Seekonk, MA

Greenbrier Residential & Apartment Community – Phase II

RI Seekonk Holdings LLC

January 2022

STORMWATER REPORT

On Behalf of: RI Seekonk Holdings LLC

Submitted by: BETA Group, Inc.

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Prepared by: BETA GROUP, INC.
Prepared for: Seekonk Conservation Commission

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1.0 INTRODUCTION

This permit application submitted on behalf of RI Seekonk Holdings LLC is for the construction of seven apartment buildings for Chapter 40 B affordable housing as the second phase of the Greenbrier Residential Condominium and Apartment project. This work shall consist of the construction of the apartment buildings, roadway and parking lot installation, new sidewalks, installation of multiple utilities, installation of temporary erosion control measures, and other associated work.

A map of the project area is shown in **Figure 1 –** Locus Map.

2.0 EXISTING CONDITIONS

The proposed project is located on two parcels off Fall River Avenue in Seekonk, MA (Book/Page: 24861/322 and 15142/1) that are approximately 16.41 acres and 76.1 acres, respectively. The 76.1-acre parcel originally consisted of an abandoned gravel-removal operation site and woodlands but has recently been developed during Phase I of the Greenbrier Project and now consists of a 440-unit condominium and apartment complex. The 16-acre parcel comprises of an abandoned movie theater with associated parking lot with woodlands located at the back of the property. There are a number of existing utilities (both active and abandoned) on this site, including sanitary sewer and an extensive stormwater drainage system.

Both parcels are located in a Residence R-3 zoning district, which represents residential areas of low density within the Town of Seekonk. As a part of Phase I of the Greenbrier project, the 76-acre parcel was presented and approved by the Seekonk Zoning and Planning Board to rezone the parcel to a Multifamily Development Overlay District. The 16-acre parcel will be presented to the Zoning and Planning Board for approval as a part of Phase II of the Greenbrier project.

The site located within the 16-acre parcel is relatively flat around the developed portion of the site with the parking lot sloping from northeast to southwest towards Fall River Avenue. Beyond the parking lot, the elevation sharply rises to the undeveloped portion of the site, which is mainly woodlands. There are five isolated wetlands either within or adjacent to the parcel boundary that receive stormwater runoff from this undeveloped area. These wetlands were flagged by Caputo & Wick Ltd.

As stated previously, the 76-acre site has previously been developed into a 440-unit condominium and apartment complex. Stormwater from that development is captured by an extensive drainage network and discharges to several stormwater BMPs before ultimately discharging to the wetlands in the vicinity of the site.

