Flow Rate (CFS) | |

| Up Stream Storage | |
|---|---|
| Storage (ac-ft) | Discharge (cfs) |
| 0.000 | 0.000 |

| Up Stream Flow Diversion | |
|---|---|
| Max. Flow to Stormceptor (cfs) | |

**Particle Size Distribution (PSD)**
**The selected PSD defines TSS removal**

| Fine Distribution | | |
|---|---|---|
| Particle Diameter (microns) | Distribution % | Specific Gravity |
| 20.0 | 20.0 | 1.30 |
| 60.0 | 20.0 | 1.80 |
| 150.0 | 20.0 | 2.20 |
| 400.0 | 20.0 | 2.65 |
| 2000.0 | 20.0 | 2.65 |

## Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

**For Stormceptor Specifications and Drawings Please Visit:**
**http://www.imbriumsystems.com/technical-specifications**

# Brief Stormceptor Sizing Report - DMH 2

| Project Information & Location | | | |
|---|---|---|---|
| **Project Name** | Estates at Bull Meadow | **Project Number** | 066 |
| **City** | Grafton | **State/ Province** | Massachusetts |
| **Country** | United States of America | **Date** | 10/5/2016 |
| **Designer Information** | | **EOR Information (optional)** | |
| **Name** | Justin LeClair | **Name** | |
| **Company** | McCarty Engineering | **Company** | |
| **Phone #** | 978-833-9055 | **Phone #** | |
| **Email** | jleclair@mccartydb.com | **Email** | |

**Stormwater Treatment Recommendation**

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

| | |
|---|---|
| **Site Name** | DMH 2 |
| **Target TSS Removal (%)** | 80 |
| **TSS Removal (%) Provided** | 84 |
| **Recommended Stormceptor Model** | STC 900 |

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

| Stormceptor Sizing Summary | |
|---|---|
| **Stormceptor Model** | **% TSS Removal Provided** |
| STC 450i | 78 |
| STC 900 | 84 |
| STC 1200 | 84 |
| STC 1800 | 85 |
| STC 2400 | 87 |
| STC 3600 | 88 |
| STC 4800 | 90 |
| STC 6000 | 90 |
| STC 7200 | 92 |
| STC 11000 | 94 |
| STC 13000 | 94 |
| STC 16000 | 95 |
| StormceptorMAX | Custom |

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## Sizing Details

| Drainage Area | |
|---|---|
| Total Area (acres) | 1.01 |
| Imperviousness % | 56.2 |

| Rainfall | |
|---|---|
| Station Name | WORCESTER WSO AP |
| State/Province | Massachusetts |
| Station ID # | 9923 |
| Years of Records | 58 |
| Latitude | 42°16'2"N |
| Longitude | 71°52'34"W |

| Water Quality Objective | |
|---|---|
| TSS Removal (%) | 80.0 |
| Runoff Volume Capture (%) | |
| Oil Spill Capture Volume (Gal) | |
| Peak Conveyed Flow Rate (CFS) | |
| Water Quality Flow Rate (CFS) | |

| Up Stream Storage | |
|---|---|
| Storage (ac-ft) | Discharge (cfs) |
| 0.000 | 0.000 |

| Up Stream Flow Diversion | |
|---|---|
| Max. Flow to Stormceptor (cfs) | |

**Particle Size Distribution (PSD)**
**The selected PSD defines TSS removal**

| Fine Distribution | | |
|---|---|---|
| Particle Diameter (microns) | Distribution % | Specific Gravity |
| 20.0 | 20.0 | 1.30 |
| 60.0 | 20.0 | 1.80 |
| 150.0 | 20.0 | 2.20 |
| 400.0 | 20.0 | 2.65 |
| 2000.0 | 20.0 | 2.65 |

## Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

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# Brief Stormceptor Sizing Report - DMH 7A

| Project Information & Location | | | |
|---|---|---|---|
| **Project Name** | Estates at Bull Meadow | **Project Number** | 066 |
| **City** | Grafton | **State/ Province** | Massachusetts |
| **Country** | United States of America | **Date** | 10/5/2016 |
| **Designer Information** | | **EOR Information (optional)** | |
| **Name** | Justin LeClair | **Name** | |
| **Company** | McCarty Engineering | **Company** | |
| **Phone #** | 978-833-9055 | **Phone #** | |
| **Email** | jleclair@mccartydb.com | **Email** | |

**Stormwater Treatment Recommendation**
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

| | |
|---|---|
| **Site Name** | DMH 7A |
| **Target TSS Removal (%)** | 80 |
| **TSS Removal (%) Provided** | 85 |
| **Recommended Stormceptor Model** | STC 450i |

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

| Stormceptor Sizing Summary | |
|---|---|
| **Stormceptor Model** | **% TSS Removal Provided** |
| STC 450i | 85 |
| STC 900 | 91 |
| STC 1200 | 91 |
| STC 1800 | 91 |
| STC 2400 | 93 |
| STC 3600 | 94 |
| STC 4800 | 95 |
| STC 6000 | 95 |
| STC 7200 | 96 |
| STC 11000 | 97 |
| STC 13000 | 98 |
| STC 16000 | 98 |
| StormceptorMAX | Custom |

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## Sizing Details

| Drainage Area | |
|---|---|
| Total Area (acres) | 2.1 |
| Imperviousness % | 18.5 |

| Rainfall | |
|---|---|
| Station Name | WORCESTER WSO AP |
| State/Province | Massachusetts |
| Station ID # | 9923 |
| Years of Records | 58 |
| Latitude | 42°16'2"N |
| Longitude | 71°52'34"W |

| Water Quality Objective | |
|---|---|
| TSS Removal (%) | 80.0 |
| Runoff Volume Capture (%) | |
| Oil Spill Capture Volume (Gal) | |
| Peak Conveyed Flow Rate (CFS) | |
| Water Quality Flow Rate (CFS) | |

| Up Stream Storage | |
|---|---|
| Storage (ac-ft) | Discharge (cfs) |
| 0.000 | 0.000 |

| Up Stream Flow Diversion | |
|---|---|
| Max. Flow to Stormceptor (cfs) | |

**Particle Size Distribution (PSD)**
**The selected PSD defines TSS removal**

| Fine Distribution | | |
|---|---|---|
| Particle Diameter (microns) | Distribution % | Specific Gravity |
| 20.0 | 20.0 | 1.30 |
| 60.0 | 20.0 | 1.80 |
| 150.0 | 20.0 | 2.20 |
| 400.0 | 20.0 | 2.65 |
| 2000.0 | 20.0 | 2.65 |

## Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

**For Stormceptor Specifications and Drawings Please Visit:**
**http://www.imbriumsystems.com/technical-specifications**

# Sediment Forebay Sizing Calculations

INFILTRATION BASIN 1 - SEDIMENT FOREBAY SIZING CALCULATION

**066 Grafton Forebay Sizing Calculation** *Type III 24-hr 100-Year Rainfall=8.79"*

Prepared by McCarty Engineering, Inc. Printed 10/7/2016

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## Summary for Pond 1P: Basin 1 Forebay Sizing

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

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 434.00' | 912 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 434.00 | 70 | 0 | 0 |
| 435.00 | 197 | 134 | 134 |
| 436.00 | 376 | 287 | 420 |
| 437.00 | 608 | 492 | 912 |

Tributary Area to Infiltration Basin 1 = 1.532 ac

Forebay 1 Required Volume = 1.532 ac X 0.1 in X (1 ft/12 in) X 43,560 sf/ac = 556 cf

912 cf > 556 cf

INFILTRATION BASIN 2 - ISOLATOR ROW (FOREBAY) SIZING CALCULATION



## Summary for Pond 2P: Infiltration Basin 2

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

7 CHAMBERS IN ISOLATOR ROW

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 436.50' | 324 cf | **ADS_StormTech SC-740** x 7<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 1 rows |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 436.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 434.00' |
| #2 | Primary | 438.33' | **8.0" Round Culvert**<br>L= 28.0' RCP, mitered to conform to fill, Ke= 0.700<br>Inlet / Outlet Invert= 438.33' / 438.00' S= 0.0118 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.35 sf |

**Discarded OutFlow** Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.00 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
└─**2=Culvert** ( Controls 0.00 cfs)

Tributary Area to Infiltration Basin 2 = 0.543 ac
Forebay 2 Required Volume = 0.543 ac X 0.1 in X (1 ft/12 in) X 43,560 sf/ac = 197 cf

324 cf > 197 cf

INFILTRATION BASIN 3 - SEDIMENT FOREBAY SIZING CALCULATION

**066 Grafton Forebay Sizing Calculation** *Type III 24-hr 100-Year Rainfall=8.79"*

Prepared by McCarty Engineering, Inc. Printed 10/7/2016

HydroCAD® 10.00-16 s/n 02034 © 2015 HydroCAD Software Solutions LLC

## Summary for Pond 3P: Basin 3 Forebay Sizing

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

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 439.00' | 1,482 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 439.00 | 150 | 0 | 0 |
| 440.00 | 338 | 244 | 244 |
| 441.00 | 600 | 469 | 713 |
| 442.00 | 937 | 769 | 1,482 |

Tributary Area to Infiltration Basin 3 = 3.786 ac

Forebay 3 Required Volume = 3.786 ac X 0.1 in X (1 ft/12 in) X 43,560 sf/ac = 1,374 cf

1,482 cf > 1,374 cf

INFILTRATION BASIN 4 - SEDIMENT FOREBAY SIZING CALCULATION



## Summary for Pond 4P: Basin 4 Forebay Sizing

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

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 459.00' | 950 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

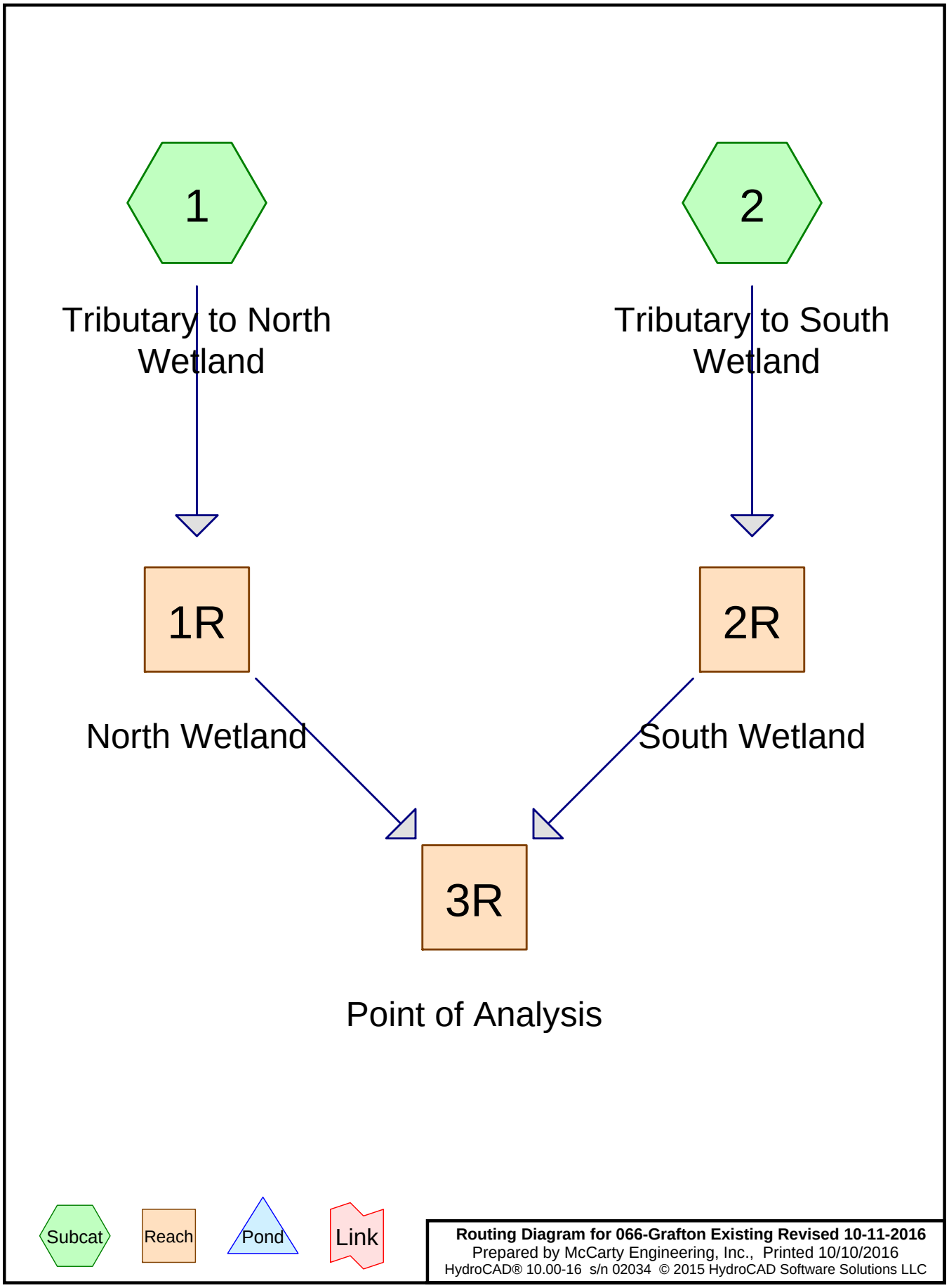
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 459.00 | 262 | 0 | 0 |
| 460.00 | 465 | 364 | 364 |
| 461.00 | 707 | 586 | 950 |

Tributary Area to Infiltration Basin 4 = 1.954 ac
Forebay 4 Required Volume = 1.954 ac X 0.1 in X (1 ft/12 in) X 43,560 sf/ac = 709 cf

950 cf > 709 cf

# Appendix B

# Existing Conditions HydroCAD Model




**Routing Diagram for 066-Grafton Existing Revised 10-11-2016**
Prepared by McCarty Engineering, Inc., Printed 10/10/2016
HydroCAD® 10.00-16 s/n 02034 © 2015 HydroCAD Software Solutions LLC

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 2.675 | 39 | >75% Grass cover, Good, HSG A (1) |
| 0.166 | 74 | >75% Grass cover, Good, HSG C (1) |
| 0.023 | 98 | Paved parking, HSG A (1) |
| 0.032 | 98 | Paved parking, HSG C (1) |
| 0.046 | 98 | Roofs, HSG A (1) |
| 0.168 | 98 | Wetland (1) |
| 13.155 | 30 | Woods, Good, HSG A (1, 2) |
| 0.125 | 77 | Woods, Good, HSG D (2) |
| **16.389** | **33** | **TOTAL AREA** |

## Soil Listing (all nodes)

| Area (acres) | Soil Group | Subcatchment Numbers |
|---|---|---|
| 15.899 | HSG A | 1, 2 |
| 0.000 | HSG B | |
| 0.198 | HSG C | 1 |
| 0.125 | HSG D | 2 |
| 0.168 | Other | 1 |
| **16.389** | | **TOTAL AREA** |

## Ground Covers (all nodes)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| 2.675 | 0.000 | 0.166 | 0.000 | 0.000 | 2.841 | >75% Grass cover, Good | 1 |
| 0.023 | 0.000 | 0.032 | 0.000 | 0.000 | 0.055 | Paved parking | 1 |
| 0.046 | 0.000 | 0.000 | 0.000 | 0.000 | 0.046 | Roofs | 1 |
| 0.000 | 0.000 | 0.000 | 0.000 | 0.168 | 0.168 | Wetland | 1 |
| 13.155 | 0.000 | 0.000 | 0.125 | 0.000 | 13.280 | Woods, Good | 1, 2 |
| **15.899** | **0.000** | **0.198** | **0.125** | **0.168** | **16.389** | **TOTAL AREA** | |

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 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 1: Tributary to North** Runoff Area=438,077 sf 2.67% Impervious Runoff Depth=0.00"
Flow Length=1,038' Tc=13.7 min CN=35 Runoff=0.00 cfs 0.000 af

**Subcatchment 2: Tributary to South** Runoff Area=275,846 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=732' Tc=12.9 min CN=31 Runoff=0.00 cfs 0.000 af

**Reach 1R: North Wetland** Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

**Reach 2R: South Wetland** Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

**Reach 3R: Point of Analysis** Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

**Total Runoff Area = 16.389 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.00"**
**98.36% Pervious = 16.121 ac 1.64% Impervious = 0.269 ac**

## Summary for Subcatchment 1: Tributary to North Wetland

[45] Hint: Runoff=Zero

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 1,000 | 98 | Paved parking, HSG A |
| | 2,000 | 98 | Roofs, HSG A |
| | 1,375 | 98 | Paved parking, HSG C |
| | 116,528 | 39 | >75% Grass cover, Good, HSG A |
| | 7,232 | 74 | >75% Grass cover, Good, HSG C |
| * | 7,326 | 98 | Wetland |
| | 302,616 | 30 | Woods, Good, HSG A |
| | 438,077 | 35 | Weighted Average |
| | 426,376 | | 97.33% Pervious Area |
| | 11,701 | | 2.67% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.3 | 50 | 0.0800 | 0.25 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 3.0 | 338 | 0.0700 | 1.85 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 7.4 | 650 | 0.0850 | 1.46 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 13.7 | 1,038 | Total | | | |

## Summary for Subcatchment 2: Tributary to South Wetland

[45] Hint: Runoff=Zero

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 270,417 | 30 | Woods, Good, HSG A |
| 5,429 | 77 | Woods, Good, HSG D |
| 275,846 | 31 | Weighted Average |
| 275,846 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.3 | 50 | 0.0400 | 0.19 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 8.6 | 682 | 0.0700 | 1.32 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 12.9 | 732 | Total | | | |

## Summary for Reach 1R: North Wetland

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

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 10.057 ac, | 2.67% Impervious, | Inflow Depth = | 0.00" | for 2-Year event |
| Inflow = | 0.00 cfs @ | 0.00 hrs, | Volume= | 0.000 af | |
| Outflow = | 0.00 cfs @ | 0.00 hrs, | Volume= | 0.000 af, | Atten= 0%, Lag= 0.0 min |

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Reach 2R: South Wetland

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

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 6.333 ac, | 0.00% Impervious, | Inflow Depth = | 0.00" | for 2-Year event |
| Inflow = | 0.00 cfs @ | 0.00 hrs, | Volume= | 0.000 af | |
| Outflow = | 0.00 cfs @ | 0.00 hrs, | Volume= | 0.000 af, | Atten= 0%, Lag= 0.0 min |

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Reach 3R: Point of Analysis

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

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 16.389 ac, | 1.64% Impervious, | Inflow Depth = | 0.00" | for 2-Year event |
| Inflow = | 0.00 cfs @ | 0.00 hrs, | Volume= | 0.000 af | |
| Outflow = | 0.00 cfs @ | 0.00 hrs, | Volume= | 0.000 af, | Atten= 0%, Lag= 0.0 min |

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 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 1: Tributary to North** Runoff Area=438,077 sf 2.67% Impervious Runoff Depth=0.07"
Flow Length=1,038' Tc=13.7 min CN=35 Runoff=0.09 cfs 0.057 af

**Subcatchment 2: Tributary to South** Runoff Area=275,846 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=732' Tc=12.9 min CN=31 Runoff=0.01 cfs 0.004 af

**Reach 1R: North Wetland** Inflow=0.09 cfs 0.057 af
Outflow=0.09 cfs 0.057 af

**Reach 2R: South Wetland** Inflow=0.01 cfs 0.004 af
Outflow=0.01 cfs 0.004 af

**Reach 3R: Point of Analysis** Inflow=0.09 cfs 0.061 af
Outflow=0.09 cfs 0.061 af

**Total Runoff Area = 16.389 ac Runoff Volume = 0.061 af Average Runoff Depth = 0.04"**
**98.36% Pervious = 16.121 ac 1.64% Impervious = 0.269 ac**

## Summary for Subcatchment 1: Tributary to North Wetland

Runoff = 0.09 cfs @ 15.45 hrs, Volume= 0.057 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 1,000 | 98 | Paved parking, HSG A |
| | 2,000 | 98 | Roofs, HSG A |
| | 1,375 | 98 | Paved parking, HSG C |
| | 116,528 | 39 | >75% Grass cover, Good, HSG A |
| | 7,232 | 74 | >75% Grass cover, Good, HSG C |
| * | 7,326 | 98 | Wetland |
| | 302,616 | 30 | Woods, Good, HSG A |
| | 438,077 | 35 | Weighted Average |
| | 426,376 | | 97.33% Pervious Area |
| | 11,701 | | 2.67% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.3 | 50 | 0.0800 | 0.25 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 3.0 | 338 | 0.0700 | 1.85 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 7.4 | 650 | 0.0850 | 1.46 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 13.7 | 1,038 | Total | | | |

## Summary for Subcatchment 2: Tributary to South Wetland

Runoff = 0.01 cfs @ 23.32 hrs, Volume= 0.004 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 270,417 | 30 | Woods, Good, HSG A |
| 5,429 | 77 | Woods, Good, HSG D |
| 275,846 | 31 | Weighted Average |
| 275,846 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.3 | 50 | 0.0400 | 0.19 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 8.6 | 682 | 0.0700 | 1.32 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 12.9 | 732 | Total | | | |

## Summary for Reach 1R: North Wetland

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

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 10.057 ac, | 2.67% Impervious, | Inflow Depth = | 0.07" | for 10-Year event |
| Inflow = | 0.09 cfs @ | 15.45 hrs, | Volume= | 0.057 af | |
| Outflow = | 0.09 cfs @ | 15.45 hrs, | Volume= | 0.057 af, | Atten= 0%, Lag= 0.0 min |

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Reach 2R: South Wetland

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

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 6.333 ac, | 0.00% Impervious, | Inflow Depth = | 0.01" | for 10-Year event |
| Inflow = | 0.01 cfs @ | 23.32 hrs, | Volume= | 0.004 af | |
| Outflow = | 0.01 cfs @ | 23.32 hrs, | Volume= | 0.004 af, | Atten= 0%, Lag= 0.0 min |

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Reach 3R: Point of Analysis

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

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 16.389 ac, | 1.64% Impervious, | Inflow Depth = | 0.04" | for 10-Year event |
| Inflow = | 0.09 cfs @ | 15.45 hrs, Volume= | 0.061 af | | |
| Outflow = | 0.09 cfs @ | 15.45 hrs, Volume= | 0.061 af, Atten= 0%, Lag= 0.0 min | | |

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 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 1: Tributary to North** Runoff Area=438,077 sf 2.67% Impervious Runoff Depth=0.28"
Flow Length=1,038' Tc=13.7 min CN=35 Runoff=0.60 cfs 0.239 af

**Subcatchment 2: Tributary to South** Runoff Area=275,846 sf 0.00% Impervious Runoff Depth=0.12"
Flow Length=732' Tc=12.9 min CN=31 Runoff=0.10 cfs 0.064 af

**Reach 1R: North Wetland** Inflow=0.60 cfs 0.239 af
Outflow=0.60 cfs 0.239 af

**Reach 2R: South Wetland** Inflow=0.10 cfs 0.064 af
Outflow=0.10 cfs 0.064 af

**Reach 3R: Point of Analysis** Inflow=0.60 cfs 0.303 af
Outflow=0.60 cfs 0.303 af

**Total Runoff Area = 16.389 ac Runoff Volume = 0.303 af Average Runoff Depth = 0.22"**
**98.36% Pervious = 16.121 ac 1.64% Impervious = 0.269 ac**

## Summary for Subcatchment 1: Tributary to North Wetland

Runoff = 0.60 cfs @ 12.56 hrs, Volume= 0.239 af, Depth= 0.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 1,000 | 98 | Paved parking, HSG A |
| | 2,000 | 98 | Roofs, HSG A |
| | 1,375 | 98 | Paved parking, HSG C |
| | 116,528 | 39 | >75% Grass cover, Good, HSG A |
| | 7,232 | 74 | >75% Grass cover, Good, HSG C |
| * | 7,326 | 98 | Wetland |
| | 302,616 | 30 | Woods, Good, HSG A |
| | 438,077 | 35 | Weighted Average |
| | 426,376 | | 97.33% Pervious Area |
| | 11,701 | | 2.67% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.3 | 50 | 0.0800 | 0.25 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 3.0 | 338 | 0.0700 | 1.85 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 7.4 | 650 | 0.0850 | 1.46 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 13.7 | 1,038 | Total | | | |

## Summary for Subcatchment 2: Tributary to South Wetland

Runoff = 0.10 cfs @ 15.09 hrs, Volume= 0.064 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 270,417 | 30 | Woods, Good, HSG A |
| 5,429 | 77 | Woods, Good, HSG D |
| 275,846 | 31 | Weighted Average |
| 275,846 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.3 | 50 | 0.0400 | 0.19 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 8.6 | 682 | 0.0700 | 1.32 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 12.9 | 732 | Total | | | |

## Summary for Reach 1R: North Wetland

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

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 10.057 ac, | 2.67% Impervious, | Inflow Depth = | 0.28" | for 25-Year event |
| Inflow = | 0.60 cfs @ | 12.56 hrs, | Volume= | 0.239 af | |
| Outflow = | 0.60 cfs @ | 12.56 hrs, | Volume= | 0.239 af, | Atten= 0%, Lag= 0.0 min |

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Reach 2R: South Wetland

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

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 6.333 ac, | 0.00% Impervious, | Inflow Depth = | 0.12" | for 25-Year event |
| Inflow = | 0.10 cfs @ | 15.09 hrs, | Volume= | 0.064 af | |
| Outflow = | 0.10 cfs @ | 15.09 hrs, | Volume= | 0.064 af, | Atten= 0%, Lag= 0.0 min |

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Reach 3R: Point of Analysis

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

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 16.389 ac, | 1.64% Impervious, | Inflow Depth = | 0.22" | for 25-Year event |
| Inflow = | 0.60 cfs @ | 12.56 hrs, | Volume= | 0.303 af | |
| Outflow = | 0.60 cfs @ | 12.56 hrs, | Volume= | 0.303 af, | Atten= 0%, Lag= 0.0 min |

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 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 1: Tributary to North** Runoff Area=438,077 sf 2.67% Impervious Runoff Depth=1.09"
Flow Length=1,038' Tc=13.7 min CN=35 Runoff=5.75 cfs 0.913 af

**Subcatchment 2: Tributary to South** Runoff Area=275,846 sf 0.00% Impervious Runoff Depth=0.71"
Flow Length=732' Tc=12.9 min CN=31 Runoff=1.76 cfs 0.373 af

**Reach 1R: North Wetland** Inflow=5.75 cfs 0.913 af
Outflow=5.75 cfs 0.913 af

**Reach 2R: South Wetland** Inflow=1.76 cfs 0.373 af
Outflow=1.76 cfs 0.373 af

**Reach 3R: Point of Analysis** Inflow=7.35 cfs 1.287 af
Outflow=7.35 cfs 1.287 af

**Total Runoff Area = 16.389 ac Runoff Volume = 1.287 af Average Runoff Depth = 0.94"**
**98.36% Pervious = 16.121 ac 1.64% Impervious = 0.269 ac**

## Summary for Subcatchment 1: Tributary to North Wetland

Runoff = 5.75 cfs @ 12.31 hrs, Volume= 0.913 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 1,000 | 98 | Paved parking, HSG A |
| | 2,000 | 98 | Roofs, HSG A |
| | 1,375 | 98 | Paved parking, HSG C |
| | 116,528 | 39 | >75% Grass cover, Good, HSG A |
| | 7,232 | 74 | >75% Grass cover, Good, HSG C |
| * | 7,326 | 98 | Wetland |
| | 302,616 | 30 | Woods, Good, HSG A |
| | 438,077 | 35 | Weighted Average |
| | 426,376 | | 97.33% Pervious Area |
| | 11,701 | | 2.67% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.3 | 50 | 0.0800 | 0.25 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 3.0 | 338 | 0.0700 | 1.85 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 7.4 | 650 | 0.0850 | 1.46 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 13.7 | 1,038 | Total | | | |

## Summary for Subcatchment 2: Tributary to South Wetland

Runoff = 1.76 cfs @ 12.43 hrs, Volume= 0.373 af, Depth= 0.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 270,417 | 30 | Woods, Good, HSG A |
| 5,429 | 77 | Woods, Good, HSG D |
| 275,846 | 31 | Weighted Average |
| 275,846 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.3 | 50 | 0.0400 | 0.19 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 8.6 | 682 | 0.0700 | 1.32 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 12.9 | 732 | Total | | | |

## Summary for Reach 1R: North Wetland

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

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 10.057 ac, | 2.67% Impervious, | Inflow Depth = | 1.09" | for 100-Year event |
| Inflow = | 5.75 cfs @ | 12.31 hrs, | Volume= | 0.913 af | |
| Outflow = | 5.75 cfs @ | 12.31 hrs, | Volume= | 0.913 af, | Atten= 0%, Lag= 0.0 min |

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

## Summary for Reach 2R: South Wetland

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

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 6.333 ac, | 0.00% Impervious, | Inflow Depth = | 0.71" | for 100-Year event |
| Inflow = | 1.76 cfs @ | 12.43 hrs, | Volume= | 0.373 af | |
| Outflow = | 1.76 cfs @ | 12.43 hrs, | Volume= | 0.373 af, | Atten= 0%, Lag= 0.0 min |

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

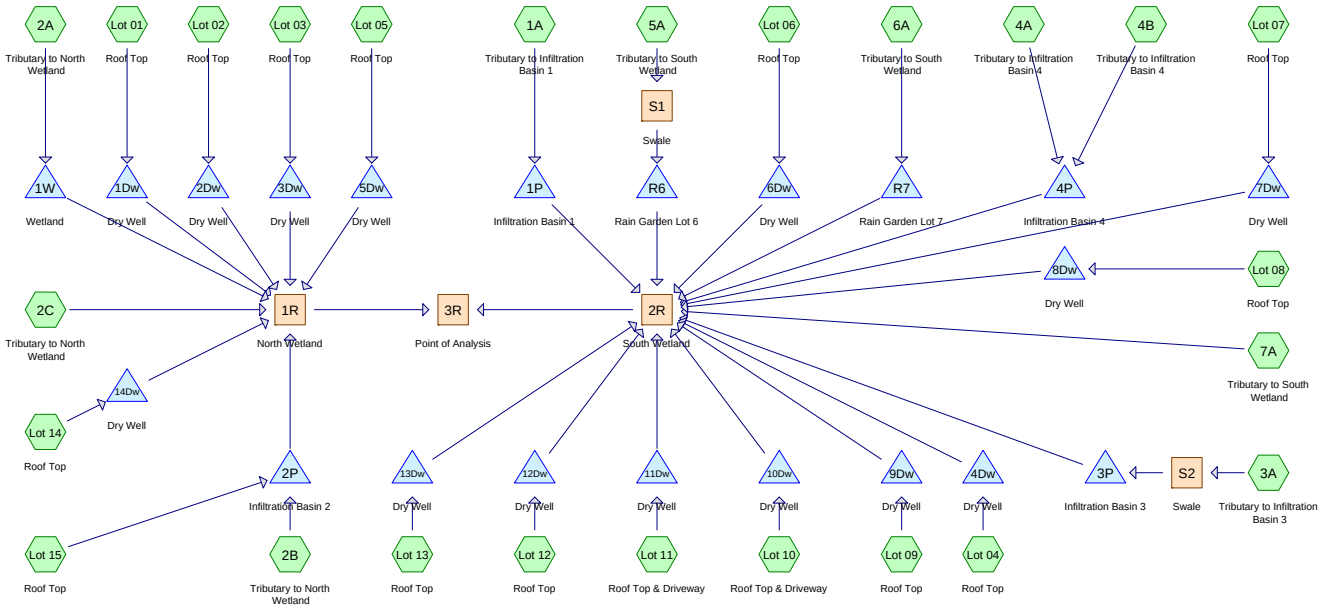
## Summary for Reach 3R: Point of Analysis

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

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 16.389 ac, | 1.64% Impervious, | Inflow Depth = | 0.94" | for 100-Year event |
| Inflow = | 7.35 cfs @ | 12.37 hrs, | Volume= | 1.287 af | |
| Outflow = | 7.35 cfs @ | 12.37 hrs, | Volume= | 1.287 af, | Atten= 0%, Lag= 0.0 min |

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

# Proposed Conditions HydroCAD Model




Subcat Reach Pond Link

**Routing Diagram for 066-Grafton Proposed Subdivision Revised 10-11-2016**

Prepared by McCarty Engineering, Inc., Printed 10/10/2016

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## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 11.823 | 39 | >75% Grass cover, Good, HSG A (1A, 2A, 2B, 2C, 3A, 4A, 4B, 5A, 6A, 7A, Lot 02) |
| 0.083 | 74 | >75% Grass cover, Good, HSG C (3A, 6A) |
| 0.180 | 98 | Paved Sidewalk, HSG A (1A, 2B, 3A, 4A) |
| 0.335 | 98 | Paved parking, HSG A (5A, Lot 01, Lot 02, Lot 05, Lot 10, Lot 11, Lot 12, Lot 13, Lot 14, Lot 15) |
| 0.023 | 98 | Paved parking, HSG C (5A) |
| 1.592 | 98 | Paved roads w/curbs & sewers, HSG A (1A, 2B, 3A, 4A) |
| 0.735 | 98 | Roofs (5A, Lot 01, Lot 02, Lot 03, Lot 04, Lot 05, Lot 06, Lot 07, Lot 08, Lot 09, Lot 10, Lot 11, Lot 12, Lot 13, Lot 14, Lot 15) |
| 0.104 | 98 | Wetland (2A) |
| 1.514 | 30 | Woods, Good, HSG A (2A, 3A, 5A) |
| **16.390** | **49** | **TOTAL AREA** |

## Soil Listing (all nodes)

| Area (acres) | Soil Group | Subcatchment Numbers |
|---|---|---|
| 15.445 | HSG A | 1A, 2A, 2B, 2C, 3A, 4A, 4B, 5A, 6A, 7A, Lot 01, Lot 02, Lot 05, Lot 10, Lot 11, Lot 12, Lot 13, Lot 14, Lot 15 |
| 0.000 | HSG B | |
| 0.105 | HSG C | 3A, 5A, 6A |
| 0.000 | HSG D | |
| 0.839 | Other | 2A, 5A, Lot 01, Lot 02, Lot 03, Lot 04, Lot 05, Lot 06, Lot 07, Lot 08, Lot 09, Lot 10, Lot 11, Lot 12, Lot 13, Lot 14, Lot 15 |
| **16.390** | | **TOTAL AREA** |

## Ground Covers (all nodes)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| 11.823 | 0.000 | 0.083 | 0.000 | 0.000 | 11.906 | >75% Grass cover, Good | 1A, 2A, 2B, 2C, 3A, 4A, 4B, 5A, 6A, 7A, Lot 02 |
| 0.180 | 0.000 | 0.000 | 0.000 | 0.000 | 0.180 | Paved Sidewalk | 1A, 2B, 3A, 4A |
| 0.335 | 0.000 | 0.023 | 0.000 | 0.000 | 0.358 | Paved parking | 5A, Lot 01, Lot 02, Lot 05, Lot 10, Lot 11, Lot 12, Lot 13, Lot 14, Lot 15 |
| 1.592 | 0.000 | 0.000 | 0.000 | 0.000 | 1.592 | Paved roads w/curbs & sewers | 1A, 2B, 3A, 4A |
| 0.000 | 0.000 | 0.000 | 0.000 | 0.735 | 0.735 | Roofs | 5A, Lot 01, Lot 02, Lot 03, |

## Ground Covers (all nodes) (continued)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| 0.000 | 0.000 | 0.000 | 0.000 | 0.104 | 0.104 | Wetland | 2A |
| 1.514 | 0.000 | 0.000 | 0.000 | 0.000 | 1.514 | Woods, Good | 2A, 3A, 5A |
| **15.445** | **0.000** | **0.105** | **0.000** | **0.839** | **16.390** | **TOTAL AREA** | |

## Pipe Listing (all nodes)

| Line# | Node Number | In-Invert (feet) | Out-Invert (feet) | Length (feet) | Slope (ft/ft) | n | Diam/Width (inches) | Height (inches) | Inside-Fill (inches) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1A | 0.00 | 0.00 | 18.0 | 0.0050 | 0.013 | 12.0 | 0.0 | 0.0 |
| 2 | 1A | 0.00 | 0.00 | 683.0 | 0.0050 | 0.013 | 18.0 | 0.0 | 0.0 |
| 3 | 4A | 0.00 | 0.00 | 296.0 | 0.0400 | 0.013 | 12.0 | 0.0 | 0.0 |
| 4 | 4A | 0.00 | 0.00 | 245.0 | 0.0100 | 0.013 | 18.0 | 0.0 | 0.0 |
| 5 | 1W | 435.00 | 434.40 | 60.0 | 0.0100 | 0.035 | 300.0 | 72.0 | 0.0 |
| 6 | 2P | 438.33 | 438.00 | 22.0 | 0.0150 | 0.011 | 8.0 | 0.0 | 0.0 |

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 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 1A: Tributary to Infiltration** Runoff Area=66,738 sf 36.85% Impervious Runoff Depth=0.46"
Flow Length=985' Tc=11.8 min CN=61 Runoff=0.43 cfs 0.058 af

**Subcatchment 2A: Tributary to North** Runoff Area=155,575 sf 2.92% Impervious Runoff Depth=0.00"
Flow Length=1,053' Tc=19.7 min CN=37 Runoff=0.00 cfs 0.000 af

**Subcatchment 2B: Tributary to North** Runoff Area=12,566 sf 69.66% Impervious Runoff Depth=1.43"
Tc=5.0 min CN=80 Runoff=0.49 cfs 0.034 af

**Subcatchment 2C: Tributary to North** Runoff Area=47,923 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=155' Tc=5.3 min CN=39 Runoff=0.00 cfs 0.000 af

**Subcatchment 3A: Tributary to Infiltration** Runoff Area=164,903 sf 10.34% Impervious Runoff Depth=0.05"
Flow Length=240' Tc=7.4 min CN=45 Runoff=0.02 cfs 0.015 af

**Subcatchment 4A: Tributary to Infiltration** Runoff Area=59,320 sf 45.18% Impervious Runoff Depth=0.66"
Flow Length=956' Tc=9.8 min CN=66 Runoff=0.74 cfs 0.075 af

**Subcatchment 4B: Tributary to Infiltration** Runoff Area=25,791 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=223' Tc=5.5 min CN=39 Runoff=0.00 cfs 0.000 af

**Subcatchment 5A: Tributary to South** Runoff Area=88,617 sf 4.51% Impervious Runoff Depth=0.01"
Flow Length=502' Tc=11.3 min CN=41 Runoff=0.00 cfs 0.001 af

**Subcatchment 6A: Tributary to South** Runoff Area=8,416 sf 0.00% Impervious Runoff Depth=0.21"
Tc=5.0 min CN=53 Runoff=0.01 cfs 0.003 af

**Subcatchment 7A: Tributary to South** Runoff Area=35,040 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=170' Tc=6.0 min CN=39 Runoff=0.00 cfs 0.000 af

**Subcatchment Lot 01: Roof Top** Runoff Area=3,503 sf 100.00% Impervious Runoff Depth=3.00"
Tc=5.0 min CN=98 Runoff=0.26 cfs 0.020 af

**Subcatchment Lot 02: Roof Top** Runoff Area=9,051 sf 39.89% Impervious Runoff Depth=0.53"
Tc=5.0 min CN=63 Runoff=0.10 cfs 0.009 af

**Subcatchment Lot 03: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=3.00"
Tc=5.0 min CN=98 Runoff=0.15 cfs 0.011 af

**Subcatchment Lot 04: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=3.00"
Tc=5.0 min CN=98 Runoff=0.15 cfs 0.011 af

**Subcatchment Lot 05: Roof Top** Runoff Area=3,233 sf 100.00% Impervious Runoff Depth=3.00"
Tc=5.0 min CN=98 Runoff=0.24 cfs 0.019 af

**Subcatchment Lot 06: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=3.00"
Tc=5.0 min CN=98 Runoff=0.15 cfs 0.011 af

**Subcatchment Lot 07: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=3.00"
Tc=5.0 min CN=98 Runoff=0.15 cfs 0.011 af

**Subcatchment Lot 08: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=3.00"
Tc=5.0 min CN=98 Runoff=0.15 cfs 0.011 af

**Subcatchment Lot 09: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=3.00"
Tc=5.0 min CN=98 Runoff=0.15 cfs 0.011 af

**Subcatchment Lot 10: Roof Top &** Runoff Area=3,612 sf 100.00% Impervious Runoff Depth=3.00"
Tc=5.0 min CN=98 Runoff=0.27 cfs 0.021 af

**Subcatchment Lot 11: Roof Top &** Runoff Area=3,465 sf 100.00% Impervious Runoff Depth=3.00"
Tc=5.0 min CN=98 Runoff=0.26 cfs 0.020 af

**Subcatchment Lot 12: Roof Top** Runoff Area=3,547 sf 100.00% Impervious Runoff Depth=3.00"
Tc=5.0 min CN=98 Runoff=0.26 cfs 0.020 af

**Subcatchment Lot 13: Roof Top** Runoff Area=3,647 sf 100.00% Impervious Runoff Depth=3.00"
Tc=5.0 min CN=98 Runoff=0.27 cfs 0.021 af

**Subcatchment Lot 14: Roof Top** Runoff Area=3,603 sf 100.00% Impervious Runoff Depth=3.00"
Tc=5.0 min CN=98 Runoff=0.27 cfs 0.021 af

**Subcatchment Lot 15: Roof Top** Runoff Area=3,378 sf 100.00% Impervious Runoff Depth=3.00"
Tc=5.0 min CN=98 Runoff=0.25 cfs 0.019 af

**Reach 1R: North Wetland** Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

**Reach 2R: South Wetland** Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

**Reach 3R: Point of Analysis** Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

**Reach S1: Swale** Avg. Flow Depth=0.01' Max Vel=0.04 fps Inflow=0.00 cfs 0.001 af
n=0.150 L=100.0' S=0.0050 '/' Capacity=17.52 cfs Outflow=0.00 cfs 0.001 af

**Reach S2: Swale** Avg. Flow Depth=0.02' Max Vel=0.09 fps Inflow=0.02 cfs 0.015 af
n=0.150 L=180.0' S=0.0111 '/' Capacity=28.10 cfs Outflow=0.02 cfs 0.015 af

**Pond 1Dw: Dry Well** Peak Elev=481.27' Storage=350 cf Inflow=0.26 cfs 0.020 af
Discarded=0.02 cfs 0.020 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.020 af

**Pond 1P: Infiltration Basin 1** Peak Elev=434.26' Storage=503 cf Inflow=0.43 cfs 0.058 af
Discarded=0.13 cfs 0.058 af Primary=0.00 cfs 0.000 af Outflow=0.13 cfs 0.058 af

**Pond 1W: Wetland** Peak Elev=434.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
300.0" x 72.0" Box Culvert n=0.035 L=60.0' S=0.0100 '/' Outflow=0.00 cfs 0.000 af

**Pond 2Dw: Dry Well** Peak Elev=479.77' Storage=90 cf Inflow=0.10 cfs 0.009 af
Discarded=0.02 cfs 0.009 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.009 af

**Pond 2P: Infiltration Basin 2** Peak Elev=436.85' Storage=711 cf Inflow=0.75 cfs 0.054 af
Discarded=0.12 cfs 0.054 af Primary=0.00 cfs 0.000 af Outflow=0.12 cfs 0.054 af

**Pond 3Dw: Dry Well** Peak Elev=481.31' Storage=178 cf Inflow=0.15 cfs 0.011 af
Discarded=0.01 cfs 0.011 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.011 af

**Pond 3P: Infiltration Basin 3** Peak Elev=439.01' Storage=16 cf Inflow=0.02 cfs 0.015 af
Discarded=0.02 cfs 0.015 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.015 af

**Pond 4Dw: Dry Well** Peak Elev=481.31' Storage=178 cf Inflow=0.15 cfs 0.011 af
Discarded=0.01 cfs 0.011 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.011 af

**Pond 4P: Infiltration Basin 4** Peak Elev=459.15' Storage=617 cf Inflow=0.74 cfs 0.075 af
Discarded=0.25 cfs 0.075 af Primary=0.00 cfs 0.000 af Outflow=0.25 cfs 0.075 af

**Pond 5Dw: Dry Well** Peak Elev=481.14' Storage=315 cf Inflow=0.24 cfs 0.019 af
Discarded=0.02 cfs 0.019 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.019 af

**Pond 6Dw: Dry Well** Peak Elev=481.31' Storage=178 cf Inflow=0.15 cfs 0.011 af
Discarded=0.01 cfs 0.011 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.011 af

**Pond 7Dw: Dry Well** Peak Elev=481.31' Storage=178 cf Inflow=0.15 cfs 0.011 af
Discarded=0.01 cfs 0.011 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.011 af

**Pond 8Dw: Dry Well** Peak Elev=481.31' Storage=178 cf Inflow=0.15 cfs 0.011 af
Discarded=0.01 cfs 0.011 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.011 af

**Pond 9Dw: Dry Well** Peak Elev=481.31' Storage=178 cf Inflow=0.15 cfs 0.011 af
Discarded=0.01 cfs 0.011 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.011 af

**Pond 10Dw: Dry Well** Peak Elev=481.32' Storage=365 cf Inflow=0.27 cfs 0.021 af
Discarded=0.02 cfs 0.021 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.021 af

**Pond 11Dw: Dry Well** Peak Elev=481.25' Storage=345 cf Inflow=0.26 cfs 0.020 af
Discarded=0.02 cfs 0.020 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.020 af

**Pond 12Dw: Dry Well** Peak Elev=481.29' Storage=356 cf Inflow=0.26 cfs 0.020 af
Discarded=0.02 cfs 0.020 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.020 af

**Pond 13Dw: Dry Well** Peak Elev=481.31' Storage=368 cf Inflow=0.27 cfs 0.021 af
Discarded=0.02 cfs 0.021 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.021 af

**Pond 14Dw: Dry Well** Peak Elev=481.27' Storage=363 cf Inflow=0.27 cfs 0.021 af
Discarded=0.02 cfs 0.021 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.021 af

**Pond R6: Rain Garden Lot 6** Peak Elev=484.00' Storage=0 cf Inflow=0.00 cfs 0.001 af
Discarded=0.00 cfs 0.001 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.001 af

**Pond R7: Rain Garden Lot 7** Peak Elev=475.01' Storage=2 cf Inflow=0.01 cfs 0.003 af
Discarded=0.01 cfs 0.003 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.003 af

**Total Runoff Area = 16.390 ac Runoff Volume = 0.426 af Average Runoff Depth = 0.31"**
**81.88% Pervious = 13.420 ac 18.12% Impervious = 2.970 ac**

## Summary for Subcatchment 1A: Tributary to Infiltration Basin 1

Runoff = 0.43 cfs @ 12.23 hrs, Volume= 0.058 af, Depth= 0.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 21,551 | 98 | Paved roads w/curbs & sewers, HSG A |
| * | 3,043 | 98 | Paved Sidewalk, HSG A |
| | 42,144 | 39 | >75% Grass cover, Good, HSG A |
| | 66,738 | 61 | Weighted Average |
| | 42,144 | | 63.15% Pervious Area |
| | 24,594 | | 36.85% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.5 | 50 | 0.0100 | 0.11 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 0.7 | 28 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.2 | 30 | 0.1600 | 2.80 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.6 | 176 | 0.0500 | 4.54 | | **Shallow Concentrated Flow,** Paved Kv= 20.3 fps |
| 0.1 | 18 | 0.0050 | 3.21 | 2.52 | **Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 |
| 2.7 | 683 | 0.0050 | 4.20 | 7.43 | **Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 |
| 11.8 | 985 | Total | | | |

## Summary for Subcatchment 2A: Tributary to North Wetland

[45] Hint: Runoff=Zero

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 91,230 | 39 | >75% Grass cover, Good, HSG A |
| * | 4,549 | 98 | Wetland |
| | 59,796 | 30 | Woods, Good, HSG A |
| | 155,575 | 37 | Weighted Average |
| | 151,026 | | 97.08% Pervious Area |
| | 4,549 | | 2.92% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.5 | 50 | 0.0100 | 0.11 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 2.9 | 327 | 0.0700 | 1.85 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 4.3 | 367 | 0.0800 | 1.41 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 3.2 | 153 | 0.0250 | 0.79 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 1.5 | 105 | 0.0280 | 1.17 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.3 | 51 | 0.2000 | 3.13 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 19.7 | 1,053 | Total | | | |

## Summary for Subcatchment 2B: Tributary to North Wetland

Runoff = 0.49 cfs @ 12.08 hrs, Volume= 0.034 af, Depth= 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 7,687 | 98 | Paved roads w/curbs & sewers, HSG A |
| | 3,812 | 39 | >75% Grass cover, Good, HSG A |
| * | 1,067 | 98 | Paved Sidewalk, HSG A |
| | 12,566 | 80 | Weighted Average |
| | 3,812 | | 30.34% Pervious Area |
| | 8,754 | | 69.66% Impervious Area |

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

## Summary for Subcatchment 2C: Tributary to North Wetland

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 47,923 | 39 | >75% Grass cover, Good, HSG A |
| 47,923 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.7 | 50 | 0.0600 | 0.23 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 1.3 | 55 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.3 | 50 | 0.1200 | 2.42 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 5.3 | 155 | Total | | | |

## Summary for Subcatchment 3A: Tributary to Infiltration Basin 3

Runoff = 0.02 cfs @ 15.30 hrs, Volume= 0.015 af, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 144,721 | 39 | >75% Grass cover, Good, HSG A |
| | 190 | 74 | >75% Grass cover, Good, HSG C |
| | 2,937 | 30 | Woods, Good, HSG A |
| * | 1,123 | 98 | Paved Sidewalk, HSG A |
| | 15,932 | 98 | Paved roads w/curbs & sewers, HSG A |
| | 164,903 | 45 | Weighted Average |
| | 147,848 | | 89.66% Pervious Area |
| | 17,055 | | 10.34% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.7 | 50 | 0.0200 | 0.15 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 1.7 | 190 | 0.0700 | 1.85 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 7.4 | 240 | Total | | | |

## Summary for Subcatchment 4A: Tributary to Infiltration Basin 4

Runoff = 0.74 cfs @ 12.16 hrs, Volume= 0.075 af, Depth= 0.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 24,181 | 98 | Paved roads w/curbs & sewers, HSG A |
| * | 2,622 | 98 | Paved Sidewalk, HSG A |
| | 32,517 | 39 | >75% Grass cover, Good, HSG A |
| | 59,320 | 66 | Weighted Average |
| | 32,517 | | 54.82% Pervious Area |
| | 26,803 | | 45.18% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.5 | 50 | 0.0100 | 0.11 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 1.1 | 365 | 0.0800 | 5.74 | | **Shallow Concentrated Flow,** Paved Kv= 20.3 fps |
| 0.5 | 296 | 0.0400 | 9.07 | 7.13 | **Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 |
| 0.7 | 245 | 0.0100 | 5.94 | 10.50 | **Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 |
| 9.8 | 956 | Total | | | |

## Summary for Subcatchment 4B: Tributary to Infiltration Basin 4

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 25,791 | 39 | >75% Grass cover, Good, HSG A |
| 25,791 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.7 | 50 | 0.0600 | 0.23 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 1.6 | 130 | 0.0380 | 1.36 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.2 | 43 | 0.1800 | 2.97 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 5.5 | 223 | Total | | | |

## Summary for Subcatchment 5A: Tributary to South Wetland

Runoff = 0.00 cfs @ 22.51 hrs, Volume= 0.001 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 81,385 | 39 | >75% Grass cover, Good, HSG A |
| 3,232 | 30 | Woods, Good, HSG A |
| 2,000 | 98 | Roofs |
| 1,000 | 98 | Paved parking, HSG A |
| 1,000 | 98 | Paved parking, HSG C |
| 88,617 | 41 | Weighted Average |
| 84,617 | | 95.49% Pervious Area |
| 4,000 | | 4.51% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.7 | 50 | 0.0600 | 0.23 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 3.1 | 319 | 0.0600 | 1.71 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 4.5 | 133 | 0.0050 | 0.49 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 11.3 | 502 | Total | | | |

## Summary for Subcatchment 6A: Tributary to South Wetland

Runoff = 0.01 cfs @ 12.36 hrs, Volume= 0.003 af, Depth= 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 5,011 | 39 | >75% Grass cover, Good, HSG A |
| 3,405 | 74 | >75% Grass cover, Good, HSG C |
| 8,416 | 53 | Weighted Average |
| 8,416 | | 100.00% Pervious Area |

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

## Summary for Subcatchment 7A: Tributary to South Wetland

Runoff = 0.00 cfs @ 24.01 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 32,283 | 39 | >75% Grass cover, Good, HSG A |
| 2,757 | 39 | >75% Grass cover, Good, HSG A |
| 35,040 | 39 | Weighted Average |
| 35,040 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.0 | 50 | 0.0500 | 0.21 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 1.4 | 60 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.6 | 60 | 0.0500 | 1.57 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 6.0 | 170 | Total | | | |

## Summary for Subcatchment Lot 01: Roof Top

Runoff = 0.26 cfs @ 12.07 hrs, Volume= 0.020 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,503 | 98 | Paved parking, HSG A |
| 3,503 | 98 | Weighted Average |
| 3,503 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 02: Roof Top

Runoff = 0.10 cfs @ 12.10 hrs, Volume= 0.009 af, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,610 | 98 | Paved parking, HSG A |
| 5,441 | 39 | >75% Grass cover, Good, HSG A |
| 9,051 | 63 | Weighted Average |
| 5,441 | | 60.11% Pervious Area |
| 3,610 | | 39.89% Impervious Area |

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

## Summary for Subcatchment Lot 03: Roof Top

Runoff = 0.15 cfs @ 12.07 hrs, Volume= 0.011 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 04: Roof Top

Runoff = 0.15 cfs @ 12.07 hrs, Volume= 0.011 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 05: Roof Top

Runoff = 0.24 cfs @ 12.07 hrs, Volume= 0.019 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,233 | 98 | Paved parking, HSG A |
| 3,233 | 98 | Weighted Average |
| 3,233 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 06: Roof Top

Runoff = 0.15 cfs @ 12.07 hrs, Volume= 0.011 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 07: Roof Top

Runoff = 0.15 cfs @ 12.07 hrs, Volume= 0.011 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 08: Roof Top

Runoff = 0.15 cfs @ 12.07 hrs, Volume= 0.011 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 09: Roof Top

Runoff = 0.15 cfs @ 12.07 hrs, Volume= 0.011 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 10: Roof Top & Driveway

Runoff = 0.27 cfs @ 12.07 hrs, Volume= 0.021 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,612 | 98 | Paved parking, HSG A |
| 3,612 | 98 | Weighted Average |
| 3,612 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 11: Roof Top & Driveway

Runoff = 0.26 cfs @ 12.07 hrs, Volume= 0.020 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,465 | 98 | Paved parking, HSG A |
| 3,465 | 98 | Weighted Average |
| 3,465 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 12: Roof Top

Runoff = 0.26 cfs @ 12.07 hrs, Volume= 0.020 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,547 | 98 | Paved parking, HSG A |
| 3,547 | 98 | Weighted Average |
| 3,547 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 13: Roof Top

Runoff = 0.27 cfs @ 12.07 hrs, Volume= 0.021 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,647 | 98 | Paved parking, HSG A |
| 3,647 | 98 | Weighted Average |
| 3,647 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 14: Roof Top

Runoff = 0.27 cfs @ 12.07 hrs, Volume= 0.021 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,603 | 98 | Paved parking, HSG A |
| 3,603 | 98 | Weighted Average |
| 3,603 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 15: Roof Top

Runoff = 0.25 cfs @ 12.07 hrs, Volume= 0.019 af, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.23"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,378 | 98 | Paved parking, HSG A |
| 3,378 | 98 | Weighted Average |
| 3,378 | | 100.00% Impervious Area |

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

## Summary for Reach 1R: North Wetland

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

Inflow Area = 5.529 ac, 13.55% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

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

## Summary for Reach 2R: South Wetland

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

Inflow Area = 10.861 ac, 20.44% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 24.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 24.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

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

## Summary for Reach 3R: Point of Analysis

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

Inflow Area = 16.390 ac, 18.12% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 24.01 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 24.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

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

## Summary for Reach S1: Swale

Inflow Area = 2.034 ac, 4.51% Impervious, Inflow Depth = 0.01" for 2-Year event
Inflow = 0.00 cfs @ 22.51 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 23.83 hrs, Volume= 0.001 af, Atten= 1%, Lag= 79.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.04 fps, Min. Travel Time= 39.4 min
Avg. Velocity = 0.04 fps, Avg. Travel Time= 39.4 min

Peak Storage= 7 cf @ 23.17 hrs
Average Depth at Peak Storage= 0.01'
Bank-Full Depth= 1.50' Flow Area= 25.5 sf, Capacity= 17.52 cfs

8.00' x 1.50' deep channel, n= 0.150 Sheet flow over Short Grass
Side Slope Z-value= 6.0 '/' Top Width= 26.00'
Length= 100.0' Slope= 0.0050 '/'
Inlet Invert= 486.00', Outlet Invert= 485.50'