FIGURE 1 – LOCUS MAP

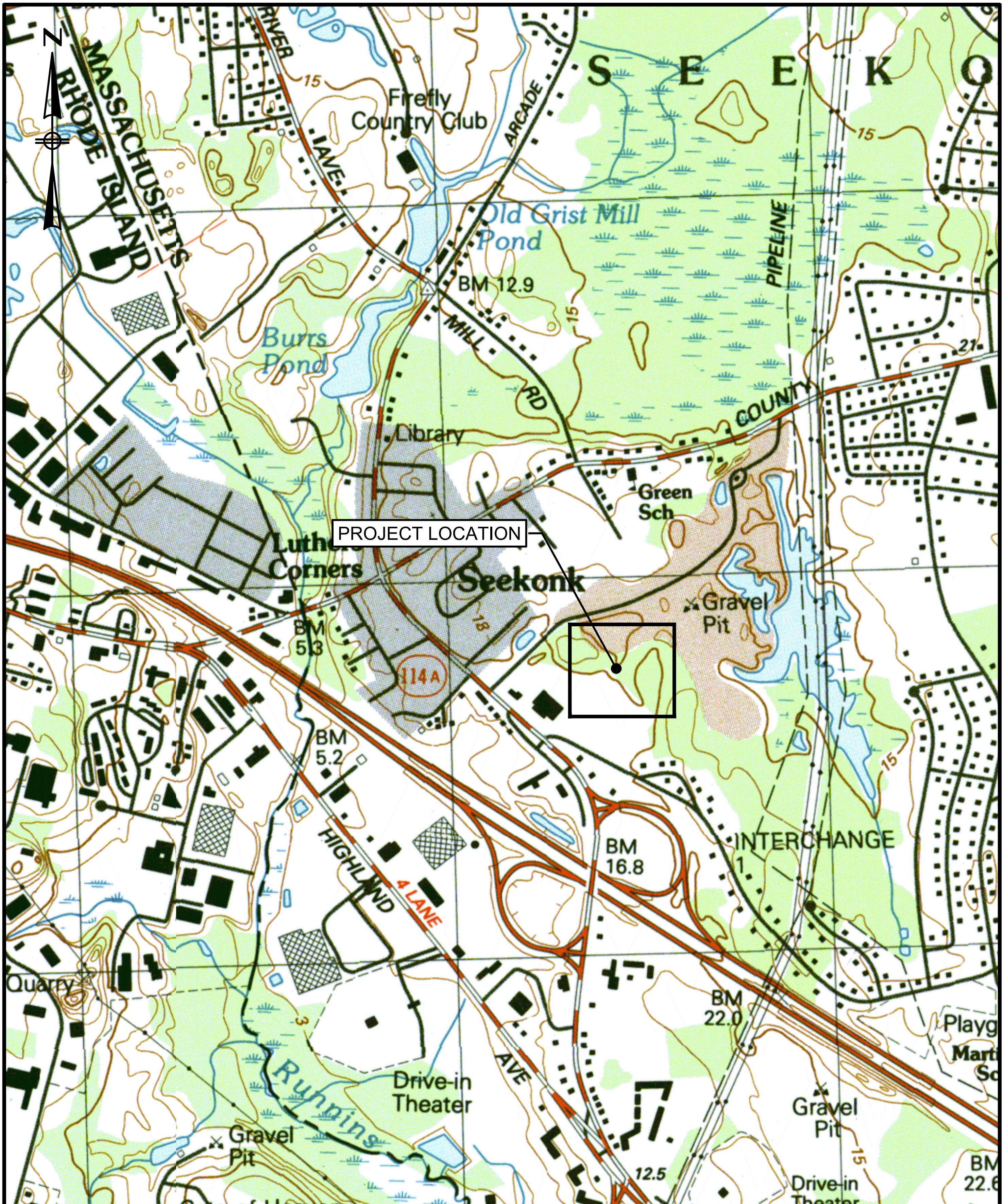

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FIGURE 1 - LOCUS MAP

GREENBRIER II

SEEKONK, MA

3.0 SITE PARAMETERS

3.1 Soil Classification

According to the *Web Soil Survey, Bristol County, Massachusetts (Northern Part)*, prepared by the US Department of Agriculture, Soil Conservation Service, soils underlying and in the vicinity of the project area consist predominantly of Merrimac fine sandy loam, Pits-Udorthents complex, and Wareham loamy sand soils (see **Figure 2 –** Soil Maps).

- Merrimac fine sandy loam, 0-3 percent slopes (254A) are typically deep, somewhat excessively drained soils found within backslopes, foot slopes, and summits. They are typically characterized by moderately high to very high permeability, low available water capacity, deep (> 80”) seasonal groundwater tables, and are classified as hydrologic soil group A soils.

- Wareham loamy sand, 0-3 percent slopes (32A) are typically deep, poorly drained soils in terrace and foot slope areas. They are typically characterized by high to very high permeability, low available water capacity, shallow (0 to 6”) seasonal groundwater tables and are classified as hydrologic soil group A/D soils.

- Pits-Udorthents complex, gravelly (617) areas consist of areas that have been excavated for sand and gravel. Depth of the excavations range from 5 to 25 feet, and some extend into the water table. In some areas the water table is at or near the surface. The unit is about 60 percent pits, 30 percent Udorthents, and 10 percent other soils.

3.2 Subsurface Investigation

A subsurface investigation was conducted specifically to determine soil permeability in the areas of the proposed stormwater BMPs. The test pit logs are included in Appendix E. The following Table summarizes the test pit results:

Test Pit #	**Ex. Ground Elev (ft)**	**Depth to Mottling (in)**	**Depth to Weeping (in)**	**Depth to Standing Water (in)**	**Estimated Seasonal High Groundwater (ft)**
TP-1	42.5	Not Observed (45" Estimated from TP-2)	Not Observed	Not Observed	Not Observed
TP-2	45.4	45"	76"	64"	41.7
TP-3	48.0	Not Observed	Not Observed	84"	41.0
TP-4	48.0	Not Observed	55"	88"	**43.4**
TP-5	46.1	Not observed	16"	16"	44.8
TP-6	46.2	Not Observed	25"	25"	44.1
TP-7	40.8	21"	44"	Not Observed	**39.1**
TP-8	40.0	40"	54"	78"	**36.7**
TP-9	42.5	29"	60"	Not Observed	**40.1**

The estimated SHGW elevation of 43.4 ft from TP-4 was utilized in the design of Basin 1.