‡

## Summary for Reach S2: Swale

Inflow Area = 3.786 ac, 10.34% Impervious, Inflow Depth = 0.05" for 2-Year event
Inflow = 0.02 cfs @ 15.30 hrs, Volume= 0.015 af
Outflow = 0.02 cfs @ 16.27 hrs, Volume= 0.015 af, Atten= 3%, Lag= 58.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.09 fps, Min. Travel Time= 32.9 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 40.4 min

Peak Storage= 44 cf @ 15.72 hrs
Average Depth at Peak Storage= 0.02'
Bank-Full Depth= 1.50' Flow Area= 26.3 sf, Capacity= 28.10 cfs

10.00' x 1.50' deep channel, n= 0.150 Sheet flow over Short Grass
Side Slope Z-value= 5.0 '/' Top Width= 25.00'
Length= 180.0' Slope= 0.0111 '/'
Inlet Invert= 445.00', Outlet Invert= 443.00'

‡

## Summary for Pond 1Dw: Dry Well

Inflow Area = 0.080 ac,100.00% Impervious, Inflow Depth = 3.00" for 2-Year event
Inflow = 0.26 cfs @ 12.07 hrs, Volume= 0.020 af
Outflow = 0.02 cfs @ 13.02 hrs, Volume= 0.020 af, Atten= 92%, Lag= 57.2 min
Discarded = 0.02 cfs @ 13.02 hrs, Volume= 0.020 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 481.27' @ 13.02 hrs Surf.Area= 276 sf Storage= 350 cf

Plug-Flow detention time= 144.9 min calculated for 0.020 af (100% of inflow)
Center-of-Mass det. time= 144.9 min ( 900.2 - 755.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.02 hrs HW=481.27' (Free Discharge)
└**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 1P: Infiltration Basin 1

Inflow Area = 1.532 ac, 36.85% Impervious, Inflow Depth = 0.46" for 2-Year event
Inflow = 0.43 cfs @ 12.23 hrs, Volume= 0.058 af
Outflow = 0.13 cfs @ 12.95 hrs, Volume= 0.058 af, Atten= 70%, Lag= 43.2 min
Discarded = 0.13 cfs @ 12.95 hrs, Volume= 0.058 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 434.26' @ 12.95 hrs Surf.Area= 2,033 sf Storage= 503 cf

Plug-Flow detention time= 35.0 min calculated for 0.058 af (100% of inflow)
Center-of-Mass det. time= 35.0 min ( 953.9 - 919.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 434.00' | 19,090 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 434.00 | 1,846 | 0 | 0 |
| 435.00 | 2,567 | 2,207 | 2,207 |
| 436.00 | 3,344 | 2,956 | 5,162 |
| 437.00 | 4,180 | 3,762 | 8,924 |
| 438.00 | 5,068 | 4,624 | 13,548 |
| 439.00 | 6,015 | 5,542 | 19,090 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 437.00' | **10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Discarded | 434.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 432.00' |

**Discarded OutFlow** Max=0.13 cfs @ 12.95 hrs HW=434.26' (Free Discharge)
└**2=Exfiltration** ( Controls 0.13 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=434.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Pond 1W: Wetland

Inflow Area = 3.572 ac, 2.92% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 434.00' @ 0.00 hrs Surf.Area= 3,853 sf Storage= 0 cf

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

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 434.00' | 58,516 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 434.00 | 3,853 | 0 | 0 |
| 436.00 | 6,072 | 9,925 | 9,925 |
| 438.00 | 7,616 | 13,688 | 23,613 |
| 440.00 | 8,714 | 16,330 | 39,943 |
| 442.00 | 9,859 | 18,573 | 58,516 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 435.00' | **300.0" W x 72.0" H Box Culvert**<br>L= 60.0' Box, headwall w/3 square edges, Ke= 0.500<br>Inlet / Outlet Invert= 435.00' / 434.40' S= 0.0100 '/' Cc= 0.900<br>n= 0.035 Earth, dense weeds, Flow Area= 150.00 sf |

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=434.00' (Free Discharge)
└**1=Culvert** ( Controls 0.00 cfs)

## Summary for Pond 2Dw: Dry Well

Inflow Area = 0.208 ac, 39.89% Impervious, Inflow Depth = 0.53" for 2-Year event
Inflow = 0.10 cfs @ 12.10 hrs, Volume= 0.009 af
Outflow = 0.02 cfs @ 12.79 hrs, Volume= 0.009 af, Atten= 79%, Lag= 41.7 min
Discarded = 0.02 cfs @ 12.79 hrs, Volume= 0.009 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 479.77' @ 12.79 hrs Surf.Area= 340 sf Storage= 90 cf

Plug-Flow detention time= 39.0 min calculated for 0.009 af (100% of inflow)
Center-of-Mass det. time= 39.0 min ( 941.5 - 902.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 422 cf | **ADS_StormTech SC-740** x 9 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 479.50' | 1,448 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>1,870 cf Overall - 422 cf Embedded = 1,448 cf |
| | | 1,870 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 479.50 | 340 | 0 | 0 |
| 485.00 | 340 | 1,870 | 1,870 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 479.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 12.79 hrs HW=479.77' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=479.50' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 2P: Infiltration Basin 2

Inflow Area = 0.366 ac, 76.09% Impervious, Inflow Depth = 1.76" for 2-Year event
Inflow = 0.75 cfs @ 12.07 hrs, Volume= 0.054 af
Outflow = 0.12 cfs @ 12.57 hrs, Volume= 0.054 af, Atten= 85%, Lag= 29.7 min
Discarded = 0.12 cfs @ 12.57 hrs, Volume= 0.054 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 436.85' @ 12.57 hrs Surf.Area= 1,455 sf Storage= 711 cf

Plug-Flow detention time= 45.4 min calculated for 0.054 af (100% of inflow)
Center-of-Mass det. time= 45.4 min ( 855.7 - 810.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 436.00' | 1,296 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>5,093 cf Overall - 1,852 cf Embedded = 3,241 cf x 40.0% Voids |
| #2 | 436.50' | 1,852 cf | **ADS_StormTech SC-740** x 40 Inside #1<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 5 rows |
| | | 3,148 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 436.00 | 1,455 | 0 | 0 |
| 439.50 | 1,455 | 5,093 | 5,093 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 436.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 434.00' |
| #2 | Primary | 438.33' | **8.0" Round Culvert**<br>L= 22.0' RCP, mitered to conform to fill, Ke= 0.700<br>Inlet / Outlet Invert= 438.33' / 438.00' S= 0.0150 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.35 sf |

**Discarded OutFlow** Max=0.12 cfs @ 12.57 hrs HW=436.85' (Free Discharge)
└**1=Exfiltration** ( Controls 0.12 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=436.00' (Free Discharge)
└**2=Culvert** ( Controls 0.00 cfs)

## Summary for Pond 3Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 3.00" for 2-Year event
Inflow = 0.15 cfs @ 12.07 hrs, Volume= 0.011 af
Outflow = 0.01 cfs @ 12.81 hrs, Volume= 0.011 af, Atten= 90%, Lag= 44.5 min
Discarded = 0.01 cfs @ 12.81 hrs, Volume= 0.011 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 481.31' @ 12.81 hrs Surf.Area= 220 sf Storage= 178 cf

Plug-Flow detention time= 93.1 min calculated for 0.011 af (100% of inflow)
Center-of-Mass det. time= 93.0 min ( 848.3 - 755.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.01 cfs @ 12.81 hrs HW=481.31' (Free Discharge)
└**1=Exfiltration** ( Controls 0.01 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 3P: Infiltration Basin 3

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 3.786 ac, 10.34% Impervious, Inflow Depth = 0.05" for 2-Year event | | | | |
| Inflow = | 0.02 cfs @ | 16.27 hrs, | Volume= | 0.015 af | |
| Outflow = | 0.02 cfs @ | 16.47 hrs, | Volume= | 0.015 af, | Atten= 1%, Lag= 12.4 min |
| Discarded = | 0.02 cfs @ | 16.47 hrs, | Volume= | 0.015 af | |
| Primary = | 0.00 cfs @ | 0.00 hrs, | Volume= | 0.000 af | |

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 439.01' @ 16.47 hrs Surf.Area= 2,844 sf Storage= 16 cf

Plug-Flow detention time= 11.7 min calculated for 0.015 af (100% of inflow)
Center-of-Mass det. time= 11.7 min ( 1,183.9 - 1,172.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 439.00' | 17,025 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 439.00 | 2,840 | 0 | 0 |
| 440.00 | 3,500 | 3,170 | 3,170 |
| 441.00 | 4,213 | 3,857 | 7,027 |
| 442.00 | 4,985 | 4,599 | 11,626 |
| 443.00 | 5,813 | 5,399 | 17,025 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 441.90' | **10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Discarded | 439.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 437.00' |

**Discarded OutFlow** Max=0.16 cfs @ 16.47 hrs HW=439.01' (Free Discharge)
└**2=Exfiltration** ( Controls 0.16 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=439.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Pond 4Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 3.00" for 2-Year event
Inflow = 0.15 cfs @ 12.07 hrs, Volume= 0.011 af
Outflow = 0.01 cfs @ 12.81 hrs, Volume= 0.011 af, Atten= 90%, Lag= 44.5 min
Discarded = 0.01 cfs @ 12.81 hrs, Volume= 0.011 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 481.31' @ 12.81 hrs Surf.Area= 220 sf Storage= 178 cf

Plug-Flow detention time= 93.1 min calculated for 0.011 af (100% of inflow)
Center-of-Mass det. time= 93.0 min ( 848.3 - 755.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.01 cfs @ 12.81 hrs HW=481.31' (Free Discharge)
└**1=Exfiltration** ( Controls 0.01 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 4P: Infiltration Basin 4

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 1.954 ac, 31.49% Impervious, Inflow Depth = 0.46" for 2-Year event | | | | |
| Inflow = | 0.74 cfs @ | 12.16 hrs, | Volume= | 0.075 af | |
| Outflow = | 0.25 cfs @ | 12.60 hrs, | Volume= | 0.075 af, | Atten= 66%, Lag= 26.6 min |
| Discarded = | 0.25 cfs @ | 12.60 hrs, | Volume= | 0.075 af | |
| Primary = | 0.00 cfs @ | 0.00 hrs, | Volume= | 0.000 af | |

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 459.15' @ 12.60 hrs Surf.Area= 4,195 sf Storage= 617 cf

Plug-Flow detention time= 18.3 min calculated for 0.075 af (100% of inflow)
Center-of-Mass det. time= 18.2 min ( 912.2 - 894.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 459.00' | 15,845 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 459.00 | 4,080 | 0 | 0 |
| 460.00 | 4,850 | 4,465 | 4,465 |
| 461.00 | 5,675 | 5,263 | 9,728 |
| 462.00 | 6,560 | 6,118 | 15,845 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 459.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 457.00' |
| #2 | Primary | 460.70' | **10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Discarded OutFlow** Max=0.25 cfs @ 12.60 hrs HW=459.15' (Free Discharge)
└**1=Exfiltration** ( Controls 0.25 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=459.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Pond 5Dw: Dry Well

Inflow Area = 0.074 ac,100.00% Impervious, Inflow Depth = 3.00" for 2-Year event
Inflow = 0.24 cfs @ 12.07 hrs, Volume= 0.019 af
Outflow = 0.02 cfs @ 12.98 hrs, Volume= 0.019 af, Atten= 92%, Lag= 54.3 min
Discarded = 0.02 cfs @ 12.98 hrs, Volume= 0.019 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 481.14' @ 12.98 hrs Surf.Area= 276 sf Storage= 315 cf

Plug-Flow detention time= 130.9 min calculated for 0.019 af (100% of inflow)
Center-of-Mass det. time= 130.9 min ( 886.1 - 755.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 12.98 hrs HW=481.14' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 6Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 3.00" for 2-Year event
Inflow = 0.15 cfs @ 12.07 hrs, Volume= 0.011 af
Outflow = 0.01 cfs @ 12.81 hrs, Volume= 0.011 af, Atten= 90%, Lag= 44.5 min
Discarded = 0.01 cfs @ 12.81 hrs, Volume= 0.011 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 481.31' @ 12.81 hrs Surf.Area= 220 sf Storage= 178 cf

Plug-Flow detention time= 93.1 min calculated for 0.011 af (100% of inflow)
Center-of-Mass det. time= 93.0 min ( 848.3 - 755.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.01 cfs @ 12.81 hrs HW=481.31' (Free Discharge)
└**1=Exfiltration** ( Controls 0.01 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 7Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 3.00" for 2-Year event
Inflow = 0.15 cfs @ 12.07 hrs, Volume= 0.011 af
Outflow = 0.01 cfs @ 12.81 hrs, Volume= 0.011 af, Atten= 90%, Lag= 44.5 min
Discarded = 0.01 cfs @ 12.81 hrs, Volume= 0.011 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 481.31' @ 12.81 hrs Surf.Area= 220 sf Storage= 178 cf

Plug-Flow detention time= 93.1 min calculated for 0.011 af (100% of inflow)
Center-of-Mass det. time= 93.0 min ( 848.3 - 755.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.01 cfs @ 12.81 hrs HW=481.31' (Free Discharge)
└**1=Exfiltration** ( Controls 0.01 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 8Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 3.00" for 2-Year event
Inflow = 0.15 cfs @ 12.07 hrs, Volume= 0.011 af
Outflow = 0.01 cfs @ 12.81 hrs, Volume= 0.011 af, Atten= 90%, Lag= 44.5 min
Discarded = 0.01 cfs @ 12.81 hrs, Volume= 0.011 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 481.31' @ 12.81 hrs Surf.Area= 220 sf Storage= 178 cf

Plug-Flow detention time= 93.1 min calculated for 0.011 af (100% of inflow)
Center-of-Mass det. time= 93.0 min ( 848.3 - 755.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.01 cfs @ 12.81 hrs HW=481.31' (Free Discharge)
└**1=Exfiltration** ( Controls 0.01 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 9Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 3.00" for 2-Year event
Inflow = 0.15 cfs @ 12.07 hrs, Volume= 0.011 af
Outflow = 0.01 cfs @ 12.81 hrs, Volume= 0.011 af, Atten= 90%, Lag= 44.5 min
Discarded = 0.01 cfs @ 12.81 hrs, Volume= 0.011 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 481.31' @ 12.81 hrs Surf.Area= 220 sf Storage= 178 cf

Plug-Flow detention time= 93.1 min calculated for 0.011 af (100% of inflow)
Center-of-Mass det. time= 93.0 min ( 848.3 - 755.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.01 cfs @ 12.81 hrs HW=481.31' (Free Discharge)
└**1=Exfiltration** ( Controls 0.01 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 10Dw: Dry Well

Inflow Area = 0.083 ac,100.00% Impervious, Inflow Depth = 3.00" for 2-Year event
Inflow = 0.27 cfs @ 12.07 hrs, Volume= 0.021 af
Outflow = 0.02 cfs @ 13.04 hrs, Volume= 0.021 af, Atten= 92%, Lag= 58.3 min
Discarded = 0.02 cfs @ 13.04 hrs, Volume= 0.021 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 481.32' @ 13.04 hrs Surf.Area= 276 sf Storage= 365 cf

Plug-Flow detention time= 150.6 min calculated for 0.021 af (100% of inflow)
Center-of-Mass det. time= 150.6 min ( 905.9 - 755.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.04 hrs HW=481.32' (Free Discharge)
└**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 11Dw: Dry Well

Inflow Area = 0.080 ac,100.00% Impervious, Inflow Depth = 3.00" for 2-Year event
Inflow = 0.26 cfs @ 12.07 hrs, Volume= 0.020 af
Outflow = 0.02 cfs @ 13.02 hrs, Volume= 0.020 af, Atten= 92%, Lag= 56.8 min
Discarded = 0.02 cfs @ 13.02 hrs, Volume= 0.020 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 481.25' @ 13.02 hrs Surf.Area= 276 sf Storage= 345 cf

Plug-Flow detention time= 142.9 min calculated for 0.020 af (100% of inflow)
Center-of-Mass det. time= 142.9 min ( 898.2 - 755.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.02 hrs HW=481.25' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 12Dw: Dry Well

Inflow Area = 0.081 ac,100.00% Impervious, Inflow Depth = 3.00" for 2-Year event
Inflow = 0.26 cfs @ 12.07 hrs, Volume= 0.020 af
Outflow = 0.02 cfs @ 13.03 hrs, Volume= 0.020 af, Atten= 92%, Lag= 57.7 min
Discarded = 0.02 cfs @ 13.03 hrs, Volume= 0.020 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 481.29' @ 13.03 hrs Surf.Area= 276 sf Storage= 356 cf

Plug-Flow detention time= 147.2 min calculated for 0.020 af (100% of inflow)
Center-of-Mass det. time= 147.2 min ( 902.5 - 755.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.03 hrs HW=481.29' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 13Dw: Dry Well

Inflow Area = 0.084 ac,100.00% Impervious, Inflow Depth = 3.00" for 2-Year event
Inflow = 0.27 cfs @ 12.07 hrs, Volume= 0.021 af
Outflow = 0.02 cfs @ 13.04 hrs, Volume= 0.021 af, Atten= 92%, Lag= 58.2 min
Discarded = 0.02 cfs @ 13.04 hrs, Volume= 0.021 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 481.31' @ 13.04 hrs Surf.Area= 280 sf Storage= 368 cf

Plug-Flow detention time= 149.7 min calculated for 0.021 af (100% of inflow)
Center-of-Mass det. time= 149.7 min ( 905.0 - 755.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,021 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>1,400 cf Overall - 379 cf Embedded = 1,021 cf |
| | | 1,400 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 280 | 0 | 0 |
| 485.00 | 280 | 1,400 | 1,400 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.04 hrs HW=481.31' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 14Dw: Dry Well

Inflow Area = 0.083 ac,100.00% Impervious, Inflow Depth = 3.00" for 2-Year event
Inflow = 0.27 cfs @ 12.07 hrs, Volume= 0.021 af
Outflow = 0.02 cfs @ 13.04 hrs, Volume= 0.021 af, Atten= 92%, Lag= 58.1 min
Discarded = 0.02 cfs @ 13.04 hrs, Volume= 0.021 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 481.27' @ 13.04 hrs Surf.Area= 276 sf Storage= 363 cf

Plug-Flow detention time= 149.8 min calculated for 0.021 af (100% of inflow)
Center-of-Mass det. time= 149.7 min ( 905.0 - 755.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 479.95' | 1,015 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>1,394 cf Overall - 379 cf Embedded = 1,015 cf |
| | | 1,394 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 479.95 | 276 | 0 | 0 |
| 485.00 | 276 | 1,394 | 1,394 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 479.95' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.04 hrs HW=481.27' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=479.95' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond R6: Rain Garden Lot 6

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 2.034 ac, | 4.51% Impervious, | Inflow Depth = | 0.01" | for 2-Year event |
| Inflow = | 0.00 cfs @ | 23.83 hrs, | Volume= | 0.001 af | |
| Outflow = | 0.00 cfs @ | 23.88 hrs, | Volume= | 0.001 af, | Atten= 0%, Lag= 2.9 min |
| Discarded = | 0.00 cfs @ | 23.88 hrs, | Volume= | 0.001 af | |
| Primary = | 0.00 cfs @ | 0.00 hrs, | Volume= | 0.000 af | |

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 484.00' @ 23.88 hrs Surf.Area= 780 sf Storage= 0 cf

Plug-Flow detention time= 3.0 min calculated for 0.001 af (100% of inflow)
Center-of-Mass det. time= 3.0 min ( 1,335.5 - 1,332.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 484.00' | 965 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 484.00 | 780 | 0 | 0 |
| 485.00 | 1,150 | 965 | 965 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 484.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 481.00' |
| #2 | Primary | 484.50' | **10.0' long x 5.0' breadth Broad-Crested Rectangular Weir**<br>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<br>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=0.04 cfs @ 23.88 hrs HW=484.00' (Free Discharge)
└**1=Exfiltration** ( Controls 0.04 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=484.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Pond R7: Rain Garden Lot 7

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 0.193 ac, | 0.00% Impervious, | Inflow Depth = | 0.21" | for 2-Year event |
| Inflow = | 0.01 cfs @ | 12.36 hrs, | Volume= | 0.003 af | |
| Outflow = | 0.01 cfs @ | 12.41 hrs, | Volume= | 0.003 af, | Atten= 3%, Lag= 3.1 min |
| Discarded = | 0.01 cfs @ | 12.41 hrs, | Volume= | 0.003 af | |
| Primary = | 0.00 cfs @ | 0.00 hrs, | Volume= | 0.000 af | |

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 475.01' @ 12.41 hrs Surf.Area= 383 sf Storage= 2 cf

Plug-Flow detention time= 3.0 min calculated for 0.003 af (100% of inflow)
Center-of-Mass det. time= 3.0 min ( 973.7 - 970.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 475.00' | 590 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 475.00 | 380 | 0 | 0 |
| 476.00 | 800 | 590 | 590 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 475.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 470.00' |
| #2 | Primary | 475.50' | **10.0' long x 5.0' breadth Broad-Crested Rectangular Weir**<br>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<br>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=0.02 cfs @ 12.41 hrs HW=475.01' (Free Discharge)
└**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=475.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 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 1A: Tributary to Infiltration** Runoff Area=66,738 sf 36.85% Impervious Runoff Depth=1.29"
Flow Length=985' Tc=11.8 min CN=61 Runoff=1.71 cfs 0.165 af

**Subcatchment 2A: Tributary to North** Runoff Area=155,575 sf 2.92% Impervious Runoff Depth=0.12"
Flow Length=1,053' Tc=19.7 min CN=37 Runoff=0.06 cfs 0.035 af

**Subcatchment 2B: Tributary to North** Runoff Area=12,566 sf 69.66% Impervious Runoff Depth=2.78"
Tc=5.0 min CN=80 Runoff=0.97 cfs 0.067 af

**Subcatchment 2C: Tributary to North** Runoff Area=47,923 sf 0.00% Impervious Runoff Depth=0.17"
Flow Length=155' Tc=5.3 min CN=39 Runoff=0.03 cfs 0.016 af

**Subcatchment 3A: Tributary to Infiltration** Runoff Area=164,903 sf 10.34% Impervious Runoff Depth=0.40"
Flow Length=240' Tc=7.4 min CN=45 Runoff=0.65 cfs 0.127 af

**Subcatchment 4A: Tributary to Infiltration** Runoff Area=59,320 sf 45.18% Impervious Runoff Depth=1.64"
Flow Length=956' Tc=9.8 min CN=66 Runoff=2.19 cfs 0.186 af

**Subcatchment 4B: Tributary to Infiltration** Runoff Area=25,791 sf 0.00% Impervious Runoff Depth=0.17"
Flow Length=223' Tc=5.5 min CN=39 Runoff=0.02 cfs 0.009 af

**Subcatchment 5A: Tributary to South** Runoff Area=88,617 sf 4.51% Impervious Runoff Depth=0.24"
Flow Length=502' Tc=11.3 min CN=41 Runoff=0.12 cfs 0.041 af

**Subcatchment 6A: Tributary to South** Runoff Area=8,416 sf 0.00% Impervious Runoff Depth=0.80"
Tc=5.0 min CN=53 Runoff=0.14 cfs 0.013 af

**Subcatchment 7A: Tributary to South** Runoff Area=35,040 sf 0.00% Impervious Runoff Depth=0.17"
Flow Length=170' Tc=6.0 min CN=39 Runoff=0.02 cfs 0.012 af

**Subcatchment Lot 01: Roof Top** Runoff Area=3,503 sf 100.00% Impervious Runoff Depth=4.63"
Tc=5.0 min CN=98 Runoff=0.40 cfs 0.031 af

**Subcatchment Lot 02: Roof Top** Runoff Area=9,051 sf 39.89% Impervious Runoff Depth=1.43"
Tc=5.0 min CN=63 Runoff=0.33 cfs 0.025 af

**Subcatchment Lot 03: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=4.63"
Tc=5.0 min CN=98 Runoff=0.23 cfs 0.018 af

**Subcatchment Lot 04: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=4.63"
Tc=5.0 min CN=98 Runoff=0.23 cfs 0.018 af

**Subcatchment Lot 05: Roof Top** Runoff Area=3,233 sf 100.00% Impervious Runoff Depth=4.63"
Tc=5.0 min CN=98 Runoff=0.37 cfs 0.029 af

**Subcatchment Lot 06: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=4.63"
Tc=5.0 min CN=98 Runoff=0.23 cfs 0.018 af

**Subcatchment Lot 07: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=4.63"
Tc=5.0 min CN=98 Runoff=0.23 cfs 0.018 af

**Subcatchment Lot 08: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=4.63"
Tc=5.0 min CN=98 Runoff=0.23 cfs 0.018 af

**Subcatchment Lot 09: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=4.63"
Tc=5.0 min CN=98 Runoff=0.23 cfs 0.018 af

**Subcatchment Lot 10: Roof Top &** Runoff Area=3,612 sf 100.00% Impervious Runoff Depth=4.63"
Tc=5.0 min CN=98 Runoff=0.41 cfs 0.032 af

**Subcatchment Lot 11: Roof Top &** Runoff Area=3,465 sf 100.00% Impervious Runoff Depth=4.63"
Tc=5.0 min CN=98 Runoff=0.39 cfs 0.031 af

**Subcatchment Lot 12: Roof Top** Runoff Area=3,547 sf 100.00% Impervious Runoff Depth=4.63"
Tc=5.0 min CN=98 Runoff=0.40 cfs 0.031 af

**Subcatchment Lot 13: Roof Top** Runoff Area=3,647 sf 100.00% Impervious Runoff Depth=4.63"
Tc=5.0 min CN=98 Runoff=0.41 cfs 0.032 af

**Subcatchment Lot 14: Roof Top** Runoff Area=3,603 sf 100.00% Impervious Runoff Depth=4.63"
Tc=5.0 min CN=98 Runoff=0.41 cfs 0.032 af

**Subcatchment Lot 15: Roof Top** Runoff Area=3,378 sf 100.00% Impervious Runoff Depth=4.63"
Tc=5.0 min CN=98 Runoff=0.38 cfs 0.030 af

**Reach 1R: North Wetland** Inflow=0.03 cfs 0.016 af
Outflow=0.03 cfs 0.016 af

**Reach 2R: South Wetland** Inflow=0.02 cfs 0.012 af
Outflow=0.02 cfs 0.012 af

**Reach 3R: Point of Analysis** Inflow=0.05 cfs 0.028 af
Outflow=0.05 cfs 0.028 af

**Reach S1: Swale** Avg. Flow Depth=0.08' Max Vel=0.13 fps Inflow=0.12 cfs 0.041 af
n=0.150 L=100.0' S=0.0050 '/' Capacity=17.52 cfs Outflow=0.09 cfs 0.041 af

**Reach S2: Swale** Avg. Flow Depth=0.17' Max Vel=0.30 fps Inflow=0.65 cfs 0.127 af
n=0.150 L=180.0' S=0.0111 '/' Capacity=28.10 cfs Outflow=0.56 cfs 0.127 af

**Pond 1Dw: Dry Well** Peak Elev=482.21' Storage=611 cf Inflow=0.40 cfs 0.031 af
Discarded=0.02 cfs 0.031 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.031 af

**Pond 1P: Infiltration Basin 1** Peak Elev=435.19' Storage=2,695 cf Inflow=1.71 cfs 0.165 af
Discarded=0.22 cfs 0.165 af Primary=0.00 cfs 0.000 af Outflow=0.22 cfs 0.165 af

**Pond 1W: Wetland** Peak Elev=434.37' Storage=1,503 cf Inflow=0.06 cfs 0.035 af
300.0" x 72.0" Box Culvert n=0.035 L=60.0' S=0.0100 '/' Outflow=0.00 cfs 0.000 af

**Pond 2Dw: Dry Well** Peak Elev=480.84' Storage=457 cf Inflow=0.33 cfs 0.025 af
Discarded=0.03 cfs 0.025 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.025 af

**Pond 2P: Infiltration Basin 2** Peak Elev=437.58' Storage=1,562 cf Inflow=1.36 cfs 0.097 af
Discarded=0.15 cfs 0.097 af Primary=0.00 cfs 0.000 af Outflow=0.15 cfs 0.097 af

**Pond 3Dw: Dry Well** Peak Elev=481.92' Storage=312 cf Inflow=0.23 cfs 0.018 af
Discarded=0.02 cfs 0.018 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.018 af

**Pond 3P: Infiltration Basin 3** Peak Elev=439.29' Storage=860 cf Inflow=0.56 cfs 0.127 af
Discarded=0.19 cfs 0.127 af Primary=0.00 cfs 0.000 af Outflow=0.19 cfs 0.127 af

**Pond 4Dw: Dry Well** Peak Elev=481.92' Storage=312 cf Inflow=0.23 cfs 0.018 af
Discarded=0.02 cfs 0.018 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.018 af

**Pond 4P: Infiltration Basin 4** Peak Elev=459.64' Storage=2,783 cf Inflow=2.19 cfs 0.195 af
Discarded=0.33 cfs 0.195 af Primary=0.00 cfs 0.000 af Outflow=0.33 cfs 0.195 af

**Pond 5Dw: Dry Well** Peak Elev=481.99' Storage=549 cf Inflow=0.37 cfs 0.029 af
Discarded=0.02 cfs 0.029 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.029 af

**Pond 6Dw: Dry Well** Peak Elev=481.92' Storage=312 cf Inflow=0.23 cfs 0.018 af
Discarded=0.02 cfs 0.018 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.018 af

**Pond 7Dw: Dry Well** Peak Elev=481.92' Storage=312 cf Inflow=0.23 cfs 0.018 af
Discarded=0.02 cfs 0.018 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.018 af

**Pond 8Dw: Dry Well** Peak Elev=481.92' Storage=312 cf Inflow=0.23 cfs 0.018 af
Discarded=0.02 cfs 0.018 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.018 af

**Pond 9Dw: Dry Well** Peak Elev=481.92' Storage=312 cf Inflow=0.23 cfs 0.018 af
Discarded=0.02 cfs 0.018 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.018 af

**Pond 10Dw: Dry Well** Peak Elev=482.30' Storage=636 cf Inflow=0.41 cfs 0.032 af
Discarded=0.02 cfs 0.032 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.032 af

**Pond 11Dw: Dry Well** Peak Elev=482.18' Storage=602 cf Inflow=0.39 cfs 0.031 af
Discarded=0.02 cfs 0.031 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.031 af

**Pond 12Dw: Dry Well** Peak Elev=482.25' Storage=621 cf Inflow=0.40 cfs 0.031 af
Discarded=0.02 cfs 0.031 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.031 af

**Pond 13Dw: Dry Well** Peak Elev=482.29' Storage=641 cf Inflow=0.41 cfs 0.032 af
Discarded=0.02 cfs 0.032 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.032 af

**Pond 14Dw: Dry Well** Peak Elev=482.25' Storage=633 cf Inflow=0.41 cfs 0.032 af
Discarded=0.02 cfs 0.032 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.032 af

**Pond R6: Rain Garden Lot 6** Peak Elev=484.28' Storage=235 cf Inflow=0.09 cfs 0.041 af
Discarded=0.05 cfs 0.041 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.041 af

**Pond R7: Rain Garden Lot 7** Peak Elev=475.28' Storage=123 cf Inflow=0.14 cfs 0.013 af
Discarded=0.03 cfs 0.013 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.013 af

**Total Runoff Area = 16.390 ac Runoff Volume = 1.049 af Average Runoff Depth = 0.77"**
**81.88% Pervious = 13.420 ac 18.12% Impervious = 2.970 ac**

## Summary for Subcatchment 1A: Tributary to Infiltration Basin 1

Runoff = 1.71 cfs @ 12.18 hrs, Volume= 0.165 af, Depth= 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 21,551 | 98 | Paved roads w/curbs & sewers, HSG A |
| * | 3,043 | 98 | Paved Sidewalk, HSG A |
| | 42,144 | 39 | >75% Grass cover, Good, HSG A |
| | 66,738 | 61 | Weighted Average |
| | 42,144 | | 63.15% Pervious Area |
| | 24,594 | | 36.85% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.5 | 50 | 0.0100 | 0.11 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 0.7 | 28 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.2 | 30 | 0.1600 | 2.80 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.6 | 176 | 0.0500 | 4.54 | | **Shallow Concentrated Flow,** Paved Kv= 20.3 fps |
| 0.1 | 18 | 0.0050 | 3.21 | 2.52 | **Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 |
| 2.7 | 683 | 0.0050 | 4.20 | 7.43 | **Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 |
| 11.8 | 985 | Total | | | |

## Summary for Subcatchment 2A: Tributary to North Wetland

Runoff = 0.06 cfs @ 14.95 hrs, Volume= 0.035 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 91,230 | 39 | >75% Grass cover, Good, HSG A |
| * | 4,549 | 98 | Wetland |
| | 59,796 | 30 | Woods, Good, HSG A |
| | 155,575 | 37 | Weighted Average |
| | 151,026 | | 97.08% Pervious Area |
| | 4,549 | | 2.92% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.5 | 50 | 0.0100 | 0.11 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 2.9 | 327 | 0.0700 | 1.85 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 4.3 | 367 | 0.0800 | 1.41 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 3.2 | 153 | 0.0250 | 0.79 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 1.5 | 105 | 0.0280 | 1.17 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.3 | 51 | 0.2000 | 3.13 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 19.7 | 1,053 | Total | | | |

## Summary for Subcatchment 2B: Tributary to North Wetland

Runoff = 0.97 cfs @ 12.07 hrs, Volume= 0.067 af, Depth= 2.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 7,687 | 98 | Paved roads w/curbs & sewers, HSG A |
| | 3,812 | 39 | >75% Grass cover, Good, HSG A |
| * | 1,067 | 98 | Paved Sidewalk, HSG A |
| | 12,566 | 80 | Weighted Average |
| | 3,812 | | 30.34% Pervious Area |
| | 8,754 | | 69.66% Impervious Area |

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

## Summary for Subcatchment 2C: Tributary to North Wetland

Runoff = 0.03 cfs @ 12.49 hrs, Volume= 0.016 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 47,923 | 39 | >75% Grass cover, Good, HSG A |
| 47,923 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.7 | 50 | 0.0600 | 0.23 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 1.3 | 55 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.3 | 50 | 0.1200 | 2.42 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 5.3 | 155 | Total | | | |

## Summary for Subcatchment 3A: Tributary to Infiltration Basin 3

Runoff = 0.65 cfs @ 12.34 hrs, Volume= 0.127 af, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 144,721 | 39 | >75% Grass cover, Good, HSG A |
| | 190 | 74 | >75% Grass cover, Good, HSG C |
| | 2,937 | 30 | Woods, Good, HSG A |
| * | 1,123 | 98 | Paved Sidewalk, HSG A |
| | 15,932 | 98 | Paved roads w/curbs & sewers, HSG A |
| | 164,903 | 45 | Weighted Average |
| | 147,848 | | 89.66% Pervious Area |
| | 17,055 | | 10.34% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.7 | 50 | 0.0200 | 0.15 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 1.7 | 190 | 0.0700 | 1.85 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 7.4 | 240 | Total | | | |

## Summary for Subcatchment 4A: Tributary to Infiltration Basin 4

Runoff = 2.19 cfs @ 12.15 hrs, Volume= 0.186 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 24,181 | 98 | Paved roads w/curbs & sewers, HSG A |
| * | 2,622 | 98 | Paved Sidewalk, HSG A |
| | 32,517 | 39 | >75% Grass cover, Good, HSG A |
| | 59,320 | 66 | Weighted Average |
| | 32,517 | | 54.82% Pervious Area |
| | 26,803 | | 45.18% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.5 | 50 | 0.0100 | 0.11 | | **Sheet Flow,**<br>Grass: Short n= 0.150 P2= 3.10" |
| 1.1 | 365 | 0.0800 | 5.74 | | **Shallow Concentrated Flow,**<br>Paved Kv= 20.3 fps |
| 0.5 | 296 | 0.0400 | 9.07 | 7.13 | **Pipe Channel,**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.013 |
| 0.7 | 245 | 0.0100 | 5.94 | 10.50 | **Pipe Channel,**<br>18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38'<br>n= 0.013 |
| 9.8 | 956 | Total | | | |

## Summary for Subcatchment 4B: Tributary to Infiltration Basin 4

Runoff = 0.02 cfs @ 12.50 hrs, Volume= 0.009 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 25,791 | 39 | >75% Grass cover, Good, HSG A |
| 25,791 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.7 | 50 | 0.0600 | 0.23 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 1.6 | 130 | 0.0380 | 1.36 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.2 | 43 | 0.1800 | 2.97 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 5.5 | 223 | Total | | | |

## Summary for Subcatchment 5A: Tributary to South Wetland

Runoff = 0.12 cfs @ 12.51 hrs, Volume= 0.041 af, Depth= 0.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 81,385 | 39 | >75% Grass cover, Good, HSG A |
| 3,232 | 30 | Woods, Good, HSG A |
| 2,000 | 98 | Roofs |
| 1,000 | 98 | Paved parking, HSG A |
| 1,000 | 98 | Paved parking, HSG C |
| 88,617 | 41 | Weighted Average |
| 84,617 | | 95.49% Pervious Area |
| 4,000 | | 4.51% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.7 | 50 | 0.0600 | 0.23 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 3.1 | 319 | 0.0600 | 1.71 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 4.5 | 133 | 0.0050 | 0.49 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 11.3 | 502 | Total | | | |

## Summary for Subcatchment 6A: Tributary to South Wetland

Runoff = 0.14 cfs @ 12.10 hrs, Volume= 0.013 af, Depth= 0.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 5,011 | 39 | >75% Grass cover, Good, HSG A |
| 3,405 | 74 | >75% Grass cover, Good, HSG C |
| 8,416 | 53 | Weighted Average |
| 8,416 | | 100.00% Pervious Area |

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

## Summary for Subcatchment 7A: Tributary to South Wetland

Runoff = 0.02 cfs @ 12.50 hrs, Volume= 0.012 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 32,283 | 39 | >75% Grass cover, Good, HSG A |
| 2,757 | 39 | >75% Grass cover, Good, HSG A |
| 35,040 | 39 | Weighted Average |
| 35,040 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.0 | 50 | 0.0500 | 0.21 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 1.4 | 60 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.6 | 60 | 0.0500 | 1.57 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 6.0 | 170 | Total | | | |

## Summary for Subcatchment Lot 01: Roof Top

Runoff = 0.40 cfs @ 12.07 hrs, Volume= 0.031 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,503 | 98 | Paved parking, HSG A |
| 3,503 | 98 | Weighted Average |
| 3,503 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 02: Roof Top

Runoff = 0.33 cfs @ 12.08 hrs, Volume= 0.025 af, Depth= 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,610 | 98 | Paved parking, HSG A |
| 5,441 | 39 | >75% Grass cover, Good, HSG A |
| 9,051 | 63 | Weighted Average |
| 5,441 | | 60.11% Pervious Area |
| 3,610 | | 39.89% Impervious Area |

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

## Summary for Subcatchment Lot 03: Roof Top

Runoff = 0.23 cfs @ 12.07 hrs, Volume= 0.018 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 04: Roof Top

Runoff = 0.23 cfs @ 12.07 hrs, Volume= 0.018 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 05: Roof Top

Runoff = 0.37 cfs @ 12.07 hrs, Volume= 0.029 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,233 | 98 | Paved parking, HSG A |
| 3,233 | 98 | Weighted Average |
| 3,233 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 06: Roof Top

Runoff = 0.23 cfs @ 12.07 hrs, Volume= 0.018 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 07: Roof Top

Runoff = 0.23 cfs @ 12.07 hrs, Volume= 0.018 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 08: Roof Top

Runoff = 0.23 cfs @ 12.07 hrs, Volume= 0.018 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 09: Roof Top

Runoff = 0.23 cfs @ 12.07 hrs, Volume= 0.018 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 10: Roof Top & Driveway

Runoff = 0.41 cfs @ 12.07 hrs, Volume= 0.032 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,612 | 98 | Paved parking, HSG A |
| 3,612 | 98 | Weighted Average |
| 3,612 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 11: Roof Top & Driveway

Runoff = 0.39 cfs @ 12.07 hrs, Volume= 0.031 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,465 | 98 | Paved parking, HSG A |
| 3,465 | 98 | Weighted Average |
| 3,465 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 12: Roof Top

Runoff = 0.40 cfs @ 12.07 hrs, Volume= 0.031 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,547 | 98 | Paved parking, HSG A |
| 3,547 | 98 | Weighted Average |
| 3,547 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 13: Roof Top

Runoff = 0.41 cfs @ 12.07 hrs, Volume= 0.032 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,647 | 98 | Paved parking, HSG A |
| 3,647 | 98 | Weighted Average |
| 3,647 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 14: Roof Top

Runoff = 0.41 cfs @ 12.07 hrs, Volume= 0.032 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,603 | 98 | Paved parking, HSG A |
| 3,603 | 98 | Weighted Average |
| 3,603 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 15: Roof Top

Runoff = 0.38 cfs @ 12.07 hrs, Volume= 0.030 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.87"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,378 | 98 | Paved parking, HSG A |
| 3,378 | 98 | Weighted Average |
| 3,378 | | 100.00% Impervious Area |

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

## Summary for Reach 1R: North Wetland

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

Inflow Area = 5.529 ac, 13.55% Impervious, Inflow Depth = 0.03" for 10-Year event
Inflow = 0.03 cfs @ 12.49 hrs, Volume= 0.016 af
Outflow = 0.03 cfs @ 12.49 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

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

## Summary for Reach 2R: South Wetland

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

Inflow Area = 10.861 ac, 20.44% Impervious, Inflow Depth = 0.01" for 10-Year event
Inflow = 0.02 cfs @ 12.50 hrs, Volume= 0.012 af
Outflow = 0.02 cfs @ 12.50 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

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

## Summary for Reach 3R: Point of Analysis

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

Inflow Area = 16.390 ac, 18.12% Impervious, Inflow Depth = 0.02" for 10-Year event
Inflow = 0.05 cfs @ 12.50 hrs, Volume= 0.028 af
Outflow = 0.05 cfs @ 12.50 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min

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

## Summary for Reach S1: Swale

Inflow Area = 2.034 ac, 4.51% Impervious, Inflow Depth = 0.24" for 10-Year event
Inflow = 0.12 cfs @ 12.51 hrs, Volume= 0.041 af
Outflow = 0.09 cfs @ 12.90 hrs, Volume= 0.041 af, Atten= 23%, Lag= 23.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.13 fps, Min. Travel Time= 12.8 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 21.4 min

Peak Storage= 72 cf @ 12.69 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 1.50' Flow Area= 25.5 sf, Capacity= 17.52 cfs

8.00' x 1.50' deep channel, n= 0.150 Sheet flow over Short Grass
Side Slope Z-value= 6.0 '/' Top Width= 26.00'
Length= 100.0' Slope= 0.0050 '/'
Inlet Invert= 486.00', Outlet Invert= 485.50'

‡

## Summary for Reach S2: Swale

Inflow Area = 3.786 ac, 10.34% Impervious, Inflow Depth = 0.40" for 10-Year event
Inflow = 0.65 cfs @ 12.34 hrs, Volume= 0.127 af
Outflow = 0.56 cfs @ 12.63 hrs, Volume= 0.127 af, Atten= 13%, Lag= 17.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.30 fps, Min. Travel Time= 9.9 min
Avg. Velocity = 0.13 fps, Avg. Travel Time= 23.0 min

Peak Storage= 332 cf @ 12.47 hrs
Average Depth at Peak Storage= 0.17'
Bank-Full Depth= 1.50' Flow Area= 26.3 sf, Capacity= 28.10 cfs

10.00' x 1.50' deep channel, n= 0.150 Sheet flow over Short Grass
Side Slope Z-value= 5.0 '/' Top Width= 25.00'
Length= 180.0' Slope= 0.0111 '/'
Inlet Invert= 445.00', Outlet Invert= 443.00'

‡

## Summary for Pond 1Dw: Dry Well

Inflow Area = 0.080 ac,100.00% Impervious, Inflow Depth = 4.63" for 10-Year event
Inflow = 0.40 cfs @ 12.07 hrs, Volume= 0.031 af
Outflow = 0.02 cfs @ 13.59 hrs, Volume= 0.031 af, Atten= 94%, Lag= 91.1 min
Discarded = 0.02 cfs @ 13.59 hrs, Volume= 0.031 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 482.21' @ 13.59 hrs Surf.Area= 276 sf Storage= 611 cf

Plug-Flow detention time= 236.8 min calculated for 0.031 af (100% of inflow)
Center-of-Mass det. time= 236.8 min ( 984.3 - 747.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.59 hrs HW=482.21' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 1P: Infiltration Basin 1

Inflow Area = 1.532 ac, 36.85% Impervious, Inflow Depth = 1.29" for 10-Year event
Inflow = 1.71 cfs @ 12.18 hrs, Volume= 0.165 af
Outflow = 0.22 cfs @ 13.68 hrs, Volume= 0.165 af, Atten= 87%, Lag= 90.1 min
Discarded = 0.22 cfs @ 13.68 hrs, Volume= 0.165 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 435.19' @ 13.68 hrs Surf.Area= 2,711 sf Storage= 2,695 cf

Plug-Flow detention time= 142.2 min calculated for 0.165 af (100% of inflow)
Center-of-Mass det. time= 142.2 min ( 1,021.8 - 879.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 434.00' | 19,090 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 434.00 | 1,846 | 0 | 0 |
| 435.00 | 2,567 | 2,207 | 2,207 |
| 436.00 | 3,344 | 2,956 | 5,162 |
| 437.00 | 4,180 | 3,762 | 8,924 |
| 438.00 | 5,068 | 4,624 | 13,548 |
| 439.00 | 6,015 | 5,542 | 19,090 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 437.00' | **10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Discarded | 434.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 432.00' |

**Discarded OutFlow** Max=0.22 cfs @ 13.68 hrs HW=435.19' (Free Discharge)
└**2=Exfiltration** ( Controls 0.22 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=434.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Pond 1W: Wetland

Inflow Area = 3.572 ac, 2.92% Impervious, Inflow Depth = 0.12" for 10-Year event
Inflow = 0.06 cfs @ 14.95 hrs, Volume= 0.035 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 434.37' @ 25.14 hrs Surf.Area= 4,264 sf Storage= 1,503 cf

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

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 434.00' | 58,516 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 434.00 | 3,853 | 0 | 0 |
| 436.00 | 6,072 | 9,925 | 9,925 |
| 438.00 | 7,616 | 13,688 | 23,613 |
| 440.00 | 8,714 | 16,330 | 39,943 |
| 442.00 | 9,859 | 18,573 | 58,516 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 435.00' | **300.0" W x 72.0" H Box Culvert**<br>L= 60.0' Box, headwall w/3 square edges, Ke= 0.500<br>Inlet / Outlet Invert= 435.00' / 434.40' S= 0.0100 '/' Cc= 0.900<br>n= 0.035 Earth, dense weeds, Flow Area= 150.00 sf |

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=434.00' (Free Discharge)
└**1=Culvert** ( Controls 0.00 cfs)

## Summary for Pond 2Dw: Dry Well

Inflow Area = 0.208 ac, 39.89% Impervious, Inflow Depth = 1.43" for 10-Year event
Inflow = 0.33 cfs @ 12.08 hrs, Volume= 0.025 af
Outflow = 0.03 cfs @ 14.21 hrs, Volume= 0.025 af, Atten= 92%, Lag= 127.7 min
Discarded = 0.03 cfs @ 14.21 hrs, Volume= 0.025 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 480.84' @ 14.21 hrs Surf.Area= 340 sf Storage= 457 cf

Plug-Flow detention time= 197.6 min calculated for 0.025 af (100% of inflow)
Center-of-Mass det. time= 197.6 min ( 1,064.9 - 867.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 422 cf | **ADS_StormTech SC-740** x 9 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 479.50' | 1,448 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,870 cf Overall - 422 cf Embedded = 1,448 cf |
| | | 1,870 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 479.50 | 340 | 0 | 0 |
| 485.00 | 340 | 1,870 | 1,870 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 479.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.03 cfs @ 14.21 hrs HW=480.84' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=479.50' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 2P: Infiltration Basin 2

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 0.366 ac, 76.09% Impervious, Inflow Depth = 3.17" for 10-Year event | | | | |
| Inflow = | 1.36 cfs @ | 12.07 hrs, | Volume= | 0.097 af | |
| Outflow = | 0.15 cfs @ | 12.82 hrs, | Volume= | 0.097 af, | Atten= 89%, Lag= 45.1 min |
| Discarded = | 0.15 cfs @ | 12.82 hrs, | Volume= | 0.097 af | |
| Primary = | 0.00 cfs @ | 0.00 hrs, | Volume= | 0.000 af | |

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 437.58' @ 12.82 hrs Surf.Area= 1,455 sf Storage= 1,562 cf

Plug-Flow detention time= 95.1 min calculated for 0.097 af (100% of inflow)
Center-of-Mass det. time= 95.1 min ( 894.1 - 799.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 436.00' | 1,296 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>5,093 cf Overall - 1,852 cf Embedded = 3,241 cf x 40.0% Voids |
| #2 | 436.50' | 1,852 cf | **ADS_StormTech SC-740** x 40 Inside #1<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 5 rows |
| | | 3,148 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 436.00 | 1,455 | 0 | 0 |
| 439.50 | 1,455 | 5,093 | 5,093 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 436.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 434.00' |
| #2 | Primary | 438.33' | **8.0" Round Culvert**<br>L= 22.0' RCP, mitered to conform to fill, Ke= 0.700<br>Inlet / Outlet Invert= 438.33' / 438.00' S= 0.0150 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.35 sf |

**Discarded OutFlow** Max=0.15 cfs @ 12.82 hrs HW=437.58' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.15 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=436.00' (Free Discharge)
└─**2=Culvert** ( Controls 0.00 cfs)

## Summary for Pond 3Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 4.63" for 10-Year event
Inflow = 0.23 cfs @ 12.07 hrs, Volume= 0.018 af
Outflow = 0.02 cfs @ 13.13 hrs, Volume= 0.018 af, Atten= 93%, Lag= 63.8 min
Discarded = 0.02 cfs @ 13.13 hrs, Volume= 0.018 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 481.92' @ 13.13 hrs Surf.Area= 220 sf Storage= 312 cf

Plug-Flow detention time= 161.5 min calculated for 0.018 af (100% of inflow)
Center-of-Mass det. time= 161.4 min ( 909.0 - 747.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.13 hrs HW=481.92' (Free Discharge)
└**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 3P: Infiltration Basin 3

Inflow Area = 3.786 ac, 10.34% Impervious, Inflow Depth = 0.40" for 10-Year event
Inflow = 0.56 cfs @ 12.63 hrs, Volume= 0.127 af
Outflow = 0.19 cfs @ 14.38 hrs, Volume= 0.127 af, Atten= 66%, Lag= 104.5 min
Discarded = 0.19 cfs @ 14.38 hrs, Volume= 0.127 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 439.29' @ 14.38 hrs Surf.Area= 3,033 sf Storage= 860 cf

Plug-Flow detention time= 43.7 min calculated for 0.127 af (100% of inflow)
Center-of-Mass det. time= 43.6 min ( 1,023.0 - 979.4 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 439.00' | 17,025 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 439.00 | 2,840 | 0 | 0 |
| 440.00 | 3,500 | 3,170 | 3,170 |
| 441.00 | 4,213 | 3,857 | 7,027 |
| 442.00 | 4,985 | 4,599 | 11,626 |
| 443.00 | 5,813 | 5,399 | 17,025 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 441.90' | **10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Discarded | 439.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 437.00' |

**Discarded OutFlow** Max=0.19 cfs @ 14.38 hrs HW=439.29' (Free Discharge)
└**2=Exfiltration** ( Controls 0.19 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=439.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Pond 4Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 4.63" for 10-Year event
Inflow = 0.23 cfs @ 12.07 hrs, Volume= 0.018 af
Outflow = 0.02 cfs @ 13.13 hrs, Volume= 0.018 af, Atten= 93%, Lag= 63.8 min
Discarded = 0.02 cfs @ 13.13 hrs, Volume= 0.018 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 481.92' @ 13.13 hrs Surf.Area= 220 sf Storage= 312 cf

Plug-Flow detention time= 161.5 min calculated for 0.018 af (100% of inflow)
Center-of-Mass det. time= 161.4 min ( 909.0 - 747.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.13 hrs HW=481.92' (Free Discharge)
└**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 4P: Infiltration Basin 4

Inflow Area = 1.954 ac, 31.49% Impervious, Inflow Depth = 1.20" for 10-Year event
Inflow = 2.19 cfs @ 12.15 hrs, Volume= 0.195 af
Outflow = 0.33 cfs @ 13.01 hrs, Volume= 0.195 af, Atten= 85%, Lag= 52.0 min
Discarded = 0.33 cfs @ 13.01 hrs, Volume= 0.195 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 459.64' @ 13.01 hrs Surf.Area= 4,575 sf Storage= 2,783 cf

Plug-Flow detention time= 80.6 min calculated for 0.195 af (100% of inflow)
Center-of-Mass det. time= 80.6 min ( 950.8 - 870.2 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 459.00' | 15,845 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 459.00 | 4,080 | 0 | 0 |
| 460.00 | 4,850 | 4,465 | 4,465 |
| 461.00 | 5,675 | 5,263 | 9,728 |
| 462.00 | 6,560 | 6,118 | 15,845 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 459.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 457.00' |
| #2 | Primary | 460.70' | **10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Discarded OutFlow** Max=0.33 cfs @ 13.01 hrs HW=459.64' (Free Discharge)
└**1=Exfiltration** ( Controls 0.33 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=459.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Pond 5Dw: Dry Well

Inflow Area = 0.074 ac,100.00% Impervious, Inflow Depth = 4.63" for 10-Year event
Inflow = 0.37 cfs @ 12.07 hrs, Volume= 0.029 af
Outflow = 0.02 cfs @ 13.48 hrs, Volume= 0.029 af, Atten= 94%, Lag= 84.3 min
Discarded = 0.02 cfs @ 13.48 hrs, Volume= 0.029 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 481.99' @ 13.48 hrs Surf.Area= 276 sf Storage= 549 cf

Plug-Flow detention time= 216.4 min calculated for 0.029 af (100% of inflow)
Center-of-Mass det. time= 216.4 min ( 963.9 - 747.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.48 hrs HW=481.99' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 6Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 4.63" for 10-Year event
Inflow = 0.23 cfs @ 12.07 hrs, Volume= 0.018 af
Outflow = 0.02 cfs @ 13.13 hrs, Volume= 0.018 af, Atten= 93%, Lag= 63.8 min
Discarded = 0.02 cfs @ 13.13 hrs, Volume= 0.018 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 481.92' @ 13.13 hrs Surf.Area= 220 sf Storage= 312 cf

Plug-Flow detention time= 161.5 min calculated for 0.018 af (100% of inflow)
Center-of-Mass det. time= 161.4 min ( 909.0 - 747.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.13 hrs HW=481.92' (Free Discharge)
└**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 7Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 4.63" for 10-Year event
Inflow = 0.23 cfs @ 12.07 hrs, Volume= 0.018 af
Outflow = 0.02 cfs @ 13.13 hrs, Volume= 0.018 af, Atten= 93%, Lag= 63.8 min
Discarded = 0.02 cfs @ 13.13 hrs, Volume= 0.018 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 481.92' @ 13.13 hrs Surf.Area= 220 sf Storage= 312 cf

Plug-Flow detention time= 161.5 min calculated for 0.018 af (100% of inflow)
Center-of-Mass det. time= 161.4 min ( 909.0 - 747.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.13 hrs HW=481.92' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 8Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 4.63" for 10-Year event
Inflow = 0.23 cfs @ 12.07 hrs, Volume= 0.018 af
Outflow = 0.02 cfs @ 13.13 hrs, Volume= 0.018 af, Atten= 93%, Lag= 63.8 min
Discarded = 0.02 cfs @ 13.13 hrs, Volume= 0.018 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 481.92' @ 13.13 hrs Surf.Area= 220 sf Storage= 312 cf

Plug-Flow detention time= 161.5 min calculated for 0.018 af (100% of inflow)
Center-of-Mass det. time= 161.4 min ( 909.0 - 747.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.13 hrs HW=481.92' (Free Discharge)
└**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 9Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 4.63" for 10-Year event
Inflow = 0.23 cfs @ 12.07 hrs, Volume= 0.018 af
Outflow = 0.02 cfs @ 13.13 hrs, Volume= 0.018 af, Atten= 93%, Lag= 63.8 min
Discarded = 0.02 cfs @ 13.13 hrs, Volume= 0.018 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 481.92' @ 13.13 hrs Surf.Area= 220 sf Storage= 312 cf

Plug-Flow detention time= 161.5 min calculated for 0.018 af (100% of inflow)
Center-of-Mass det. time= 161.4 min ( 909.0 - 747.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.13 hrs HW=481.92' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 10Dw: Dry Well

Inflow Area = 0.083 ac,100.00% Impervious, Inflow Depth = 4.63" for 10-Year event
Inflow = 0.41 cfs @ 12.07 hrs, Volume= 0.032 af
Outflow = 0.02 cfs @ 13.63 hrs, Volume= 0.032 af, Atten= 94%, Lag= 93.6 min
Discarded = 0.02 cfs @ 13.63 hrs, Volume= 0.032 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 482.30' @ 13.63 hrs Surf.Area= 276 sf Storage= 636 cf