The estimated SHGW elevation of 40.1 ft from TP-9 was utilized in the design of Basin 2A.

The estimated SHGW elevation of 36.7 ft from TP-8 was utilized in the design of Basin 2B.

The estimated SHGW elevation of 39.1 ft from TP-7 was utilized in the design of Basin 3.

3.3 Flood Zone Classification

According to the Flood Insurance Rate Map (FIRM) for the Town of Seekonk (Community Panel Number 25005C0212F, dated 7/7/2009), the project area lies entirely within Zone X (see **Figure 3 –** FEMA Flood Zones).

- Zone X land areas are areas within the 500-year (0.2% annual chance) flood plain.

4.0 PROJECT DESCRIPTION

During Phase II of the Greenbrier project, RI Seekonk Holdings LLC plans to construct seven apartment buildings for Chapter 40 B affordable housing, containing approximately 240 units, as well as a community center and associated utility buildings. The development will include the creation of an internal roadway network, ADA compliant pedestrian sidewalks, state roadway access, closed drainage systems, municipal water connection, and connection to the Phase I wastewater treatment facility. There will be a number of landscaping elements, including plantings along the internal roadway system as well as adjacent to the apartment buildings.

This Phase of construction will include the installation of three stormwater BMPs (infiltration basins) which will provide the required recharge and water quality treatment volumes for all proposed impervious area within the project limits. Pretreatment devices will be used prior to stormwater entering these BMPs.

This project will increase the overall impervious area within the project limits, however, with the proposed stormwater BMPs, the net stormwater discharge leaving the site will be reduced.

5.0 MITIGATION METHODS

The following measures will be taken to avoid or minimize disturbances to inland waters, wetland features and associated jurisdictional areas.

5.1 Soil Erosion and Sedimentation Controls

Soil erosion and sedimentation control issues have been incorporated in the design and construction planning process of the proposed project. A compost filter sock barrier is proposed along the downgradient limits of disturbance; the soil erosion and sedimentation control measures will be installed prior to the initiation of construction activities. Once established, these measures will be monitored weekly and maintained throughout the project until construction activities are complete.

The erosion controls will serve as the strict limits of disturbance for the project. No alterations, including vegetative clearing or surface disturbance, will occur beyond this line. The limits of clearing, grading, and disturbance will be kept to a minimum within the proposed area of construction. All areas outside of these limits, as depicted on the project site plans, will be totally undisturbed, to remain in a completely natural condition. After any significant rainstorm (i.e. greater than 1”), all sedimentation control measures will be inspected and replaced if failed.

6.0 CONFORMANCE WITH REGULATIONS

The project will occur within portions of various buffer zones associated with various isolated wetlands located adjacent to the project area. Any impacts to the buffer zones or resource area will be minimized to the maximum extent practicable while achieving the project purpose.

6.1 Natural Heritage and Endangered Species Program (NHESP)

After conducting a GIS investigation of the site, it has been concluded that the project area is not located within any Estimated and/or Priority Habitats as described by the NHESP.

7.0 STORMWATER MANAGEMENT STANDARDS

The project has been designed to meet the Stormwater Management Standards outlined in 310 CMR 10.05(6)(k). The project’s conformance with these standards is described below.

Standard 1: No New Untreated Discharges – Met

There will be no new untreated discharges to any adjacent wetlands as part of this project.

Standard 2: Peak Rate Control & Flood Prevention – Met

With the installation of the infiltration basins, the overall post-development peak discharge rates will be reduced compared to the pre-development discharge rates for the 2, 10, 25, and 100-year storms.

Standard 3: Recharge to Groundwater – Met

This standard has been met, the BMPs installed will cumulatively provide much greater groundwater recharge volume than required.

Standard 4: 80% TSS Removal – Met

With the implementation of deep-sump, hooded catch basins, Stormceptor pretreatment units and sediment forebays this standard has been met.

Another requirement for this standard is the preparation of a Construction Period Pollution Prevention Plan. Please refer to Appendix D.

Standard 5: LUHPPLs

The development will generate more than 1,000 trips per day and therefore is considered a high-intensity-use parking lot. The treatment train has been designed to provide at least 44% TSS removal prior to discharge to the infiltration basins and 80% TSS removal prior to overall discharge.