Plug-Flow detention time= 244.8 min calculated for 0.032 af (100% of inflow)
Center-of-Mass det. time= 244.8 min ( 992.4 - 747.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.63 hrs HW=482.30' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 11Dw: Dry Well

Inflow Area = 0.080 ac,100.00% Impervious, Inflow Depth = 4.63" for 10-Year event
Inflow = 0.39 cfs @ 12.07 hrs, Volume= 0.031 af
Outflow = 0.02 cfs @ 13.57 hrs, Volume= 0.031 af, Atten= 94%, Lag= 90.2 min
Discarded = 0.02 cfs @ 13.57 hrs, Volume= 0.031 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 482.18' @ 13.57 hrs Surf.Area= 276 sf Storage= 602 cf

Plug-Flow detention time= 234.0 min calculated for 0.031 af (100% of inflow)
Center-of-Mass det. time= 233.9 min ( 981.5 - 747.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.57 hrs HW=482.18' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 12Dw: Dry Well

Inflow Area = 0.081 ac,100.00% Impervious, Inflow Depth = 4.63" for 10-Year event
Inflow = 0.40 cfs @ 12.07 hrs, Volume= 0.031 af
Outflow = 0.02 cfs @ 13.61 hrs, Volume= 0.031 af, Atten= 94%, Lag= 92.1 min
Discarded = 0.02 cfs @ 13.61 hrs, Volume= 0.031 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 482.25' @ 13.61 hrs Surf.Area= 276 sf Storage= 621 cf

Plug-Flow detention time= 240.1 min calculated for 0.031 af (100% of inflow)
Center-of-Mass det. time= 240.0 min ( 987.6 - 747.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.61 hrs HW=482.25' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 13Dw: Dry Well

Inflow Area = 0.084 ac,100.00% Impervious, Inflow Depth = 4.63" for 10-Year event
Inflow = 0.41 cfs @ 12.07 hrs, Volume= 0.032 af
Outflow = 0.02 cfs @ 13.62 hrs, Volume= 0.032 af, Atten= 94%, Lag= 93.2 min
Discarded = 0.02 cfs @ 13.62 hrs, Volume= 0.032 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 482.29' @ 13.62 hrs Surf.Area= 280 sf Storage= 641 cf

Plug-Flow detention time= 243.6 min calculated for 0.032 af (100% of inflow)
Center-of-Mass det. time= 243.6 min ( 991.1 - 747.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,021 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,400 cf Overall - 379 cf Embedded = 1,021 cf |
| | | 1,400 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 280 | 0 | 0 |
| 485.00 | 280 | 1,400 | 1,400 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.62 hrs HW=482.29' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 14Dw: Dry Well

Inflow Area = 0.083 ac,100.00% Impervious, Inflow Depth = 4.63" for 10-Year event
Inflow = 0.41 cfs @ 12.07 hrs, Volume= 0.032 af
Outflow = 0.02 cfs @ 13.62 hrs, Volume= 0.032 af, Atten= 94%, Lag= 92.7 min
Discarded = 0.02 cfs @ 13.62 hrs, Volume= 0.032 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 482.25' @ 13.62 hrs Surf.Area= 276 sf Storage= 633 cf

Plug-Flow detention time= 243.1 min calculated for 0.032 af (100% of inflow)
Center-of-Mass det. time= 243.1 min ( 990.6 - 747.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 479.95' | 1,015 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,394 cf Overall - 379 cf Embedded = 1,015 cf |
| | | 1,394 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 479.95 | 276 | 0 | 0 |
| 485.00 | 276 | 1,394 | 1,394 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 479.95' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.62 hrs HW=482.25' (Free Discharge)
└**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=479.95' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond R6: Rain Garden Lot 6

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 2.034 ac, | 4.51% Impervious, | Inflow Depth = | 0.24" | for 10-Year event |
| Inflow = | 0.09 cfs @ | 12.90 hrs, | Volume= | 0.041 af | |
| Outflow = | 0.05 cfs @ | 15.96 hrs, | Volume= | 0.041 af, | Atten= 43%, Lag= 183.2 min |
| Discarded = | 0.05 cfs @ | 15.96 hrs, | Volume= | 0.041 af | |
| Primary = | 0.00 cfs @ | 0.00 hrs, | Volume= | 0.000 af | |

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 484.28' @ 15.96 hrs Surf.Area= 884 sf Storage= 235 cf

Plug-Flow detention time= 40.3 min calculated for 0.041 af (100% of inflow)
Center-of-Mass det. time= 40.3 min ( 1,067.0 - 1,026.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 484.00' | 965 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 484.00 | 780 | 0 | 0 |
| 485.00 | 1,150 | 965 | 965 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 484.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 481.00' |
| #2 | Primary | 484.50' | **10.0' long x 5.0' breadth Broad-Crested Rectangular Weir**<br>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<br>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=0.05 cfs @ 15.96 hrs HW=484.28' (Free Discharge)
└**1=Exfiltration** ( Controls 0.05 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=484.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Pond R7: Rain Garden Lot 7

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 0.193 ac, | 0.00% Impervious, | Inflow Depth = | 0.80" | for 10-Year event |
| Inflow = | 0.14 cfs @ | 12.10 hrs, | Volume= | 0.013 af | |
| Outflow = | 0.03 cfs @ | 12.77 hrs, | Volume= | 0.013 af, | Atten= 79%, Lag= 40.1 min |
| Discarded = | 0.03 cfs @ | 12.77 hrs, | Volume= | 0.013 af | |
| Primary = | 0.00 cfs @ | 0.00 hrs, | Volume= | 0.000 af | |

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 475.28' @ 12.77 hrs Surf.Area= 497 sf Storage= 123 cf

Plug-Flow detention time= 33.8 min calculated for 0.013 af (100% of inflow)
Center-of-Mass det. time= 33.8 min ( 936.6 - 902.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 475.00' | 590 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 475.00 | 380 | 0 | 0 |
| 476.00 | 800 | 590 | 590 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 475.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 470.00' |
| #2 | Primary | 475.50' | **10.0' long x 5.0' breadth Broad-Crested Rectangular Weir**<br>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<br>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=0.03 cfs @ 12.77 hrs HW=475.28' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=475.00' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 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 1A: Tributary to Infiltration** Runoff Area=66,738 sf 36.85% Impervious Runoff Depth=2.11"
Flow Length=985' Tc=11.8 min CN=61 Runoff=2.99 cfs 0.270 af

**Subcatchment 2A: Tributary to North** Runoff Area=155,575 sf 2.92% Impervious Runoff Depth=0.38"
Flow Length=1,053' Tc=19.7 min CN=37 Runoff=0.39 cfs 0.114 af

**Subcatchment 2B: Tributary to North** Runoff Area=12,566 sf 69.66% Impervious Runoff Depth=3.93"
Tc=5.0 min CN=80 Runoff=1.37 cfs 0.094 af

**Subcatchment 2C: Tributary to North** Runoff Area=47,923 sf 0.00% Impervious Runoff Depth=0.49"
Flow Length=155' Tc=5.3 min CN=39 Runoff=0.23 cfs 0.045 af

**Subcatchment 3A: Tributary to Infiltration** Runoff Area=164,903 sf 10.34% Impervious Runoff Depth=0.87"
Flow Length=240' Tc=7.4 min CN=45 Runoff=2.30 cfs 0.273 af

**Subcatchment 4A: Tributary to Infiltration** Runoff Area=59,320 sf 45.18% Impervious Runoff Depth=2.56"
Flow Length=956' Tc=9.8 min CN=66 Runoff=3.53 cfs 0.290 af

**Subcatchment 4B: Tributary to Infiltration** Runoff Area=25,791 sf 0.00% Impervious Runoff Depth=0.49"
Flow Length=223' Tc=5.5 min CN=39 Runoff=0.12 cfs 0.024 af

**Subcatchment 5A: Tributary to South** Runoff Area=88,617 sf 4.51% Impervious Runoff Depth=0.61"
Flow Length=502' Tc=11.3 min CN=41 Runoff=0.57 cfs 0.103 af

**Subcatchment 6A: Tributary to South** Runoff Area=8,416 sf 0.00% Impervious Runoff Depth=1.45"
Tc=5.0 min CN=53 Runoff=0.30 cfs 0.023 af

**Subcatchment 7A: Tributary to South** Runoff Area=35,040 sf 0.00% Impervious Runoff Depth=0.49"
Flow Length=170' Tc=6.0 min CN=39 Runoff=0.17 cfs 0.033 af

**Subcatchment Lot 01: Roof Top** Runoff Area=3,503 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=98 Runoff=0.50 cfs 0.040 af

**Subcatchment Lot 02: Roof Top** Runoff Area=9,051 sf 39.89% Impervious Runoff Depth=2.29"
Tc=5.0 min CN=63 Runoff=0.56 cfs 0.040 af

**Subcatchment Lot 03: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=98 Runoff=0.29 cfs 0.023 af

**Subcatchment Lot 04: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=98 Runoff=0.29 cfs 0.023 af

**Subcatchment Lot 05: Roof Top** Runoff Area=3,233 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=98 Runoff=0.46 cfs 0.037 af

**Subcatchment Lot 06: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=98 Runoff=0.29 cfs 0.023 af

**Subcatchment Lot 07: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=98 Runoff=0.29 cfs 0.023 af

**Subcatchment Lot 08: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=98 Runoff=0.29 cfs 0.023 af

**Subcatchment Lot 09: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=98 Runoff=0.29 cfs 0.023 af

**Subcatchment Lot 10: Roof Top &** Runoff Area=3,612 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=98 Runoff=0.52 cfs 0.041 af

**Subcatchment Lot 11: Roof Top &** Runoff Area=3,465 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=98 Runoff=0.50 cfs 0.039 af

**Subcatchment Lot 12: Roof Top** Runoff Area=3,547 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=98 Runoff=0.51 cfs 0.040 af

**Subcatchment Lot 13: Roof Top** Runoff Area=3,647 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=98 Runoff=0.52 cfs 0.041 af

**Subcatchment Lot 14: Roof Top** Runoff Area=3,603 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=98 Runoff=0.52 cfs 0.041 af

**Subcatchment Lot 15: Roof Top** Runoff Area=3,378 sf 100.00% Impervious Runoff Depth=5.92"
Tc=5.0 min CN=98 Runoff=0.49 cfs 0.038 af

**Reach 1R: North Wetland** Inflow=0.23 cfs 0.058 af
Outflow=0.23 cfs 0.058 af

**Reach 2R: South Wetland** Inflow=0.48 cfs 0.072 af
Outflow=0.48 cfs 0.072 af

**Reach 3R: Point of Analysis** Inflow=0.59 cfs 0.130 af
Outflow=0.59 cfs 0.130 af

**Reach S1: Swale** Avg. Flow Depth=0.24' Max Vel=0.24 fps Inflow=0.57 cfs 0.103 af
n=0.150 L=100.0' S=0.0050 '/' Capacity=17.52 cfs Outflow=0.54 cfs 0.103 af

**Reach S2: Swale** Avg. Flow Depth=0.34' Max Vel=0.47 fps Inflow=2.30 cfs 0.273 af
n=0.150 L=180.0' S=0.0111 '/' Capacity=28.10 cfs Outflow=1.87 cfs 0.273 af

**Pond 1Dw: Dry Well** Peak Elev=483.03' Storage=835 cf Inflow=0.50 cfs 0.040 af
Discarded=0.03 cfs 0.040 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.040 af

**Pond 1P: Infiltration Basin 1** Peak Elev=435.97' Storage=5,071 cf Inflow=2.99 cfs 0.270 af
Discarded=0.32 cfs 0.270 af Primary=0.00 cfs 0.000 af Outflow=0.32 cfs 0.270 af

**Pond 1W: Wetland** Peak Elev=435.01' Storage=4,446 cf Inflow=0.39 cfs 0.114 af
300.0" x 72.0" Box Culvert n=0.035 L=60.0' S=0.0100 '/' Outflow=0.06 cfs 0.013 af

**Pond 2Dw: Dry Well** Peak Elev=482.03' Storage=859 cf Inflow=0.56 cfs 0.040 af
Discarded=0.03 cfs 0.040 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.040 af

**Pond 2P: Infiltration Basin 2** Peak Elev=438.31' Storage=2,321 cf Inflow=1.85 cfs 0.133 af
Discarded=0.17 cfs 0.133 af Primary=0.00 cfs 0.000 af Outflow=0.17 cfs 0.133 af

**Pond 3Dw: Dry Well** Peak Elev=482.46' Storage=430 cf Inflow=0.29 cfs 0.023 af
Discarded=0.02 cfs 0.023 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.023 af

**Pond 3P: Infiltration Basin 3** Peak Elev=440.22' Storage=3,942 cf Inflow=1.87 cfs 0.273 af
Discarded=0.31 cfs 0.273 af Primary=0.00 cfs 0.000 af Outflow=0.31 cfs 0.273 af

**Pond 4Dw: Dry Well** Peak Elev=482.46' Storage=430 cf Inflow=0.29 cfs 0.023 af
Discarded=0.02 cfs 0.023 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.023 af

**Pond 4P: Infiltration Basin 4** Peak Elev=460.16' Storage=5,271 cf Inflow=3.62 cfs 0.315 af
Discarded=0.42 cfs 0.315 af Primary=0.00 cfs 0.000 af Outflow=0.42 cfs 0.315 af

**Pond 5Dw: Dry Well** Peak Elev=482.73' Storage=752 cf Inflow=0.46 cfs 0.037 af
Discarded=0.03 cfs 0.037 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.037 af

**Pond 6Dw: Dry Well** Peak Elev=482.46' Storage=430 cf Inflow=0.29 cfs 0.023 af
Discarded=0.02 cfs 0.023 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.023 af

**Pond 7Dw: Dry Well** Peak Elev=482.46' Storage=430 cf Inflow=0.29 cfs 0.023 af
Discarded=0.02 cfs 0.023 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.023 af

**Pond 8Dw: Dry Well** Peak Elev=482.46' Storage=430 cf Inflow=0.29 cfs 0.023 af
Discarded=0.02 cfs 0.023 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.023 af

**Pond 9Dw: Dry Well** Peak Elev=482.46' Storage=430 cf Inflow=0.29 cfs 0.023 af
Discarded=0.02 cfs 0.023 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.023 af

**Pond 10Dw: Dry Well** Peak Elev=483.15' Storage=869 cf Inflow=0.52 cfs 0.041 af
Discarded=0.03 cfs 0.041 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.041 af

**Pond 11Dw: Dry Well** Peak Elev=482.98' Storage=823 cf Inflow=0.50 cfs 0.039 af
Discarded=0.03 cfs 0.039 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.039 af

**Pond 12Dw: Dry Well** Peak Elev=483.07' Storage=849 cf Inflow=0.51 cfs 0.040 af
Discarded=0.03 cfs 0.040 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.040 af

**Pond 13Dw: Dry Well** Peak Elev=483.13' Storage=876 cf Inflow=0.52 cfs 0.041 af
Discarded=0.03 cfs 0.041 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.041 af

**Pond 14Dw: Dry Well** Peak Elev=483.08' Storage=865 cf Inflow=0.52 cfs 0.041 af
Discarded=0.03 cfs 0.041 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.041 af

**Pond R6: Rain Garden Lot 6** Peak Elev=484.56' Storage=499 cf Inflow=0.54 cfs 0.103 af
Discarded=0.06 cfs 0.066 af Primary=0.38 cfs 0.037 af Outflow=0.45 cfs 0.103 af

**Pond R7: Rain Garden Lot 7** Peak Elev=475.52' Storage=256 cf Inflow=0.30 cfs 0.023 af
Discarded=0.04 cfs 0.021 af Primary=0.08 cfs 0.002 af Outflow=0.12 cfs 0.023 af

**Total Runoff Area = 16.390 ac Runoff Volume = 1.764 af Average Runoff Depth = 1.29"**
**81.88% Pervious = 13.420 ac 18.12% Impervious = 2.970 ac**

## Summary for Subcatchment 1A: Tributary to Infiltration Basin 1

Runoff = 2.99 cfs @ 12.18 hrs, Volume= 0.270 af, Depth= 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 21,551 | 98 | Paved roads w/curbs & sewers, HSG A |
| * | 3,043 | 98 | Paved Sidewalk, HSG A |
| | 42,144 | 39 | >75% Grass cover, Good, HSG A |
| | 66,738 | 61 | Weighted Average |
| | 42,144 | | 63.15% Pervious Area |
| | 24,594 | | 36.85% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.5 | 50 | 0.0100 | 0.11 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 0.7 | 28 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.2 | 30 | 0.1600 | 2.80 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.6 | 176 | 0.0500 | 4.54 | | **Shallow Concentrated Flow,** Paved Kv= 20.3 fps |
| 0.1 | 18 | 0.0050 | 3.21 | 2.52 | **Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 |
| 2.7 | 683 | 0.0050 | 4.20 | 7.43 | **Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 |
| 11.8 | 985 | Total | | | |

## Summary for Subcatchment 2A: Tributary to North Wetland

Runoff = 0.39 cfs @ 12.59 hrs, Volume= 0.114 af, Depth= 0.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 91,230 | 39 | >75% Grass cover, Good, HSG A |
| * | 4,549 | 98 | Wetland |
| | 59,796 | 30 | Woods, Good, HSG A |
| | 155,575 | 37 | Weighted Average |
| | 151,026 | | 97.08% Pervious Area |
| | 4,549 | | 2.92% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.5 | 50 | 0.0100 | 0.11 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 2.9 | 327 | 0.0700 | 1.85 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 4.3 | 367 | 0.0800 | 1.41 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 3.2 | 153 | 0.0250 | 0.79 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 1.5 | 105 | 0.0280 | 1.17 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.3 | 51 | 0.2000 | 3.13 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 19.7 | 1,053 | Total | | | |

## Summary for Subcatchment 2B: Tributary to North Wetland

Runoff = 1.37 cfs @ 12.07 hrs, Volume= 0.094 af, Depth= 3.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 7,687 | 98 | Paved roads w/curbs & sewers, HSG A |
| | 3,812 | 39 | >75% Grass cover, Good, HSG A |
| * | 1,067 | 98 | Paved Sidewalk, HSG A |
| | 12,566 | 80 | Weighted Average |
| | 3,812 | | 30.34% Pervious Area |
| | 8,754 | | 69.66% Impervious Area |

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

## Summary for Subcatchment 2C: Tributary to North Wetland

Runoff = 0.23 cfs @ 12.32 hrs, Volume= 0.045 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 47,923 | 39 | >75% Grass cover, Good, HSG A |
| 47,923 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.7 | 50 | 0.0600 | 0.23 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 1.3 | 55 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.3 | 50 | 0.1200 | 2.42 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 5.3 | 155 | Total | | | |

## Summary for Subcatchment 3A: Tributary to Infiltration Basin 3

Runoff = 2.30 cfs @ 12.14 hrs, Volume= 0.273 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 144,721 | 39 | >75% Grass cover, Good, HSG A |
| | 190 | 74 | >75% Grass cover, Good, HSG C |
| | 2,937 | 30 | Woods, Good, HSG A |
| * | 1,123 | 98 | Paved Sidewalk, HSG A |
| | 15,932 | 98 | Paved roads w/curbs & sewers, HSG A |
| | 164,903 | 45 | Weighted Average |
| | 147,848 | | 89.66% Pervious Area |
| | 17,055 | | 10.34% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.7 | 50 | 0.0200 | 0.15 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 1.7 | 190 | 0.0700 | 1.85 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 7.4 | 240 | Total | | | |

## Summary for Subcatchment 4A: Tributary to Infiltration Basin 4

Runoff = 3.53 cfs @ 12.14 hrs, Volume= 0.290 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 24,181 | 98 | Paved roads w/curbs & sewers, HSG A |
| * | 2,622 | 98 | Paved Sidewalk, HSG A |
| | 32,517 | 39 | >75% Grass cover, Good, HSG A |
| | 59,320 | 66 | Weighted Average |
| | 32,517 | | 54.82% Pervious Area |
| | 26,803 | | 45.18% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.5 | 50 | 0.0100 | 0.11 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 1.1 | 365 | 0.0800 | 5.74 | | **Shallow Concentrated Flow,** Paved Kv= 20.3 fps |
| 0.5 | 296 | 0.0400 | 9.07 | 7.13 | **Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 |
| 0.7 | 245 | 0.0100 | 5.94 | 10.50 | **Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 |
| 9.8 | 956 | Total | | | |

## Summary for Subcatchment 4B: Tributary to Infiltration Basin 4

Runoff = 0.12 cfs @ 12.32 hrs, Volume= 0.024 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 25,791 | 39 | >75% Grass cover, Good, HSG A |
| 25,791 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.7 | 50 | 0.0600 | 0.23 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 1.6 | 130 | 0.0380 | 1.36 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.2 | 43 | 0.1800 | 2.97 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 5.5 | 223 | Total | | | |

## Summary for Subcatchment 5A: Tributary to South Wetland

Runoff = 0.57 cfs @ 12.36 hrs, Volume= 0.103 af, Depth= 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 81,385 | 39 | >75% Grass cover, Good, HSG A |
| 3,232 | 30 | Woods, Good, HSG A |
| 2,000 | 98 | Roofs |
| 1,000 | 98 | Paved parking, HSG A |
| 1,000 | 98 | Paved parking, HSG C |
| 88,617 | 41 | Weighted Average |
| 84,617 | | 95.49% Pervious Area |
| 4,000 | | 4.51% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.7 | 50 | 0.0600 | 0.23 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 3.1 | 319 | 0.0600 | 1.71 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 4.5 | 133 | 0.0050 | 0.49 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 11.3 | 502 | Total | | | |

## Summary for Subcatchment 6A: Tributary to South Wetland

Runoff = 0.30 cfs @ 12.09 hrs, Volume= 0.023 af, Depth= 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 5,011 | 39 | >75% Grass cover, Good, HSG A |
| 3,405 | 74 | >75% Grass cover, Good, HSG C |
| 8,416 | 53 | Weighted Average |
| 8,416 | | 100.00% Pervious Area |

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

## Summary for Subcatchment 7A: Tributary to South Wetland

Runoff = 0.17 cfs @ 12.33 hrs, Volume= 0.033 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 32,283 | 39 | >75% Grass cover, Good, HSG A |
| 2,757 | 39 | >75% Grass cover, Good, HSG A |
| 35,040 | 39 | Weighted Average |
| 35,040 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.0 | 50 | 0.0500 | 0.21 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 1.4 | 60 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.6 | 60 | 0.0500 | 1.57 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 6.0 | 170 | Total | | | |

## Summary for Subcatchment Lot 01: Roof Top

Runoff = 0.50 cfs @ 12.07 hrs, Volume= 0.040 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,503 | 98 | Paved parking, HSG A |
| 3,503 | 98 | Weighted Average |
| 3,503 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 02: Roof Top

Runoff = 0.56 cfs @ 12.08 hrs, Volume= 0.040 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,610 | 98 | Paved parking, HSG A |
| 5,441 | 39 | >75% Grass cover, Good, HSG A |
| 9,051 | 63 | Weighted Average |
| 5,441 | | 60.11% Pervious Area |
| 3,610 | | 39.89% Impervious Area |

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

## Summary for Subcatchment Lot 03: Roof Top

Runoff = 0.29 cfs @ 12.07 hrs, Volume= 0.023 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 04: Roof Top

Runoff = 0.29 cfs @ 12.07 hrs, Volume= 0.023 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 05: Roof Top

Runoff = 0.46 cfs @ 12.07 hrs, Volume= 0.037 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,233 | 98 | Paved parking, HSG A |
| 3,233 | 98 | Weighted Average |
| 3,233 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 06: Roof Top

Runoff = 0.29 cfs @ 12.07 hrs, Volume= 0.023 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 07: Roof Top

Runoff = 0.29 cfs @ 12.07 hrs, Volume= 0.023 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 08: Roof Top

Runoff = 0.29 cfs @ 12.07 hrs, Volume= 0.023 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 09: Roof Top

Runoff = 0.29 cfs @ 12.07 hrs, Volume= 0.023 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 10: Roof Top & Driveway

Runoff = 0.52 cfs @ 12.07 hrs, Volume= 0.041 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,612 | 98 | Paved parking, HSG A |
| 3,612 | 98 | Weighted Average |
| 3,612 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 11: Roof Top & Driveway

Runoff = 0.50 cfs @ 12.07 hrs, Volume= 0.039 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,465 | 98 | Paved parking, HSG A |
| 3,465 | 98 | Weighted Average |
| 3,465 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 12: Roof Top

Runoff = 0.51 cfs @ 12.07 hrs, Volume= 0.040 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,547 | 98 | Paved parking, HSG A |
| 3,547 | 98 | Weighted Average |
| 3,547 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 13: Roof Top

Runoff = 0.52 cfs @ 12.07 hrs, Volume= 0.041 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,647 | 98 | Paved parking, HSG A |
| 3,647 | 98 | Weighted Average |
| 3,647 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 14: Roof Top

Runoff = 0.52 cfs @ 12.07 hrs, Volume= 0.041 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,603 | 98 | Paved parking, HSG A |
| 3,603 | 98 | Weighted Average |
| 3,603 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 15: Roof Top

Runoff = 0.49 cfs @ 12.07 hrs, Volume= 0.038 af, Depth= 5.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.16"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,378 | 98 | Paved parking, HSG A |
| 3,378 | 98 | Weighted Average |
| 3,378 | | 100.00% Impervious Area |

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

## Summary for Reach 1R: North Wetland

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

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 5.529 ac, | 13.55% Impervious, | Inflow Depth = | 0.13" | for 25-Year event |
| Inflow = | 0.23 cfs @ | 12.32 hrs, | Volume= | 0.058 af | |
| Outflow = | 0.23 cfs @ | 12.32 hrs, | Volume= | 0.058 af, | Atten= 0%, Lag= 0.0 min |

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

## Summary for Reach 2R: South Wetland

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

Inflow Area = 10.861 ac, 20.44% Impervious, Inflow Depth = 0.08" for 25-Year event
Inflow = 0.48 cfs @ 12.72 hrs, Volume= 0.072 af
Outflow = 0.48 cfs @ 12.72 hrs, Volume= 0.072 af, Atten= 0%, Lag= 0.0 min

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

## Summary for Reach 3R: Point of Analysis

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

Inflow Area = 16.390 ac, 18.12% Impervious, Inflow Depth = 0.10" for 25-Year event
Inflow = 0.59 cfs @ 12.72 hrs, Volume= 0.130 af
Outflow = 0.59 cfs @ 12.72 hrs, Volume= 0.130 af, Atten= 0%, Lag= 0.0 min

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

## Summary for Reach S1: Swale

Inflow Area = 2.034 ac, 4.51% Impervious, Inflow Depth = 0.61" for 25-Year event
Inflow = 0.57 cfs @ 12.36 hrs, Volume= 0.103 af
Outflow = 0.54 cfs @ 12.57 hrs, Volume= 0.103 af, Atten= 6%, Lag= 12.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.24 fps, Min. Travel Time= 6.9 min
Avg. Velocity = 0.10 fps, Avg. Travel Time= 16.5 min

Peak Storage= 222 cf @ 12.45 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 1.50' Flow Area= 25.5 sf, Capacity= 17.52 cfs

8.00' x 1.50' deep channel, n= 0.150 Sheet flow over Short Grass
Side Slope Z-value= 6.0 '/' Top Width= 26.00'
Length= 100.0' Slope= 0.0050 '/'
Inlet Invert= 486.00', Outlet Invert= 485.50'

‡

## Summary for Reach S2: Swale

Inflow Area = 3.786 ac, 10.34% Impervious, Inflow Depth = 0.87" for 25-Year event
Inflow = 2.30 cfs @ 12.14 hrs, Volume= 0.273 af
Outflow = 1.87 cfs @ 12.38 hrs, Volume= 0.273 af, Atten= 19%, Lag= 14.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.47 fps, Min. Travel Time= 6.4 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 18.6 min

Peak Storage= 723 cf @ 12.27 hrs
Average Depth at Peak Storage= 0.34'
Bank-Full Depth= 1.50' Flow Area= 26.3 sf, Capacity= 28.10 cfs

10.00' x 1.50' deep channel, n= 0.150 Sheet flow over Short Grass
Side Slope Z-value= 5.0 '/' Top Width= 25.00'
Length= 180.0' Slope= 0.0111 '/'
Inlet Invert= 445.00', Outlet Invert= 443.00'

‡

## Summary for Pond 1Dw: Dry Well

Inflow Area = 0.080 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year event
Inflow = 0.50 cfs @ 12.07 hrs, Volume= 0.040 af
Outflow = 0.03 cfs @ 13.86 hrs, Volume= 0.040 af, Atten= 95%, Lag= 107.4 min
Discarded = 0.03 cfs @ 13.86 hrs, Volume= 0.040 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 483.03' @ 13.86 hrs Surf.Area= 276 sf Storage= 835 cf

Plug-Flow detention time= 300.7 min calculated for 0.040 af (100% of inflow)
Center-of-Mass det. time= 300.7 min ( 1,044.5 - 743.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.03 cfs @ 13.86 hrs HW=483.03' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 1P: Infiltration Basin 1

Inflow Area = 1.532 ac, 36.85% Impervious, Inflow Depth = 2.11" for 25-Year event
Inflow = 2.99 cfs @ 12.18 hrs, Volume= 0.270 af
Outflow = 0.32 cfs @ 13.88 hrs, Volume= 0.270 af, Atten= 89%, Lag= 102.5 min
Discarded = 0.32 cfs @ 13.88 hrs, Volume= 0.270 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 435.97' @ 13.88 hrs Surf.Area= 3,323 sf Storage= 5,071 cf

Plug-Flow detention time= 203.4 min calculated for 0.270 af (100% of inflow)
Center-of-Mass det. time= 203.4 min ( 1,067.3 - 864.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 434.00' | 19,090 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 434.00 | 1,846 | 0 | 0 |
| 435.00 | 2,567 | 2,207 | 2,207 |
| 436.00 | 3,344 | 2,956 | 5,162 |
| 437.00 | 4,180 | 3,762 | 8,924 |
| 438.00 | 5,068 | 4,624 | 13,548 |
| 439.00 | 6,015 | 5,542 | 19,090 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 437.00' | **10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Discarded | 434.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 432.00' |

**Discarded OutFlow** Max=0.32 cfs @ 13.88 hrs HW=435.97' (Free Discharge)
└**2=Exfiltration** ( Controls 0.32 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=434.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Pond 1W: Wetland

Inflow Area = 3.572 ac, 2.92% Impervious, Inflow Depth = 0.38" for 25-Year event
Inflow = 0.39 cfs @ 12.59 hrs, Volume= 0.114 af
Outflow = 0.06 cfs @ 22.29 hrs, Volume= 0.013 af, Atten= 84%, Lag= 582.1 min
Primary = 0.06 cfs @ 22.29 hrs, Volume= 0.013 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 435.01' @ 22.29 hrs Surf.Area= 4,971 sf Storage= 4,446 cf

Plug-Flow detention time= 628.8 min calculated for 0.013 af (11% of inflow)
Center-of-Mass det. time= 396.1 min ( 1,382.2 - 986.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 434.00' | 58,516 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 434.00 | 3,853 | 0 | 0 |
| 436.00 | 6,072 | 9,925 | 9,925 |
| 438.00 | 7,616 | 13,688 | 23,613 |
| 440.00 | 8,714 | 16,330 | 39,943 |
| 442.00 | 9,859 | 18,573 | 58,516 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 435.00' | **300.0" W x 72.0" H Box Culvert**<br>L= 60.0' Box, headwall w/3 square edges, Ke= 0.500<br>Inlet / Outlet Invert= 435.00' / 434.40' S= 0.0100 '/' Cc= 0.900<br>n= 0.035 Earth, dense weeds, Flow Area= 150.00 sf |

**Primary OutFlow** Max=0.02 cfs @ 22.29 hrs HW=435.01' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.02 cfs @ 0.14 fps)

## Summary for Pond 2Dw: Dry Well

Inflow Area = 0.208 ac, 39.89% Impervious, Inflow Depth = 2.29" for 25-Year event
Inflow = 0.56 cfs @ 12.08 hrs, Volume= 0.040 af
Outflow = 0.03 cfs @ 14.95 hrs, Volume= 0.040 af, Atten= 94%, Lag= 172.5 min
Discarded = 0.03 cfs @ 14.95 hrs, Volume= 0.040 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 482.03' @ 14.95 hrs Surf.Area= 340 sf Storage= 859 cf

Plug-Flow detention time= 313.9 min calculated for 0.040 af (100% of inflow)
Center-of-Mass det. time= 313.9 min ( 1,166.6 - 852.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 422 cf | **ADS_StormTech SC-740** x 9 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 479.50' | 1,448 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,870 cf Overall - 422 cf Embedded = 1,448 cf |
| | | 1,870 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 479.50 | 340 | 0 | 0 |
| 485.00 | 340 | 1,870 | 1,870 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 479.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.03 cfs @ 14.95 hrs HW=482.03' (Free Discharge)
└**1=Exfiltration** ( Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=479.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 2P: Infiltration Basin 2

Inflow Area = 0.366 ac, 76.09% Impervious, Inflow Depth = 4.35" for 25-Year event
Inflow = 1.85 cfs @ 12.07 hrs, Volume= 0.133 af
Outflow = 0.17 cfs @ 12.93 hrs, Volume= 0.133 af, Atten= 91%, Lag= 51.2 min
Discarded = 0.17 cfs @ 12.93 hrs, Volume= 0.133 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 438.31' @ 12.93 hrs Surf.Area= 1,455 sf Storage= 2,321 cf

Plug-Flow detention time= 128.3 min calculated for 0.133 af (100% of inflow)
Center-of-Mass det. time= 128.3 min ( 920.7 - 792.4 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 436.00' | 1,296 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>5,093 cf Overall - 1,852 cf Embedded = 3,241 cf x 40.0% Voids |
| #2 | 436.50' | 1,852 cf | **ADS_StormTech SC-740** x 40 Inside #1<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 5 rows |
| | | 3,148 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 436.00 | 1,455 | 0 | 0 |
| 439.50 | 1,455 | 5,093 | 5,093 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 436.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 434.00' |
| #2 | Primary | 438.33' | **8.0" Round Culvert**<br>L= 22.0' RCP, mitered to conform to fill, Ke= 0.700<br>Inlet / Outlet Invert= 438.33' / 438.00' S= 0.0150 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.35 sf |

**Discarded OutFlow** Max=0.17 cfs @ 12.93 hrs HW=438.31' (Free Discharge)
└**1=Exfiltration** ( Controls 0.17 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=436.00' (Free Discharge)
└**2=Culvert** ( Controls 0.00 cfs)

## Summary for Pond 3Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year event
Inflow = 0.29 cfs @ 12.07 hrs, Volume= 0.023 af
Outflow = 0.02 cfs @ 13.54 hrs, Volume= 0.023 af, Atten= 94%, Lag= 88.3 min
Discarded = 0.02 cfs @ 13.54 hrs, Volume= 0.023 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 482.46' @ 13.54 hrs Surf.Area= 220 sf Storage= 430 cf

Plug-Flow detention time= 217.0 min calculated for 0.023 af (100% of inflow)
Center-of-Mass det. time= 217.0 min ( 960.8 - 743.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.54 hrs HW=482.46' (Free Discharge)
└**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 3P: Infiltration Basin 3

Inflow Area = 3.786 ac, 10.34% Impervious, Inflow Depth = 0.87" for 25-Year event
Inflow = 1.87 cfs @ 12.38 hrs, Volume= 0.273 af
Outflow = 0.31 cfs @ 15.18 hrs, Volume= 0.273 af, Atten= 83%, Lag= 168.2 min
Discarded = 0.31 cfs @ 15.18 hrs, Volume= 0.273 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 440.22' @ 15.18 hrs Surf.Area= 3,654 sf Storage= 3,942 cf

Plug-Flow detention time= 157.9 min calculated for 0.273 af (100% of inflow)
Center-of-Mass det. time= 157.8 min ( 1,091.5 - 933.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 439.00' | 17,025 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 439.00 | 2,840 | 0 | 0 |
| 440.00 | 3,500 | 3,170 | 3,170 |
| 441.00 | 4,213 | 3,857 | 7,027 |
| 442.00 | 4,985 | 4,599 | 11,626 |
| 443.00 | 5,813 | 5,399 | 17,025 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 441.90' | **10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Discarded | 439.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 437.00' |

**Discarded OutFlow** Max=0.31 cfs @ 15.18 hrs HW=440.22' (Free Discharge)
└**2=Exfiltration** ( Controls 0.31 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=439.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Pond 4Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year event
Inflow = 0.29 cfs @ 12.07 hrs, Volume= 0.023 af
Outflow = 0.02 cfs @ 13.54 hrs, Volume= 0.023 af, Atten= 94%, Lag= 88.3 min
Discarded = 0.02 cfs @ 13.54 hrs, Volume= 0.023 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 482.46' @ 13.54 hrs Surf.Area= 220 sf Storage= 430 cf

Plug-Flow detention time= 217.0 min calculated for 0.023 af (100% of inflow)
Center-of-Mass det. time= 217.0 min ( 960.8 - 743.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.54 hrs HW=482.46' (Free Discharge)
└**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 4P: Infiltration Basin 4

Inflow Area = 1.954 ac, 31.49% Impervious, Inflow Depth = 1.93" for 25-Year event
Inflow = 3.62 cfs @ 12.14 hrs, Volume= 0.315 af
Outflow = 0.42 cfs @ 13.37 hrs, Volume= 0.315 af, Atten= 88%, Lag= 73.3 min
Discarded = 0.42 cfs @ 13.37 hrs, Volume= 0.315 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 460.16' @ 13.37 hrs Surf.Area= 4,985 sf Storage= 5,271 cf

Plug-Flow detention time= 136.2 min calculated for 0.315 af (100% of inflow)
Center-of-Mass det. time= 136.1 min ( 994.0 - 857.9 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 459.00' | 15,845 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 459.00 | 4,080 | 0 | 0 |
| 460.00 | 4,850 | 4,465 | 4,465 |
| 461.00 | 5,675 | 5,263 | 9,728 |
| 462.00 | 6,560 | 6,118 | 15,845 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 459.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 457.00' |
| #2 | Primary | 460.70' | **10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Discarded OutFlow** Max=0.42 cfs @ 13.37 hrs HW=460.16' (Free Discharge)
└**1=Exfiltration** ( Controls 0.42 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=459.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

## Summary for Pond 5Dw: Dry Well

Inflow Area = 0.074 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year event
Inflow = 0.46 cfs @ 12.07 hrs, Volume= 0.037 af
Outflow = 0.03 cfs @ 13.77 hrs, Volume= 0.037 af, Atten= 94%, Lag= 102.3 min
Discarded = 0.03 cfs @ 13.77 hrs, Volume= 0.037 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 482.73' @ 13.77 hrs Surf.Area= 276 sf Storage= 752 cf

Plug-Flow detention time= 278.0 min calculated for 0.037 af (100% of inflow)
Center-of-Mass det. time= 278.0 min ( 1,021.8 - 743.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.03 cfs @ 13.77 hrs HW=482.73' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 6Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year event
Inflow = 0.29 cfs @ 12.07 hrs, Volume= 0.023 af
Outflow = 0.02 cfs @ 13.54 hrs, Volume= 0.023 af, Atten= 94%, Lag= 88.3 min
Discarded = 0.02 cfs @ 13.54 hrs, Volume= 0.023 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 482.46' @ 13.54 hrs Surf.Area= 220 sf Storage= 430 cf

Plug-Flow detention time= 217.0 min calculated for 0.023 af (100% of inflow)
Center-of-Mass det. time= 217.0 min ( 960.8 - 743.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.54 hrs HW=482.46' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 7Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year event
Inflow = 0.29 cfs @ 12.07 hrs, Volume= 0.023 af
Outflow = 0.02 cfs @ 13.54 hrs, Volume= 0.023 af, Atten= 94%, Lag= 88.3 min
Discarded = 0.02 cfs @ 13.54 hrs, Volume= 0.023 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 482.46' @ 13.54 hrs Surf.Area= 220 sf Storage= 430 cf

Plug-Flow detention time= 217.0 min calculated for 0.023 af (100% of inflow)
Center-of-Mass det. time= 217.0 min ( 960.8 - 743.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.54 hrs HW=482.46' (Free Discharge)
└**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 8Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year event
Inflow = 0.29 cfs @ 12.07 hrs, Volume= 0.023 af
Outflow = 0.02 cfs @ 13.54 hrs, Volume= 0.023 af, Atten= 94%, Lag= 88.3 min
Discarded = 0.02 cfs @ 13.54 hrs, Volume= 0.023 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 482.46' @ 13.54 hrs Surf.Area= 220 sf Storage= 430 cf

Plug-Flow detention time= 217.0 min calculated for 0.023 af (100% of inflow)
Center-of-Mass det. time= 217.0 min ( 960.8 - 743.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.54 hrs HW=482.46' (Free Discharge)
└**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 9Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year event
Inflow = 0.29 cfs @ 12.07 hrs, Volume= 0.023 af
Outflow = 0.02 cfs @ 13.54 hrs, Volume= 0.023 af, Atten= 94%, Lag= 88.3 min
Discarded = 0.02 cfs @ 13.54 hrs, Volume= 0.023 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 482.46' @ 13.54 hrs Surf.Area= 220 sf Storage= 430 cf

Plug-Flow detention time= 217.0 min calculated for 0.023 af (100% of inflow)
Center-of-Mass det. time= 217.0 min ( 960.8 - 743.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.54 hrs HW=482.46' (Free Discharge)
└**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 10Dw: Dry Well

Inflow Area = 0.083 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year event
Inflow = 0.52 cfs @ 12.07 hrs, Volume= 0.041 af
Outflow = 0.03 cfs @ 13.89 hrs, Volume= 0.041 af, Atten= 95%, Lag= 109.2 min
Discarded = 0.03 cfs @ 13.89 hrs, Volume= 0.041 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 483.15' @ 13.89 hrs Surf.Area= 276 sf Storage= 869 cf

Plug-Flow detention time= 309.5 min calculated for 0.041 af (100% of inflow)
Center-of-Mass det. time= 309.5 min ( 1,053.4 - 743.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.03 cfs @ 13.89 hrs HW=483.15' (Free Discharge)
└**1=Exfiltration** ( Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 11Dw: Dry Well

Inflow Area = 0.080 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year event
Inflow = 0.50 cfs @ 12.07 hrs, Volume= 0.039 af
Outflow = 0.03 cfs @ 13.85 hrs, Volume= 0.039 af, Atten= 95%, Lag= 106.7 min
Discarded = 0.03 cfs @ 13.85 hrs, Volume= 0.039 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 482.98' @ 13.85 hrs Surf.Area= 276 sf Storage= 823 cf

Plug-Flow detention time= 297.6 min calculated for 0.039 af (100% of inflow)
Center-of-Mass det. time= 297.6 min ( 1,041.4 - 743.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.03 cfs @ 13.85 hrs HW=482.98' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 12Dw: Dry Well

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 0.081 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year event | | | | |
| Inflow = | 0.51 cfs @ | 12.07 hrs, | Volume= | 0.040 af | |
| Outflow = | 0.03 cfs @ | 13.87 hrs, | Volume= | 0.040 af, | Atten= 95%, Lag= 108.1 min |
| Discarded = | 0.03 cfs @ | 13.87 hrs, | Volume= | 0.040 af | |
| Primary = | 0.00 cfs @ | 0.00 hrs, | Volume= | 0.000 af | |

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 483.07' @ 13.87 hrs Surf.Area= 276 sf Storage= 849 cf

Plug-Flow detention time= 304.3 min calculated for 0.040 af (100% of inflow)
Center-of-Mass det. time= 304.3 min ( 1,048.1 - 743.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.03 cfs @ 13.87 hrs HW=483.07' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 13Dw: Dry Well

Inflow Area = 0.084 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year event
Inflow = 0.52 cfs @ 12.07 hrs, Volume= 0.041 af
Outflow = 0.03 cfs @ 13.89 hrs, Volume= 0.041 af, Atten= 95%, Lag= 108.9 min
Discarded = 0.03 cfs @ 13.89 hrs, Volume= 0.041 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 483.13' @ 13.89 hrs Surf.Area= 280 sf Storage= 876 cf

Plug-Flow detention time= 308.2 min calculated for 0.041 af (100% of inflow)
Center-of-Mass det. time= 308.2 min ( 1,052.0 - 743.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,021 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,400 cf Overall - 379 cf Embedded = 1,021 cf |
| | | 1,400 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 280 | 0 | 0 |
| 485.00 | 280 | 1,400 | 1,400 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.03 cfs @ 13.89 hrs HW=483.13' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 14Dw: Dry Well

Inflow Area = 0.083 ac,100.00% Impervious, Inflow Depth = 5.92" for 25-Year event
Inflow = 0.52 cfs @ 12.07 hrs, Volume= 0.041 af
Outflow = 0.03 cfs @ 13.88 hrs, Volume= 0.041 af, Atten= 95%, Lag= 108.4 min
Discarded = 0.03 cfs @ 13.88 hrs, Volume= 0.041 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 483.08' @ 13.88 hrs Surf.Area= 276 sf Storage= 865 cf

Plug-Flow detention time= 307.3 min calculated for 0.041 af (100% of inflow)
Center-of-Mass det. time= 307.2 min ( 1,051.1 - 743.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 479.95' | 1,015 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,394 cf Overall - 379 cf Embedded = 1,015 cf |
| | | 1,394 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 479.95 | 276 | 0 | 0 |
| 485.00 | 276 | 1,394 | 1,394 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 479.95' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.03 cfs @ 13.88 hrs HW=483.08' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=479.95' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond R6: Rain Garden Lot 6

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 2.034 ac, | 4.51% Impervious, | Inflow Depth = | 0.61" | for 25-Year event |
| Inflow = | 0.54 cfs @ | 12.57 hrs, | Volume= | 0.103 af | |
| Outflow = | 0.45 cfs @ | 12.72 hrs, | Volume= | 0.103 af, | Atten= 17%, Lag= 9.3 min |
| Discarded = | 0.06 cfs @ | 12.72 hrs, | Volume= | 0.066 af | |
| Primary = | 0.38 cfs @ | 12.72 hrs, | Volume= | 0.037 af | |

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 484.56' @ 12.72 hrs Surf.Area= 989 sf Storage= 499 cf

Plug-Flow detention time= 66.7 min calculated for 0.103 af (100% of inflow)
Center-of-Mass det. time= 66.6 min ( 1,028.3 - 961.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 484.00' | 965 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 484.00 | 780 | 0 | 0 |
| 485.00 | 1,150 | 965 | 965 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 484.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 481.00' |
| #2 | Primary | 484.50' | **10.0' long x 5.0' breadth Broad-Crested Rectangular Weir**<br>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<br>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 @ 12.72 hrs HW=484.56' (Free Discharge)
└**1=Exfiltration** ( Controls 0.06 cfs)

**Primary OutFlow** Max=0.38 cfs @ 12.72 hrs HW=484.56' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 0.38 cfs @ 0.59 fps)

## Summary for Pond R7: Rain Garden Lot 7

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 0.193 ac, | 0.00% Impervious, | Inflow Depth = | 1.45" | for 25-Year event |
| Inflow = | 0.30 cfs @ | 12.09 hrs, | Volume= | 0.023 af | |
| Outflow = | 0.12 cfs @ | 12.41 hrs, | Volume= | 0.023 af, | Atten= 59%, Lag= 19.2 min |
| Discarded = | 0.04 cfs @ | 12.41 hrs, | Volume= | 0.021 af | |
| Primary = | 0.08 cfs @ | 12.41 hrs, | Volume= | 0.002 af | |

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 475.52' @ 12.41 hrs Surf.Area= 600 sf Storage= 256 cf

Plug-Flow detention time= 64.2 min calculated for 0.023 af (100% of inflow)
Center-of-Mass det. time= 64.2 min ( 944.6 - 880.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 475.00' | 590 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 475.00 | 380 | 0 | 0 |
| 476.00 | 800 | 590 | 590 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 475.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 470.00' |
| #2 | Primary | 475.50' | **10.0' long x 5.0' breadth Broad-Crested Rectangular Weir**<br>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<br>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=0.04 cfs @ 12.41 hrs HW=475.52' (Free Discharge)
└**1=Exfiltration** ( Controls 0.04 cfs)

**Primary OutFlow** Max=0.08 cfs @ 12.41 hrs HW=475.52' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 0.08 cfs @ 0.36 fps)

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 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 1A: Tributary to Infiltration** Runoff Area=66,738 sf 36.85% Impervious Runoff Depth=4.06"
Flow Length=985' Tc=11.8 min CN=61 Runoff=5.97 cfs 0.518 af

**Subcatchment 2A: Tributary to North** Runoff Area=155,575 sf 2.92% Impervious Runoff Depth=1.29"
Flow Length=1,053' Tc=19.7 min CN=37 Runoff=2.50 cfs 0.385 af

**Subcatchment 2B: Tributary to North** Runoff Area=12,566 sf 69.66% Impervious Runoff Depth=6.37"
Tc=5.0 min CN=80 Runoff=2.19 cfs 0.153 af

**Subcatchment 2C: Tributary to North** Runoff Area=47,923 sf 0.00% Impervious Runoff Depth=1.50"
Flow Length=155' Tc=5.3 min CN=39 Runoff=1.47 cfs 0.138 af

**Subcatchment 3A: Tributary to Infiltration** Runoff Area=164,903 sf 10.34% Impervious Runoff Depth=2.17"
Flow Length=240' Tc=7.4 min CN=45 Runoff=8.05 cfs 0.684 af

**Subcatchment 4A: Tributary to Infiltration** Runoff Area=59,320 sf 45.18% Impervious Runoff Depth=4.66"
Flow Length=956' Tc=9.8 min CN=66 Runoff=6.55 cfs 0.529 af

**Subcatchment 4B: Tributary to Infiltration** Runoff Area=25,791 sf 0.00% Impervious Runoff Depth=1.50"
Flow Length=223' Tc=5.5 min CN=39 Runoff=0.79 cfs 0.074 af

**Subcatchment 5A: Tributary to South** Runoff Area=88,617 sf 4.51% Impervious Runoff Depth=1.72"
Flow Length=502' Tc=11.3 min CN=41 Runoff=2.71 cfs 0.292 af

**Subcatchment 6A: Tributary to South** Runoff Area=8,416 sf 0.00% Impervious Runoff Depth=3.10"
Tc=5.0 min CN=53 Runoff=0.70 cfs 0.050 af

**Subcatchment 7A: Tributary to South** Runoff Area=35,040 sf 0.00% Impervious Runoff Depth=1.50"
Flow Length=170' Tc=6.0 min CN=39 Runoff=1.05 cfs 0.101 af

**Subcatchment Lot 01: Roof Top** Runoff Area=3,503 sf 100.00% Impervious Runoff Depth=8.55"
Tc=5.0 min CN=98 Runoff=0.72 cfs 0.057 af

**Subcatchment Lot 02: Roof Top** Runoff Area=9,051 sf 39.89% Impervious Runoff Depth=4.30"
Tc=5.0 min CN=63 Runoff=1.08 cfs 0.074 af

**Subcatchment Lot 03: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=8.55"
Tc=5.0 min CN=98 Runoff=0.41 cfs 0.033 af

**Subcatchment Lot 04: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=8.55"
Tc=5.0 min CN=98 Runoff=0.41 cfs 0.033 af

**Subcatchment Lot 05: Roof Top** Runoff Area=3,233 sf 100.00% Impervious Runoff Depth=8.55"
Tc=5.0 min CN=98 Runoff=0.66 cfs 0.053 af

**Subcatchment Lot 06: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=8.55"
Tc=5.0 min CN=98 Runoff=0.41 cfs 0.033 af

**Subcatchment Lot 07: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=8.55"
Tc=5.0 min CN=98 Runoff=0.41 cfs 0.033 af

**Subcatchment Lot 08: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=8.55"
Tc=5.0 min CN=98 Runoff=0.41 cfs 0.033 af

**Subcatchment Lot 09: Roof Top** Runoff Area=2,000 sf 100.00% Impervious Runoff Depth=8.55"
Tc=5.0 min CN=98 Runoff=0.41 cfs 0.033 af

**Subcatchment Lot 10: Roof Top &** Runoff Area=3,612 sf 100.00% Impervious Runoff Depth=8.55"
Tc=5.0 min CN=98 Runoff=0.74 cfs 0.059 af

**Subcatchment Lot 11: Roof Top &** Runoff Area=3,465 sf 100.00% Impervious Runoff Depth=8.55"
Tc=5.0 min CN=98 Runoff=0.71 cfs 0.057 af

**Subcatchment Lot 12: Roof Top** Runoff Area=3,547 sf 100.00% Impervious Runoff Depth=8.55"
Tc=5.0 min CN=98 Runoff=0.73 cfs 0.058 af

**Subcatchment Lot 13: Roof Top** Runoff Area=3,647 sf 100.00% Impervious Runoff Depth=8.55"
Tc=5.0 min CN=98 Runoff=0.75 cfs 0.060 af

**Subcatchment Lot 14: Roof Top** Runoff Area=3,603 sf 100.00% Impervious Runoff Depth=8.55"
Tc=5.0 min CN=98 Runoff=0.74 cfs 0.059 af

**Subcatchment Lot 15: Roof Top** Runoff Area=3,378 sf 100.00% Impervious Runoff Depth=8.55"
Tc=5.0 min CN=98 Runoff=0.69 cfs 0.055 af

**Reach 1R: North Wetland** Inflow=1.94 cfs 0.463 af
Outflow=1.94 cfs 0.463 af

**Reach 2R: South Wetland** Inflow=4.92 cfs 0.558 af
Outflow=4.92 cfs 0.558 af

**Reach 3R: Point of Analysis** Inflow=6.38 cfs 1.020 af
Outflow=6.38 cfs 1.020 af

**Reach S1: Swale** Avg. Flow Depth=0.56' Max Vel=0.40 fps Inflow=2.71 cfs 0.292 af
n=0.150 L=100.0' S=0.0050 '/' Capacity=17.52 cfs Outflow=2.50 cfs 0.292 af

**Reach S2: Swale** Avg. Flow Depth=0.73' Max Vel=0.72 fps Inflow=8.05 cfs 0.684 af
n=0.150 L=180.0' S=0.0111 '/' Capacity=28.10 cfs Outflow=7.16 cfs 0.684 af

**Pond 1Dw: Dry Well** Peak Elev=484.76' Storage=1,314 cf Inflow=0.72 cfs 0.057 af
Discarded=0.03 cfs 0.057 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.057 af

**Pond 1P: Infiltration Basin 1** Peak Elev=437.12' Storage=9,437 cf Inflow=5.97 cfs 0.518 af
Discarded=0.47 cfs 0.463 af Primary=1.07 cfs 0.055 af Outflow=1.54 cfs 0.518 af

**Pond 1W: Wetland** Peak Elev=435.08' Storage=4,791 cf Inflow=2.50 cfs 0.385 af
300.0" x 72.0" Box Culvert n=0.035 L=60.0' S=0.0100 '/' Outflow=1.05 cfs 0.284 af

**Pond 2Dw: Dry Well** Peak Elev=484.90' Storage=1,837 cf Inflow=1.08 cfs 0.074 af
Discarded=0.05 cfs 0.074 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.074 af

**Pond 2P: Infiltration Basin 2** Peak Elev=439.08' Storage=2,905 cf Inflow=2.88 cfs 0.208 af
Discarded=0.21 cfs 0.168 af Primary=0.96 cfs 0.041 af Outflow=1.17 cfs 0.208 af

**Pond 3Dw: Dry Well** Peak Elev=483.65' Storage=693 cf Inflow=0.41 cfs 0.033 af
Discarded=0.02 cfs 0.033 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.033 af

**Pond 3P: Infiltration Basin 3** Peak Elev=441.98' Storage=11,538 cf Inflow=7.16 cfs 0.684 af
Discarded=0.57 cfs 0.618 af Primary=0.60 cfs 0.066 af Outflow=1.17 cfs 0.684 af

**Pond 4Dw: Dry Well** Peak Elev=483.65' Storage=693 cf Inflow=0.41 cfs 0.033 af
Discarded=0.02 cfs 0.033 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.033 af

**Pond 4P: Infiltration Basin 4** Peak Elev=460.89' Storage=9,131 cf Inflow=7.28 cfs 0.603 af
Discarded=0.56 cfs 0.504 af Primary=2.13 cfs 0.099 af Outflow=2.69 cfs 0.603 af

**Pond 5Dw: Dry Well** Peak Elev=484.31' Storage=1,189 cf Inflow=0.66 cfs 0.053 af
Discarded=0.03 cfs 0.053 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.053 af

**Pond 6Dw: Dry Well** Peak Elev=483.65' Storage=693 cf Inflow=0.41 cfs 0.033 af
Discarded=0.02 cfs 0.033 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.033 af

**Pond 7Dw: Dry Well** Peak Elev=483.65' Storage=693 cf Inflow=0.41 cfs 0.033 af
Discarded=0.02 cfs 0.033 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.033 af

**Pond 8Dw: Dry Well** Peak Elev=483.65' Storage=693 cf Inflow=0.41 cfs 0.033 af
Discarded=0.02 cfs 0.033 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.033 af

**Pond 9Dw: Dry Well** Peak Elev=483.65' Storage=693 cf Inflow=0.41 cfs 0.033 af
Discarded=0.02 cfs 0.033 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.033 af

**Pond 10Dw: Dry Well** Peak Elev=484.94' Storage=1,364 cf Inflow=0.74 cfs 0.059 af
Discarded=0.03 cfs 0.059 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.059 af

**Pond 11Dw: Dry Well** Peak Elev=484.70' Storage=1,296 cf Inflow=0.71 cfs 0.057 af
Discarded=0.03 cfs 0.057 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.057 af

**Pond 12Dw: Dry Well** Peak Elev=484.83' Storage=1,334 cf Inflow=0.73 cfs 0.058 af
Discarded=0.03 cfs 0.058 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.058 af

**Pond 13Dw: Dry Well** Peak Elev=484.91' Storage=1,376 cf Inflow=0.75 cfs 0.060 af
Discarded=0.03 cfs 0.060 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.060 af

**Pond 14Dw: Dry Well** Peak Elev=484.87' Storage=1,358 cf Inflow=0.74 cfs 0.059 af
Discarded=0.03 cfs 0.059 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.059 af

**Pond R6: Rain Garden Lot 6** Peak Elev=484.72' Storage=656 cf Inflow=2.50 cfs 0.292 af
Discarded=0.07 cfs 0.075 af Primary=2.41 cfs 0.216 af Outflow=2.48 cfs 0.292 af

**Pond R7: Rain Garden Lot 7** Peak Elev=475.59' Storage=297 cf Inflow=0.70 cfs 0.050 af
Discarded=0.04 cfs 0.030 af Primary=0.63 cfs 0.020 af Outflow=0.66 cfs 0.050 af

**Total Runoff Area = 16.390 ac Runoff Volume = 3.653 af Average Runoff Depth = 2.67"**
**81.88% Pervious = 13.420 ac 18.12% Impervious = 2.970 ac**

## Summary for Subcatchment 1A: Tributary to Infiltration Basin 1

Runoff = 5.97 cfs @ 12.17 hrs, Volume= 0.518 af, Depth= 4.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 21,551 | 98 | Paved roads w/curbs & sewers, HSG A |
| * | 3,043 | 98 | Paved Sidewalk, HSG A |
| | 42,144 | 39 | >75% Grass cover, Good, HSG A |
| | 66,738 | 61 | Weighted Average |
| | 42,144 | | 63.15% Pervious Area |
| | 24,594 | | 36.85% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.5 | 50 | 0.0100 | 0.11 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 0.7 | 28 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.2 | 30 | 0.1600 | 2.80 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.6 | 176 | 0.0500 | 4.54 | | **Shallow Concentrated Flow,** Paved Kv= 20.3 fps |
| 0.1 | 18 | 0.0050 | 3.21 | 2.52 | **Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 |
| 2.7 | 683 | 0.0050 | 4.20 | 7.43 | **Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 |
| 11.8 | 985 | Total | | | |

## Summary for Subcatchment 2A: Tributary to North Wetland

Runoff = 2.50 cfs @ 12.37 hrs, Volume= 0.385 af, Depth= 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 91,230 | 39 | >75% Grass cover, Good, HSG A |
| * | 4,549 | 98 | Wetland |
| | 59,796 | 30 | Woods, Good, HSG A |
| | 155,575 | 37 | Weighted Average |
| | 151,026 | | 97.08% Pervious Area |
| | 4,549 | | 2.92% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.5 | 50 | 0.0100 | 0.11 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 2.9 | 327 | 0.0700 | 1.85 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 4.3 | 367 | 0.0800 | 1.41 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 3.2 | 153 | 0.0250 | 0.79 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 1.5 | 105 | 0.0280 | 1.17 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.3 | 51 | 0.2000 | 3.13 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 19.7 | 1,053 | Total | | | |

## Summary for Subcatchment 2B: Tributary to North Wetland

Runoff = 2.19 cfs @ 12.07 hrs, Volume= 0.153 af, Depth= 6.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 7,687 | 98 | Paved roads w/curbs & sewers, HSG A |
| | 3,812 | 39 | >75% Grass cover, Good, HSG A |
| * | 1,067 | 98 | Paved Sidewalk, HSG A |
| | 12,566 | 80 | Weighted Average |
| | 3,812 | | 30.34% Pervious Area |
| | 8,754 | | 69.66% Impervious Area |

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

## Summary for Subcatchment 2C: Tributary to North Wetland

Runoff = 1.47 cfs @ 12.10 hrs, Volume= 0.138 af, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 47,923 | 39 | >75% Grass cover, Good, HSG A |
| 47,923 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.7 | 50 | 0.0600 | 0.23 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 1.3 | 55 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.3 | 50 | 0.1200 | 2.42 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 5.3 | 155 | Total | | | |

## Summary for Subcatchment 3A: Tributary to Infiltration Basin 3

Runoff = 8.05 cfs @ 12.12 hrs, Volume= 0.684 af, Depth= 2.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 144,721 | 39 | >75% Grass cover, Good, HSG A |
| | 190 | 74 | >75% Grass cover, Good, HSG C |
| | 2,937 | 30 | Woods, Good, HSG A |
| * | 1,123 | 98 | Paved Sidewalk, HSG A |
| | 15,932 | 98 | Paved roads w/curbs & sewers, HSG A |
| | 164,903 | 45 | Weighted Average |
| | 147,848 | | 89.66% Pervious Area |
| | 17,055 | | 10.34% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.7 | 50 | 0.0200 | 0.15 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 1.7 | 190 | 0.0700 | 1.85 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 7.4 | 240 | Total | | | |

## Summary for Subcatchment 4A: Tributary to Infiltration Basin 4

Runoff = 6.55 cfs @ 12.14 hrs, Volume= 0.529 af, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 24,181 | 98 | Paved roads w/curbs & sewers, HSG A |
| * | 2,622 | 98 | Paved Sidewalk, HSG A |
| | 32,517 | 39 | >75% Grass cover, Good, HSG A |
| | 59,320 | 66 | Weighted Average |
| | 32,517 | | 54.82% Pervious Area |
| | 26,803 | | 45.18% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.5 | 50 | 0.0100 | 0.11 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 1.1 | 365 | 0.0800 | 5.74 | | **Shallow Concentrated Flow,** Paved Kv= 20.3 fps |
| 0.5 | 296 | 0.0400 | 9.07 | 7.13 | **Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 |
| 0.7 | 245 | 0.0100 | 5.94 | 10.50 | **Pipe Channel,** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 |
| 9.8 | 956 | Total | | | |

## Summary for Subcatchment 4B: Tributary to Infiltration Basin 4

Runoff = 0.79 cfs @ 12.10 hrs, Volume= 0.074 af, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 25,791 | 39 | >75% Grass cover, Good, HSG A |
| 25,791 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.7 | 50 | 0.0600 | 0.23 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 1.6 | 130 | 0.0380 | 1.36 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.2 | 43 | 0.1800 | 2.97 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 5.5 | 223 | Total | | | |

## Summary for Subcatchment 5A: Tributary to South Wetland

Runoff = 2.71 cfs @ 12.19 hrs, Volume= 0.292 af, Depth= 1.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 81,385 | 39 | >75% Grass cover, Good, HSG A |
| 3,232 | 30 | Woods, Good, HSG A |
| 2,000 | 98 | Roofs |
| 1,000 | 98 | Paved parking, HSG A |
| 1,000 | 98 | Paved parking, HSG C |
| 88,617 | 41 | Weighted Average |
| 84,617 | | 95.49% Pervious Area |
| 4,000 | | 4.51% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.7 | 50 | 0.0600 | 0.23 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 3.1 | 319 | 0.0600 | 1.71 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 4.5 | 133 | 0.0050 | 0.49 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 11.3 | 502 | Total | | | |

## Summary for Subcatchment 6A: Tributary to South Wetland

Runoff = 0.70 cfs @ 12.08 hrs, Volume= 0.050 af, Depth= 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 5,011 | 39 | >75% Grass cover, Good, HSG A |
| 3,405 | 74 | >75% Grass cover, Good, HSG C |
| 8,416 | 53 | Weighted Average |
| 8,416 | | 100.00% Pervious Area |

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

## Summary for Subcatchment 7A: Tributary to South Wetland

Runoff = 1.05 cfs @ 12.11 hrs, Volume= 0.101 af, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 32,283 | 39 | >75% Grass cover, Good, HSG A |
| 2,757 | 39 | >75% Grass cover, Good, HSG A |
| 35,040 | 39 | Weighted Average |
| 35,040 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.0 | 50 | 0.0500 | 0.21 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 3.10" |
| 1.4 | 60 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.6 | 60 | 0.0500 | 1.57 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 6.0 | 170 | Total | | | |

## Summary for Subcatchment Lot 01: Roof Top

Runoff = 0.72 cfs @ 12.07 hrs, Volume= 0.057 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,503 | 98 | Paved parking, HSG A |
| 3,503 | 98 | Weighted Average |
| 3,503 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 02: Roof Top

Runoff = 1.08 cfs @ 12.08 hrs, Volume= 0.074 af, Depth= 4.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,610 | 98 | Paved parking, HSG A |
| 5,441 | 39 | >75% Grass cover, Good, HSG A |
| 9,051 | 63 | Weighted Average |
| 5,441 | | 60.11% Pervious Area |
| 3,610 | | 39.89% Impervious Area |

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

## Summary for Subcatchment Lot 03: Roof Top

Runoff = 0.41 cfs @ 12.07 hrs, Volume= 0.033 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 04: Roof Top

Runoff = 0.41 cfs @ 12.07 hrs, Volume= 0.033 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 05: Roof Top

Runoff = 0.66 cfs @ 12.07 hrs, Volume= 0.053 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,233 | 98 | Paved parking, HSG A |
| 3,233 | 98 | Weighted Average |
| 3,233 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 06: Roof Top

Runoff = 0.41 cfs @ 12.07 hrs, Volume= 0.033 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 07: Roof Top

Runoff = 0.41 cfs @ 12.07 hrs, Volume= 0.033 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 08: Roof Top

Runoff = 0.41 cfs @ 12.07 hrs, Volume= 0.033 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 09: Roof Top

Runoff = 0.41 cfs @ 12.07 hrs, Volume= 0.033 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 2,000 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 10: Roof Top & Driveway

Runoff = 0.74 cfs @ 12.07 hrs, Volume= 0.059 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,612 | 98 | Paved parking, HSG A |
| 3,612 | 98 | Weighted Average |
| 3,612 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 11: Roof Top & Driveway

Runoff = 0.71 cfs @ 12.07 hrs, Volume= 0.057 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,465 | 98 | Paved parking, HSG A |
| 3,465 | 98 | Weighted Average |
| 3,465 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 12: Roof Top

Runoff = 0.73 cfs @ 12.07 hrs, Volume= 0.058 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,547 | 98 | Paved parking, HSG A |
| 3,547 | 98 | Weighted Average |
| 3,547 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 13: Roof Top

Runoff = 0.75 cfs @ 12.07 hrs, Volume= 0.060 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,647 | 98 | Paved parking, HSG A |
| 3,647 | 98 | Weighted Average |
| 3,647 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 14: Roof Top

Runoff = 0.74 cfs @ 12.07 hrs, Volume= 0.059 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,603 | 98 | Paved parking, HSG A |
| 3,603 | 98 | Weighted Average |
| 3,603 | | 100.00% Impervious Area |

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

## Summary for Subcatchment Lot 15: Roof Top

Runoff = 0.69 cfs @ 12.07 hrs, Volume= 0.055 af, Depth= 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 2,000 | 98 | Roofs |
| 1,378 | 98 | Paved parking, HSG A |
| 3,378 | 98 | Weighted Average |
| 3,378 | | 100.00% Impervious Area |

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

## Summary for Reach 1R: North Wetland

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

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 5.529 ac, | 13.55% Impervious, | Inflow Depth = | 1.00" | for 100-Year event |
| Inflow = | 1.94 cfs @ | 12.21 hrs, | Volume= | 0.463 af | |
| Outflow = | 1.94 cfs @ | 12.21 hrs, | Volume= | 0.463 af, | Atten= 0%, Lag= 0.0 min |

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

## Summary for Reach 2R: South Wetland

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

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 10.861 ac, | 20.44% Impervious, | Inflow Depth = | 0.62" | for 100-Year event |
| Inflow = | 4.92 cfs @ | 12.54 hrs, | Volume= | 0.558 af | |
| Outflow = | 4.92 cfs @ | 12.54 hrs, | Volume= | 0.558 af, | Atten= 0%, Lag= 0.0 min |

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

## Summary for Reach 3R: Point of Analysis

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

Inflow Area = 16.390 ac, 18.12% Impervious, Inflow Depth = 0.75" for 100-Year event
Inflow = 6.38 cfs @ 12.42 hrs, Volume= 1.020 af
Outflow = 6.38 cfs @ 12.42 hrs, Volume= 1.020 af, Atten= 0%, Lag= 0.0 min

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

## Summary for Reach S1: Swale

Inflow Area = 2.034 ac, 4.51% Impervious, Inflow Depth = 1.72" for 100-Year event
Inflow = 2.71 cfs @ 12.19 hrs, Volume= 0.292 af
Outflow = 2.50 cfs @ 12.32 hrs, Volume= 0.292 af, Atten= 8%, Lag= 7.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.40 fps, Min. Travel Time= 4.2 min
Avg. Velocity = 0.13 fps, Avg. Travel Time= 12.4 min

Peak Storage= 630 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.56'
Bank-Full Depth= 1.50' Flow Area= 25.5 sf, Capacity= 17.52 cfs

8.00' x 1.50' deep channel, n= 0.150 Sheet flow over Short Grass
Side Slope Z-value= 6.0 '/' Top Width= 26.00'
Length= 100.0' Slope= 0.0050 '/'
Inlet Invert= 486.00', Outlet Invert= 485.50'

‡

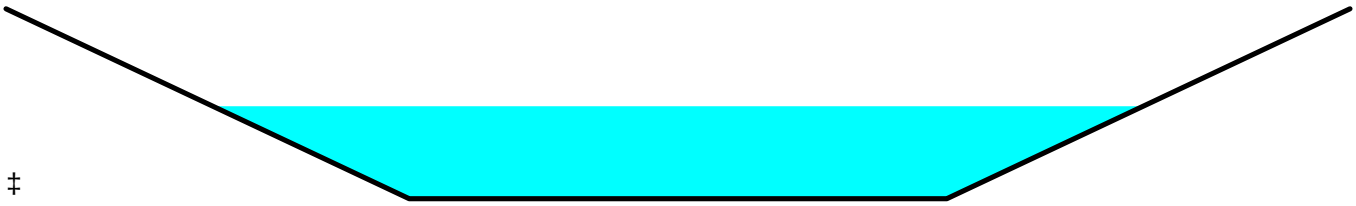
## Summary for Reach S2: Swale

Inflow Area = 3.786 ac, 10.34% Impervious, Inflow Depth = 2.17" for 100-Year event
Inflow = 8.05 cfs @ 12.12 hrs, Volume= 0.684 af
Outflow = 7.16 cfs @ 12.24 hrs, Volume= 0.684 af, Atten= 11%, Lag= 7.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.72 fps, Min. Travel Time= 4.2 min
Avg. Velocity = 0.21 fps, Avg. Travel Time= 14.5 min

Peak Storage= 1,793 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.73'
Bank-Full Depth= 1.50' Flow Area= 26.3 sf, Capacity= 28.10 cfs

10.00' x 1.50' deep channel, n= 0.150 Sheet flow over Short Grass
Side Slope Z-value= 5.0 '/' Top Width= 25.00'
Length= 180.0' Slope= 0.0111 '/'
Inlet Invert= 445.00', Outlet Invert= 443.00'



‡

## Summary for Pond 1Dw: Dry Well

Inflow Area = 0.080 ac,100.00% Impervious, Inflow Depth = 8.55" for 100-Year event
Inflow = 0.72 cfs @ 12.07 hrs, Volume= 0.057 af
Outflow = 0.03 cfs @ 14.22 hrs, Volume= 0.057 af, Atten= 95%, Lag= 129.1 min
Discarded = 0.03 cfs @ 14.22 hrs, Volume= 0.057 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 484.76' @ 14.22 hrs Surf.Area= 276 sf Storage= 1,314 cf

Plug-Flow detention time= 405.6 min calculated for 0.057 af (100% of inflow)
Center-of-Mass det. time= 405.7 min ( 1,144.8 - 739.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.03 cfs @ 14.22 hrs HW=484.76' (Free Discharge)
└**1=Exfiltration** ( Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 1P: Infiltration Basin 1

Inflow Area = 1.532 ac, 36.85% Impervious, Inflow Depth = 4.06" for 100-Year event
Inflow = 5.97 cfs @ 12.17 hrs, Volume= 0.518 af
Outflow = 1.54 cfs @ 12.64 hrs, Volume= 0.518 af, Atten= 74%, Lag= 28.3 min
Discarded = 0.47 cfs @ 12.64 hrs, Volume= 0.463 af
Primary = 1.07 cfs @ 12.64 hrs, Volume= 0.055 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 437.12' @ 12.64 hrs Surf.Area= 4,288 sf Storage= 9,437 cf

Plug-Flow detention time= 235.0 min calculated for 0.518 af (100% of inflow)
Center-of-Mass det. time= 235.0 min ( 1,079.6 - 844.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 434.00' | 19,090 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 434.00 | 1,846 | 0 | 0 |
| 435.00 | 2,567 | 2,207 | 2,207 |
| 436.00 | 3,344 | 2,956 | 5,162 |
| 437.00 | 4,180 | 3,762 | 8,924 |
| 438.00 | 5,068 | 4,624 | 13,548 |
| 439.00 | 6,015 | 5,542 | 19,090 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 437.00' | **10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Discarded | 434.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 432.00' |

**Discarded OutFlow** Max=0.47 cfs @ 12.64 hrs HW=437.12' (Free Discharge)
└**2=Exfiltration** ( Controls 0.47 cfs)

**Primary OutFlow** Max=1.05 cfs @ 12.64 hrs HW=437.12' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 1.05 cfs @ 0.87 fps)

## Summary for Pond 1W: Wetland

Inflow Area = 3.572 ac, 2.92% Impervious, Inflow Depth = 1.29" for 100-Year event
Inflow = 2.50 cfs @ 12.37 hrs, Volume= 0.385 af
Outflow = 1.05 cfs @ 12.91 hrs, Volume= 0.284 af, Atten= 58%, Lag= 32.2 min
Primary = 1.05 cfs @ 12.91 hrs, Volume= 0.284 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 435.08' @ 12.91 hrs Surf.Area= 5,047 sf Storage= 4,791 cf

Plug-Flow detention time= 175.8 min calculated for 0.284 af (74% of inflow)
Center-of-Mass det. time= 72.8 min ( 996.3 - 923.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 434.00' | 58,516 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 434.00 | 3,853 | 0 | 0 |
| 436.00 | 6,072 | 9,925 | 9,925 |
| 438.00 | 7,616 | 13,688 | 23,613 |
| 440.00 | 8,714 | 16,330 | 39,943 |
| 442.00 | 9,859 | 18,573 | 58,516 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 435.00' | **300.0" W x 72.0" H Box Culvert**<br>L= 60.0' Box, headwall w/3 square edges, Ke= 0.500<br>Inlet / Outlet Invert= 435.00' / 434.40' S= 0.0100 '/' Cc= 0.900<br>n= 0.035 Earth, dense weeds, Flow Area= 150.00 sf |

**Primary OutFlow** Max=0.91 cfs @ 12.91 hrs HW=435.08' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.91 cfs @ 0.63 fps)

## Summary for Pond 2Dw: Dry Well

Inflow Area = 0.208 ac, 39.89% Impervious, Inflow Depth = 4.30" for 100-Year event
Inflow = 1.08 cfs @ 12.08 hrs, Volume= 0.074 af
Outflow = 0.05 cfs @ 15.39 hrs, Volume= 0.074 af, Atten= 96%, Lag= 198.7 min
Discarded = 0.05 cfs @ 15.39 hrs, Volume= 0.074 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 484.90' @ 15.39 hrs Surf.Area= 340 sf Storage= 1,837 cf

Plug-Flow detention time= 471.0 min calculated for 0.074 af (100% of inflow)
Center-of-Mass det. time= 471.1 min ( 1,305.2 - 834.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 422 cf | **ADS_StormTech SC-740** x 9 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 479.50' | 1,448 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,870 cf Overall - 422 cf Embedded = 1,448 cf |
| | | 1,870 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 479.50 | 340 | 0 | 0 |
| 485.00 | 340 | 1,870 | 1,870 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 479.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.05 cfs @ 15.39 hrs HW=484.90' (Free Discharge)
└**1=Exfiltration** ( Controls 0.05 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=479.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 2P: Infiltration Basin 2

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 0.366 ac, 76.09% Impervious, Inflow Depth = 6.83" for 100-Year event | | | | |
| Inflow = | 2.88 cfs @ | 12.07 hrs, | Volume= | 0.208 af | |
| Outflow = | 1.17 cfs @ | 12.27 hrs, | Volume= | 0.208 af, | Atten= 59%, Lag= 11.9 min |
| Discarded = | 0.21 cfs @ | 12.27 hrs, | Volume= | 0.168 af | |
| Primary = | 0.96 cfs @ | 12.27 hrs, | Volume= | 0.041 af | |

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 439.08' @ 12.27 hrs Surf.Area= 1,455 sf Storage= 2,905 cf

Plug-Flow detention time= 112.5 min calculated for 0.208 af (100% of inflow)
Center-of-Mass det. time= 112.5 min ( 895.2 - 782.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 436.00' | 1,296 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>5,093 cf Overall - 1,852 cf Embedded = 3,241 cf x 40.0% Voids |
| #2 | 436.50' | 1,852 cf | **ADS_StormTech SC-740** x 40 Inside #1<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 5 rows |
| | | 3,148 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 436.00 | 1,455 | 0 | 0 |
| 439.50 | 1,455 | 5,093 | 5,093 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 436.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 434.00' |
| #2 | Primary | 438.33' | **8.0" Round Culvert**<br>L= 22.0' RCP, mitered to conform to fill, Ke= 0.700<br>Inlet / Outlet Invert= 438.33' / 438.00' S= 0.0150 '/' Cc= 0.900<br>n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.35 sf |

**Discarded OutFlow** Max=0.21 cfs @ 12.27 hrs HW=439.08' (Free Discharge)
└**1=Exfiltration** ( Controls 0.21 cfs)

**Primary OutFlow** Max=0.96 cfs @ 12.27 hrs HW=439.08' (Free Discharge)
└**2=Culvert** (Inlet Controls 0.96 cfs @ 2.75 fps)

## Summary for Pond 3Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 8.55" for 100-Year event
Inflow = 0.41 cfs @ 12.07 hrs, Volume= 0.033 af
Outflow = 0.02 cfs @ 13.98 hrs, Volume= 0.033 af, Atten= 95%, Lag= 114.6 min
Discarded = 0.02 cfs @ 13.98 hrs, Volume= 0.033 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 483.65' @ 13.98 hrs Surf.Area= 220 sf Storage= 693 cf

Plug-Flow detention time= 318.7 min calculated for 0.033 af (100% of inflow)
Center-of-Mass det. time= 318.8 min ( 1,057.9 - 739.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.98 hrs HW=483.65' (Free Discharge)
└**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 3P: Infiltration Basin 3

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 3.786 ac, 10.34% Impervious, Inflow Depth = 2.17" for 100-Year event | | | | |
| Inflow = | 7.16 cfs @ | 12.24 hrs, Volume= | 0.684 af | | |
| Outflow = | 1.17 cfs @ | 13.20 hrs, Volume= | 0.684 af, Atten= 84%, Lag= 57.5 min | | |
| Discarded = | 0.57 cfs @ | 13.20 hrs, Volume= | 0.618 af | | |
| Primary = | 0.60 cfs @ | 13.20 hrs, Volume= | 0.066 af | | |

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 441.98' @ 13.20 hrs Surf.Area= 4,971 sf Storage= 11,538 cf

Plug-Flow detention time= 249.4 min calculated for 0.684 af (100% of inflow)
Center-of-Mass det. time= 249.4 min ( 1,141.8 - 892.4 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 439.00' | 17,025 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 439.00 | 2,840 | 0 | 0 |
| 440.00 | 3,500 | 3,170 | 3,170 |
| 441.00 | 4,213 | 3,857 | 7,027 |
| 442.00 | 4,985 | 4,599 | 11,626 |
| 443.00 | 5,813 | 5,399 | 17,025 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 441.90' | **10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |
| #2 | Discarded | 439.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 437.00' |

**Discarded OutFlow** Max=0.57 cfs @ 13.20 hrs HW=441.98' (Free Discharge)
└─**2=Exfiltration** ( Controls 0.57 cfs)

**Primary OutFlow** Max=0.59 cfs @ 13.20 hrs HW=441.98' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 0.59 cfs @ 0.71 fps)

## Summary for Pond 4Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 8.55" for 100-Year event
Inflow = 0.41 cfs @ 12.07 hrs, Volume= 0.033 af
Outflow = 0.02 cfs @ 13.98 hrs, Volume= 0.033 af, Atten= 95%, Lag= 114.6 min
Discarded = 0.02 cfs @ 13.98 hrs, Volume= 0.033 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 483.65' @ 13.98 hrs Surf.Area= 220 sf Storage= 693 cf

Plug-Flow detention time= 318.7 min calculated for 0.033 af (100% of inflow)
Center-of-Mass det. time= 318.8 min ( 1,057.9 - 739.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.98 hrs HW=483.65' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 4P: Infiltration Basin 4

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 1.954 ac, 31.49% Impervious, Inflow Depth = 3.71" for 100-Year event | | | | |
| Inflow = | 7.28 cfs @ | 12.14 hrs, | Volume= | 0.603 af | |
| Outflow = | 2.69 cfs @ | 12.48 hrs, | Volume= | 0.603 af, | Atten= 63%, Lag= 20.9 min |
| Discarded = | 0.56 cfs @ | 12.48 hrs, | Volume= | 0.504 af | |
| Primary = | 2.13 cfs @ | 12.48 hrs, | Volume= | 0.099 af | |

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 460.89' @ 12.48 hrs Surf.Area= 5,588 sf Storage= 9,131 cf

Plug-Flow detention time= 158.4 min calculated for 0.603 af (100% of inflow)
Center-of-Mass det. time= 158.4 min ( 999.2 - 840.8 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 459.00' | 15,845 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 459.00 | 4,080 | 0 | 0 |
| 460.00 | 4,850 | 4,465 | 4,465 |
| 461.00 | 5,675 | 5,263 | 9,728 |
| 462.00 | 6,560 | 6,118 | 15,845 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 459.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 457.00' |
| #2 | Primary | 460.70' | **10.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Discarded OutFlow** Max=0.56 cfs @ 12.48 hrs HW=460.89' (Free Discharge)
└**1=Exfiltration** ( Controls 0.56 cfs)

**Primary OutFlow** Max=2.13 cfs @ 12.48 hrs HW=460.89' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 2.13 cfs @ 1.10 fps)

## Summary for Pond 5Dw: Dry Well

Inflow Area = 0.074 ac,100.00% Impervious, Inflow Depth = 8.55" for 100-Year event
Inflow = 0.66 cfs @ 12.07 hrs, Volume= 0.053 af
Outflow = 0.03 cfs @ 14.11 hrs, Volume= 0.053 af, Atten= 95%, Lag= 122.5 min
Discarded = 0.03 cfs @ 14.11 hrs, Volume= 0.053 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 484.31' @ 14.11 hrs Surf.Area= 276 sf Storage= 1,189 cf

Plug-Flow detention time= 381.0 min calculated for 0.053 af (100% of inflow)
Center-of-Mass det. time= 381.0 min ( 1,120.1 - 739.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.03 cfs @ 14.11 hrs HW=484.31' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 6Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 8.55" for 100-Year event
Inflow = 0.41 cfs @ 12.07 hrs, Volume= 0.033 af
Outflow = 0.02 cfs @ 13.98 hrs, Volume= 0.033 af, Atten= 95%, Lag= 114.6 min
Discarded = 0.02 cfs @ 13.98 hrs, Volume= 0.033 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 483.65' @ 13.98 hrs Surf.Area= 220 sf Storage= 693 cf

Plug-Flow detention time= 318.7 min calculated for 0.033 af (100% of inflow)
Center-of-Mass det. time= 318.8 min ( 1,057.9 - 739.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.98 hrs HW=483.65' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 7Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 8.55" for 100-Year event
Inflow = 0.41 cfs @ 12.07 hrs, Volume= 0.033 af
Outflow = 0.02 cfs @ 13.98 hrs, Volume= 0.033 af, Atten= 95%, Lag= 114.6 min
Discarded = 0.02 cfs @ 13.98 hrs, Volume= 0.033 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 483.65' @ 13.98 hrs Surf.Area= 220 sf Storage= 693 cf

Plug-Flow detention time= 318.7 min calculated for 0.033 af (100% of inflow)
Center-of-Mass det. time= 318.8 min ( 1,057.9 - 739.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.98 hrs HW=483.65' (Free Discharge)
└**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 8Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 8.55" for 100-Year event
Inflow = 0.41 cfs @ 12.07 hrs, Volume= 0.033 af
Outflow = 0.02 cfs @ 13.98 hrs, Volume= 0.033 af, Atten= 95%, Lag= 114.6 min
Discarded = 0.02 cfs @ 13.98 hrs, Volume= 0.033 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 483.65' @ 13.98 hrs Surf.Area= 220 sf Storage= 693 cf

Plug-Flow detention time= 318.7 min calculated for 0.033 af (100% of inflow)
Center-of-Mass det. time= 318.8 min ( 1,057.9 - 739.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.98 hrs HW=483.65' (Free Discharge)
└**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 9Dw: Dry Well

Inflow Area = 0.046 ac,100.00% Impervious, Inflow Depth = 8.55" for 100-Year event
Inflow = 0.41 cfs @ 12.07 hrs, Volume= 0.033 af
Outflow = 0.02 cfs @ 13.98 hrs, Volume= 0.033 af, Atten= 95%, Lag= 114.6 min
Discarded = 0.02 cfs @ 13.98 hrs, Volume= 0.033 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 483.65' @ 13.98 hrs Surf.Area= 220 sf Storage= 693 cf

Plug-Flow detention time= 318.7 min calculated for 0.033 af (100% of inflow)
Center-of-Mass det. time= 318.8 min ( 1,057.9 - 739.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 284 cf | **ADS_StormTech SC-740** x 6 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 3 rows |
| #2 | 480.50' | 596 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>880 cf Overall - 284 cf Embedded = 596 cf |
| | | 880 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.50 | 220 | 0 | 0 |
| 484.50 | 220 | 880 | 880 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.50' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 484.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.02 cfs @ 13.98 hrs HW=483.65' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.02 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.50' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 10Dw: Dry Well

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 0.083 ac,100.00% Impervious, Inflow Depth = 8.55" for 100-Year event | | | | |
| Inflow = | 0.74 cfs @ | 12.07 hrs, | Volume= | 0.059 af | |
| Outflow = | 0.03 cfs @ | 14.26 hrs, | Volume= | 0.059 af, | Atten= 95%, Lag= 131.5 min |
| Discarded = | 0.03 cfs @ | 14.26 hrs, | Volume= | 0.059 af | |
| Primary = | 0.00 cfs @ | 0.00 hrs, | Volume= | 0.000 af | |

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 484.94' @ 14.26 hrs Surf.Area= 276 sf Storage= 1,364 cf

Plug-Flow detention time= 415.2 min calculated for 0.059 af (100% of inflow)
Center-of-Mass det. time= 415.2 min ( 1,154.4 - 739.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.03 cfs @ 14.26 hrs HW=484.94' (Free Discharge)
└**1=Exfiltration** ( Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 11Dw: Dry Well

Inflow Area = 0.080 ac,100.00% Impervious, Inflow Depth = 8.55" for 100-Year event
Inflow = 0.71 cfs @ 12.07 hrs, Volume= 0.057 af
Outflow = 0.03 cfs @ 14.21 hrs, Volume= 0.057 af, Atten= 95%, Lag= 128.2 min
Discarded = 0.03 cfs @ 14.21 hrs, Volume= 0.057 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 484.70' @ 14.21 hrs Surf.Area= 276 sf Storage= 1,296 cf

Plug-Flow detention time= 402.3 min calculated for 0.057 af (100% of inflow)
Center-of-Mass det. time= 402.3 min ( 1,141.5 - 739.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.03 cfs @ 14.21 hrs HW=484.70' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 12Dw: Dry Well

Inflow Area = 0.081 ac,100.00% Impervious, Inflow Depth = 8.55" for 100-Year event
Inflow = 0.73 cfs @ 12.07 hrs, Volume= 0.058 af
Outflow = 0.03 cfs @ 14.24 hrs, Volume= 0.058 af, Atten= 95%, Lag= 130.1 min
Discarded = 0.03 cfs @ 14.24 hrs, Volume= 0.058 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 484.83' @ 14.24 hrs Surf.Area= 276 sf Storage= 1,334 cf

Plug-Flow detention time= 409.5 min calculated for 0.058 af (100% of inflow)
Center-of-Mass det. time= 409.6 min ( 1,148.7 - 739.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,001 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc)<br>1,380 cf Overall - 379 cf Embedded = 1,001 cf |
| | | 1,380 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 276 | 0 | 0 |
| 485.00 | 276 | 1,380 | 1,380 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.03 cfs @ 14.24 hrs HW=484.83' (Free Discharge)
└**1=Exfiltration** ( Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 13Dw: Dry Well

Inflow Area = 0.084 ac,100.00% Impervious, Inflow Depth = 8.55" for 100-Year event
Inflow = 0.75 cfs @ 12.07 hrs, Volume= 0.060 af
Outflow = 0.03 cfs @ 14.26 hrs, Volume= 0.060 af, Atten= 95%, Lag= 131.2 min
Discarded = 0.03 cfs @ 14.26 hrs, Volume= 0.060 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 484.91' @ 14.26 hrs Surf.Area= 280 sf Storage= 1,376 cf

Plug-Flow detention time= 413.7 min calculated for 0.060 af (100% of inflow)
Center-of-Mass det. time= 413.8 min ( 1,152.9 - 739.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 480.00' | 1,021 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,400 cf Overall - 379 cf Embedded = 1,021 cf |
| | | 1,400 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 480.00 | 280 | 0 | 0 |
| 485.00 | 280 | 1,400 | 1,400 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 480.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.03 cfs @ 14.26 hrs HW=484.91' (Free Discharge)
└**1=Exfiltration** ( Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=480.00' (Free Discharge)
└**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond 14Dw: Dry Well

Inflow Area = 0.083 ac,100.00% Impervious, Inflow Depth = 8.55" for 100-Year event
Inflow = 0.74 cfs @ 12.07 hrs, Volume= 0.059 af
Outflow = 0.03 cfs @ 14.23 hrs, Volume= 0.059 af, Atten= 95%, Lag= 129.8 min
Discarded = 0.03 cfs @ 14.23 hrs, Volume= 0.059 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 484.87' @ 14.23 hrs Surf.Area= 276 sf Storage= 1,358 cf

Plug-Flow detention time= 411.8 min calculated for 0.059 af (100% of inflow)
Center-of-Mass det. time= 411.8 min ( 1,151.0 - 739.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 481.00' | 379 cf | **ADS_StormTech SC-740** x 8 Inside #2<br>Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf<br>Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 6.45 sf x 4 rows |
| #2 | 479.95' | 1,015 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>1,394 cf Overall - 379 cf Embedded = 1,015 cf |
| | | 1,394 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 479.95 | 276 | 0 | 0 |
| 485.00 | 276 | 1,394 | 1,394 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 479.95' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 476.00' |
| #2 | Primary | 485.00' | **5.0" Vert. Orifice/Grate** C= 0.600 |

**Discarded OutFlow** Max=0.03 cfs @ 14.23 hrs HW=484.87' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.03 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=479.95' (Free Discharge)
└─**2=Orifice/Grate** ( Controls 0.00 cfs)

## Summary for Pond R6: Rain Garden Lot 6

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 2.034 ac, | 4.51% Impervious, | Inflow Depth = | 1.72" | for 100-Year event |
| Inflow = | 2.50 cfs @ | 12.32 hrs, | Volume= | 0.292 af | |
| Outflow = | 2.48 cfs @ | 12.34 hrs, | Volume= | 0.292 af, | Atten= 1%, Lag= 1.3 min |
| Discarded = | 0.07 cfs @ | 12.34 hrs, | Volume= | 0.075 af | |
| Primary = | 2.41 cfs @ | 12.34 hrs, | Volume= | 0.216 af | |

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 484.72' @ 12.34 hrs Surf.Area= 1,046 sf Storage= 656 cf

Plug-Flow detention time= 29.7 min calculated for 0.292 af (100% of inflow)
Center-of-Mass det. time= 29.7 min ( 939.4 - 909.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 484.00' | 965 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 484.00 | 780 | 0 | 0 |
| 485.00 | 1,150 | 965 | 965 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 484.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 481.00' |
| #2 | Primary | 484.50' | **10.0' long x 5.0' breadth Broad-Crested Rectangular Weir**<br>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<br>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 @ 12.34 hrs HW=484.72' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.07 cfs)

**Primary OutFlow** Max=2.41 cfs @ 12.34 hrs HW=484.72' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 2.41 cfs @ 1.10 fps)

## Summary for Pond R7: Rain Garden Lot 7

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 0.193 ac, | 0.00% Impervious, | Inflow Depth = | 3.10" | for 100-Year event |
| Inflow = | 0.70 cfs @ | 12.08 hrs, | Volume= | 0.050 af | |
| Outflow = | 0.66 cfs @ | 12.11 hrs, | Volume= | 0.050 af, | Atten= 5%, Lag= 1.6 min |
| Discarded = | 0.04 cfs @ | 12.11 hrs, | Volume= | 0.030 af | |
| Primary = | 0.63 cfs @ | 12.11 hrs, | Volume= | 0.020 af | |

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 475.59' @ 12.11 hrs Surf.Area= 628 sf Storage= 297 cf

Plug-Flow detention time= 48.9 min calculated for 0.050 af (100% of inflow)
Center-of-Mass det. time= 48.9 min ( 904.8 - 856.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 475.00' | 590 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

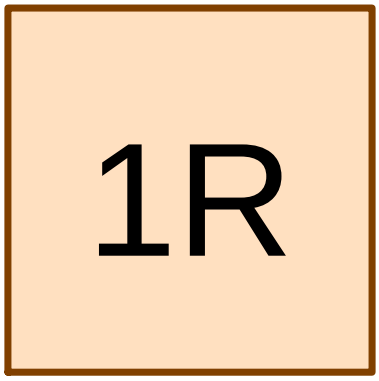
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 475.00 | 380 | 0 | 0 |
| 476.00 | 800 | 590 | 590 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 475.00' | **2.410 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 470.00' |
| #2 | Primary | 475.50' | **10.0' long x 5.0' breadth Broad-Crested Rectangular Weir**<br>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<br>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 |

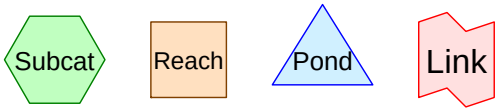
**Discarded OutFlow** Max=0.04 cfs @ 12.11 hrs HW=475.59' (Free Discharge)
└─**1=Exfiltration** ( Controls 0.04 cfs)

**Primary OutFlow** Max=0.62 cfs @ 12.11 hrs HW=475.59' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.62 cfs @ 0.70 fps)

# 2’ X 3’ Box Culvert Design




# 2' X 3' Box Culvert




**Routing Diagram for 006 - Grafton 2X3 BOX CULVERT**
Prepared by McCarty Engineering, Inc., Printed 6/9/2016
HydroCAD® 10.00-16 s/n 02034 © 2015 HydroCAD Software Solutions LLC

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| **0.000** | **0** | **TOTAL AREA** |

## Soil Listing (all nodes)

| Area (acres) | Soil Group | Subcatchment Numbers |
|---|---|---|
| 0.000 | HSG A | |
| 0.000 | HSG B | |
| 0.000 | HSG C | |
| 0.000 | HSG D | |
| 0.000 | Other | |
| **0.000** | | **TOTAL AREA** |

## Ground Covers (all nodes)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| **0.000** | **0.000** | **0.000** | **0.000** | **0.000** | **0.000** | **TOTAL AREA** | |

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Reach 1R: 2' X 3' Box Culvert** Avg. Flow Depth=0.93' Max Vel=7.53 fps Inflow=20.93 cfs 83.045 af
n=0.011 L=46.0' S=0.0065 '/' Capacity=59.06 cfs Outflow=20.93 cfs 83.024 af

## Summary for Reach 1R: 2' X 3' Box Culvert

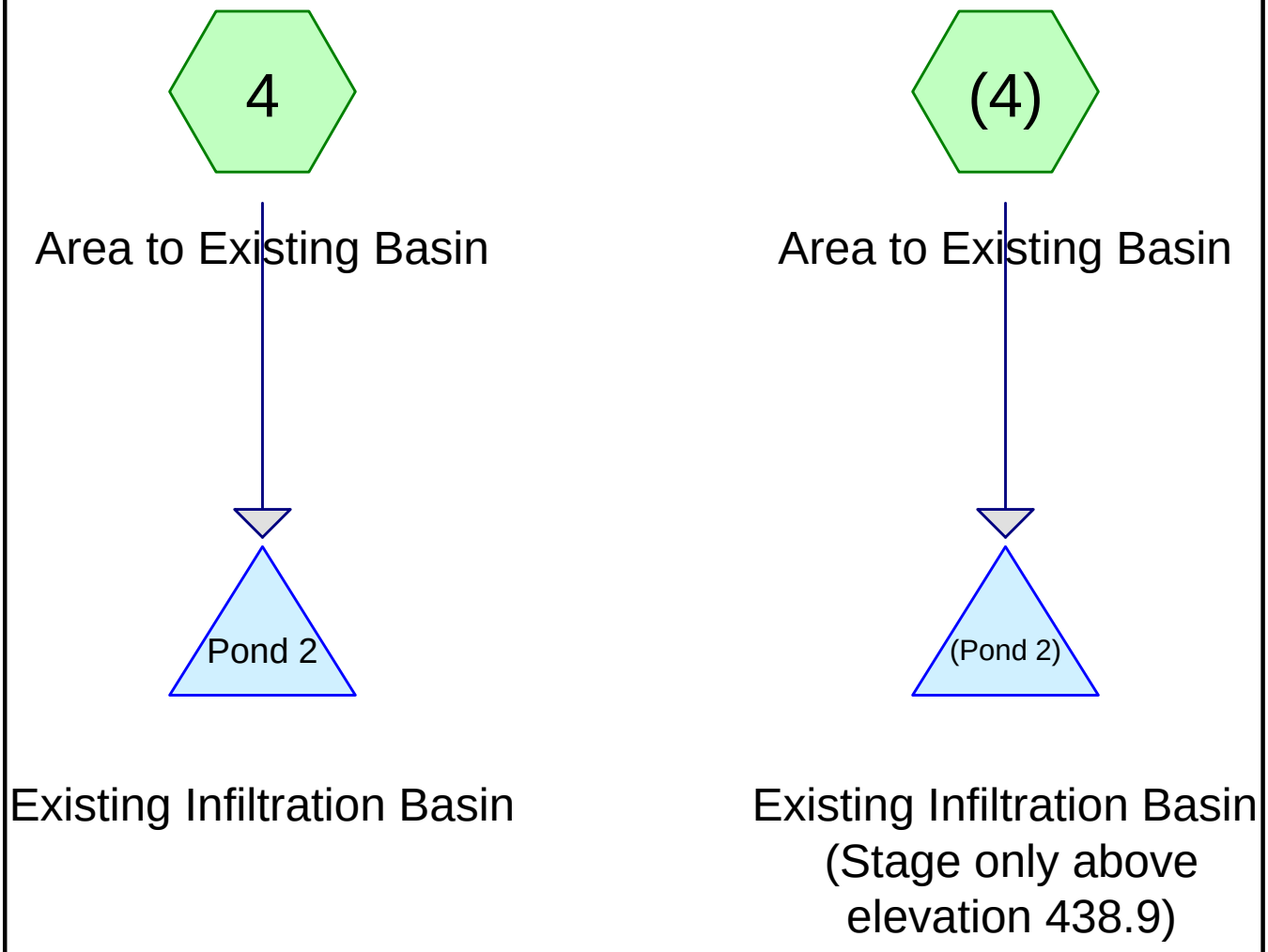
| | | | | | |
|---|---|---|---|---|---|
| Inflow | = | 20.93 cfs @ | 0.00 hrs, | Volume= | 83.045 af, Incl. 20.93 cfs Base Flow |
| Outflow | = | 20.93 cfs @ | 0.18 hrs, | Volume= | 83.024 af, Atten= 0%, Lag= 10.8 min |

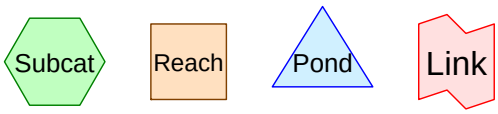
Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 7.53 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 7.53 fps, Avg. Travel Time= 0.1 min

Peak Storage= 128 cf @ 0.18 hrs
Average Depth at Peak Storage= 0.93'
Bank-Full Depth= 2.00' Flow Area= 6.0 sf, Capacity= 59.06 cfs

3.00' x 2.00' deep channel, n= 0.011 Concrete pipe, straight & clean
Length= 46.0' Slope= 0.0065 '/'
Inlet Invert= 440.10', Outlet Invert= 439.80'

# Existing Basin 2 HydroCAD Model




**Routing Diagram for Existing Detention Basin 2**
Prepared by McCarty Engineering, Inc., Printed 6/9/2016
HydroCAD® 10.00-16 s/n 02034 © 2015 HydroCAD Software Solutions LLC

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.380 | 39 | >75% Grass cover, Good, HSG A ((4), 4) |
| 0.476 | 98 | Paved parking, HSG A ((4), 4) |
| **0.855** | **72** | **TOTAL AREA** |

## Soil Listing (all nodes)

| Area (acres) | Soil Group | Subcatchment Numbers |
|---|---|---|
| 0.855 | HSG A | (4), 4 |
| 0.000 | HSG B | |
| 0.000 | HSG C | |
| 0.000 | HSG D | |
| 0.000 | Other | |
| **0.855** | | **TOTAL AREA** |

## Ground Covers (all nodes)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| 0.380 | 0.000 | 0.000 | 0.000 | 0.000 | 0.380 | >75% Grass cover, Good | (4), 4 |
| 0.476 | 0.000 | 0.000 | 0.000 | 0.000 | 0.476 | Paved parking | (4), 4 |
| **0.855** | **0.000** | **0.000** | **0.000** | **0.000** | **0.855** | **TOTAL AREA** | |

## Pipe Listing (all nodes)

| Line# | Node Number | In-Invert (feet) | Out-Invert (feet) | Length (feet) | Slope (ft/ft) | n | Diam/Width (inches) | Height (inches) | Inside-Fill (inches) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | (Pond 2) | 435.60 | 435.20 | 40.0 | 0.0100 | 0.012 | 18.0 | 0.0 | 0.0 |
| 2 | (Pond 2) | 435.60 | 435.15 | 45.0 | 0.0100 | 0.012 | 18.0 | 0.0 | 0.0 |
| 3 | (Pond 2) | 435.00 | 434.50 | 50.0 | 0.0100 | 0.011 | 8.0 | 0.0 | 0.0 |
| 4 | Pond 2 | 435.60 | 435.20 | 40.0 | 0.0100 | 0.012 | 18.0 | 0.0 | 0.0 |
| 5 | Pond 2 | 435.60 | 435.15 | 45.0 | 0.0100 | 0.012 | 18.0 | 0.0 | 0.0 |
| 6 | Pond 2 | 435.00 | 434.50 | 50.0 | 0.0100 | 0.011 | 8.0 | 0.0 | 0.0 |

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 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 (4): Area to Existing Basin** Runoff Area=18,625 sf 55.62% Impervious Runoff Depth=5.39"
Tc=5.0 min CN=72 Runoff=2.80 cfs 0.192 af

**Subcatchment 4: Area to Existing Basin** Runoff Area=18,625 sf 55.62% Impervious Runoff Depth=5.39"
Tc=5.0 min CN=72 Runoff=2.80 cfs 0.192 af

**Pond (Pond 2): Existing Infiltration Basin** Peak Elev=438.90' Storage=16 cf Inflow=2.80 cfs 0.192 af
Discarded=0.07 cfs 0.005 af Primary=2.72 cfs 0.187 af Outflow=2.80 cfs 0.192 af

**Pond Pond 2: Existing Infiltration Basin** Peak Elev=435.24' Storage=2,297 cf Inflow=2.80 cfs 0.192 af
Discarded=0.55 cfs 0.178 af Primary=0.12 cfs 0.014 af Outflow=0.67 cfs 0.192 af

**Total Runoff Area = 0.855 ac Runoff Volume = 0.384 af Average Runoff Depth = 5.39"**
**44.38% Pervious = 0.380 ac 55.62% Impervious = 0.476 ac**

## Summary for Subcatchment (4): Area to Existing Basin

Runoff = 2.80 cfs @ 12.07 hrs, Volume= 0.192 af, Depth= 5.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 1,277 | 98 | Paved parking, HSG A |
| 9,082 | 98 | Paved parking, HSG A |
| 8,266 | 39 | >75% Grass cover, Good, HSG A |
| 18,625 | 72 | Weighted Average |
| 8,266 | | 44.38% Pervious Area |
| 10,359 | | 55.62% Impervious Area |

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

## Summary for Subcatchment 4: Area to Existing Basin

Runoff = 2.80 cfs @ 12.07 hrs, Volume= 0.192 af, Depth= 5.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.79"

| Area (sf) | CN | Description |
|---|---|---|
| 1,277 | 98 | Paved parking, HSG A |
| 9,082 | 98 | Paved parking, HSG A |
| 8,266 | 39 | >75% Grass cover, Good, HSG A |
| 18,625 | 72 | Weighted Average |
| 8,266 | | 44.38% Pervious Area |
| 10,359 | | 55.62% Impervious Area |

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

## Summary for Pond (Pond 2): Existing Infiltration Basin (Stage only above elevation 438.9)

| | | | | | |
|---|---|---|---|---|---|
| Inflow Area = | 0.428 ac, 55.62% Impervious, Inflow Depth = 5.39" for 100-Year event | | | | |
| Inflow = | 2.80 cfs @ | 12.07 hrs, Volume= | 0.192 af | | |
| Outflow = | 2.80 cfs @ | 12.08 hrs, Volume= | 0.192 af, Atten= 0%, Lag= 0.1 min | | |
| Discarded = | 0.07 cfs @ | 12.08 hrs, Volume= | 0.005 af | | |
| Primary = | 2.72 cfs @ | 12.08 hrs, Volume= | 0.187 af | | |

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 438.90' @ 12.08 hrs Surf.Area= 15,119 sf Storage= 16 cf

Plug-Flow detention time= 0.1 min calculated for 0.192 af (100% of inflow)
Center-of-Mass det. time= 0.1 min ( 815.8 - 815.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 438.90' | 17,582 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 438.90 | 15,117 | 0 | 0 |
| 440.00 | 16,850 | 17,582 | 17,582 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 435.60' | **18.0" Round Culvert**<br>L= 40.0' RCP, sq.cut end projecting, Ke= 0.500<br>Inlet / Outlet Invert= 435.60' / 435.20' S= 0.0100 '/' Cc= 0.900<br>n= 0.012, Flow Area= 1.77 sf |
| #2 | Primary | 439.00' | **10.0' long x 3.0' breadth Broad-Crested Rectangular Weir**<br>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<br>Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32 |
| #3 | Primary | 435.60' | **18.0" Round Culvert X 2.00**<br>L= 45.0' RCP, sq.cut end projecting, Ke= 0.500<br>Inlet / Outlet Invert= 435.60' / 435.15' S= 0.0100 '/' Cc= 0.900<br>n= 0.012, Flow Area= 1.77 sf |
| #4 | Device 3 | 435.90' | **12.0" Vert. Orifice/Grate X 2.00** C= 0.600 |
| #5 | Primary | 435.00' | **8.0" Round Culvert**<br>L= 50.0' RCP, sq.cut end projecting, Ke= 0.500<br>Inlet / Outlet Invert= 435.00' / 434.50' S= 0.0100 '/' Cc= 0.900<br>n= 0.011, Flow Area= 0.35 sf |
| #6 | Device 5 | 435.00' | **8" Elbow with 2 Foot Riser**<br>Head (feet) 0.00 0.50 1.00 1.50 2.00 2.50 3.00 4.00<br>Disch. (cfs) 0.000 0.250 0.550 1.050 1.650 3.800 4.100 4.500 |
| #7 | Discarded | 438.90' | **2.160 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 433.00' |

**Discarded OutFlow** Max=0.76 cfs @ 12.08 hrs HW=438.90' (Free Discharge)
└─**7=Exfiltration** ( Controls 0.76 cfs)

**Primary OutFlow** Max=28.47 cfs @ 12.08 hrs HW=438.90' (Free Discharge)
├─**1=Culvert** (Inlet Controls 13.59 cfs @ 7.69 fps)
├─**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)
├─**3=Culvert** (Passes 11.96 cfs of 27.18 cfs potential flow)
│ └─**4=Orifice/Grate** (Orifice Controls 11.96 cfs @ 7.61 fps)
└─**5=Culvert** (Barrel Controls 2.92 cfs @ 8.37 fps)
└─**6=8" Elbow with 2 Foot Riser** (Passes 2.92 cfs of 4.46 cfs potential flow)

## Summary for Pond Pond 2: Existing Infiltration Basin

Inflow Area = 0.428 ac, 55.62% Impervious, Inflow Depth = 5.39" for 100-Year event
Inflow = 2.80 cfs @ 12.07 hrs, Volume= 0.192 af
Outflow = 0.67 cfs @ 12.47 hrs, Volume= 0.192 af, Atten= 76%, Lag= 23.6 min
Discarded = 0.55 cfs @ 12.47 hrs, Volume= 0.178 af
Primary = 0.12 cfs @ 12.47 hrs, Volume= 0.014 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 435.24' @ 12.47 hrs Surf.Area= 9,902 sf Storage= 2,297 cf

Plug-Flow detention time= 29.6 min calculated for 0.192 af (100% of inflow)
Center-of-Mass det. time= 29.6 min ( 845.3 - 815.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 435.00' | 65,800 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 435.00 | 9,500 | 0 | 0 |
| 436.00 | 11,200 | 10,350 | 10,350 |
| 438.00 | 13,700 | 24,900 | 35,250 |
| 440.00 | 16,850 | 30,550 | 65,800 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 435.60' | **18.0" Round Culvert**<br>L= 40.0' RCP, sq.cut end projecting, Ke= 0.500<br>Inlet / Outlet Invert= 435.60' / 435.20' S= 0.0100 '/' Cc= 0.900<br>n= 0.012, Flow Area= 1.77 sf |
| #2 | Primary | 439.00' | **10.0' long x 3.0' breadth Broad-Crested Rectangular Weir**<br>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<br>Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32 |
| #3 | Primary | 435.60' | **18.0" Round Culvert X 2.00**<br>L= 45.0' RCP, sq.cut end projecting, Ke= 0.500<br>Inlet / Outlet Invert= 435.60' / 435.15' S= 0.0100 '/' Cc= 0.900<br>n= 0.012, Flow Area= 1.77 sf |
| #4 | Device 3 | 435.90' | **12.0" Vert. Orifice/Grate X 2.00** C= 0.600 |
| #5 | Primary | 435.00' | **8.0" Round Culvert**<br>L= 50.0' RCP, sq.cut end projecting, Ke= 0.500<br>Inlet / Outlet Invert= 435.00' / 434.50' S= 0.0100 '/' Cc= 0.900<br>n= 0.011, Flow Area= 0.35 sf |
| #6 | Device 5 | 435.00' | **8" Elbow with 2 Foot Riser**<br>Head (feet) 0.00 0.50 1.00 1.50 2.00 2.50 3.00 4.00<br>Disch. (cfs) 0.000 0.250 0.550 1.050 1.650 3.800 4.100 4.500 |
| #7 | Discarded | 435.00' | **2.160 in/hr Exfiltration over Surface area**<br>Conductivity to Groundwater Elevation = 433.00' |

**Discarded OutFlow** Max=0.55 cfs @ 12.47 hrs HW=435.24' (Free Discharge)
└─**7=Exfiltration** ( Controls 0.55 cfs)

**Primary OutFlow** Max=0.12 cfs @ 12.47 hrs HW=435.24' (Free Discharge)
├─**1=Culvert** ( Controls 0.00 cfs)
├─**2=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)
├─**3=Culvert** ( Controls 0.00 cfs)
│ └─**4=Orifice/Grate** ( Controls 0.00 cfs)
└─**5=Culvert** (Passes 0.12 cfs of 0.18 cfs potential flow)
└─**6=8" Elbow with 2 Foot Riser** (Custom Controls 0.12 cfs)