Standard 6: Critical Areas – Not applicable

Standard 7: Redevelopment Projects – Not Applicable

Standard 8: Erosion and Sediment Control – Met

Soil and erosion control shall be provided during construction by means of compost filter sock and catch basin inlet devices as described earlier in the report. The Construction Period Pollution Prevention Plan has been included in Appendix D. The Construction Period Pollution Prevention and Erosion & Sediment Control Plan is attached to the Notice of Intent.

Standard 9: Operation and Maintenance Plan – Met

The Operation and Maintenance (O&M) Plan for the post-construction BMP's constructed under this project can be found in Appendix A. Implementation of the O&M plan for this project shall be the responsibility of the RI Seekonk Holdings LLC.

Standard 10: Illicit Discharges – Met

There are no known or suspected illicit discharges to the proposed stormwater conveyance system.

In summary, the project does not qualify as a limited and a redevelopment project, so the project must meet all of applicable the Stormwater Management Standards. This project meets Standards 1, 2, 3, 4, 5, 8, 9, and 10; standards 6 and 7 are not applicable to the project.

8.0 DRAINAGE ANALYSIS

8.1 Overall Watersheds

The project includes installing new catchment and conveyance structures located and sized to capture and convey storms up to and including the 25-year storm event. It will also incorporate stormwater pretreatment measures and BMPs to provide water quality treatment of stormwater runoff. BMP selection was based on a variety of factors, including available land area, topography, underlying soil conditions, groundwater proximity, and vicinity of wetlands.

As the majority of the project area is currently undeveloped, BMPs were sized to prevent the increase of stormwater flows due to the large expansion of impervious area throughout the site. A large portion of stormwater flow that previously entered the existing drainage system at the 800 Fall River Avenue parking lot will be captured and routed to the proposed BMPs. Refer to Appendix C for existing and proposed Watershed Plans.

The project is located within the Runnins River watershed, within the overall Narragansett Bay watershed.

8.2 Proposed Conditions Watershed Analysis

The proposed conditions hydrologic analysis was performed using the Soil Conservation Service Technical Release 55 (SCS TR-55) methodology, using HydroCAD Version 10.0. The 2, 10, 25, and 100-year storm events were modeled for a 24-hour, Type III storm.

The stormwater management system for the project has been designed so that the post-development conditions result in no increase or a negligible increase to peak runoff rates to the adjacent wetlands or parcels. There is a slight increase in flow to individual wetlands during all storm events, however, there is a net overall decrease in the flow rate of stormwater leaving the proposed site. These increases to the individual wetlands are considered negligible and will not result in any negative impacts to the wetland. The 100-year storm results in a slight increase in flow and volume. The increased volume was compared with the area of the receiving wetland to approximate the increase in depth due to this volume. It was determined that the increase in volume will result in a negligible increase in depth. Therefore, the impacts of the 100-year storm will not result in any negative impacts to the wetlands or cause any downstream flooding.

Storm Event Flow Rates

Storm Event	2 Year		10 Year		25 Year		100 Year	
Development Condition	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Wetland 1	0.00	0.00	0.00	0.00	0.01	0.03	0.13	0.23
Wetland C	0.00	0.00	0.00	0.01	0.01	0.07	0.10	0.40
Wetland D	0.00	0.00	0.00	0.02	0.00	0.11	0.07	0.51
Wetland N	0.00	0.00	0.00	0.04	0.02	0.21	0.34	0.90
Wetland M	0.00	0.00	0.00	0.00	0.02	0.00	0.16	0.00
Showcase	20.66	11.48	35.39	22.37	46.97	31.40	70.39	50.66
Total	20.66	11.48	35.39	22.44	47.03	31.82	71.19	52.70

8.3 Groundwater Recharge

The Required Recharge Volume equals a depth of runoff corresponding to the soil type times the net impervious areas covering that soil type at the post-development site.

Rv = F x impervious area

Rv = Required Recharge Volume, expressed in Ft3, cubic yards, or acre-feet
F = Target Depth Factor associated with each Hydrologic Soil Group
Impervious Area = net pavement and rooftop area on site

The groundwater recharge was calculated using a Target Depth Factor of 0.6 for Hydrologic Group A soils.

BMP NAME	Groundwater Recharge Required & Provided				
	Ex. Imp. Area to Remain (s.f.)	New Imp. Area (s.f.)	Recharge Required (c.f.)	Recharge Provided (c.f.)	Recharge Deficit (c.f.)
Overall Site	0	330,331	16,517	30,429	-13,912
Project	0	330,331	16,517	30,429	-13,912

Please note that in the Recharge Deficit/Surplus Column, positive values represent deficit recharge volumes, while negative values represent surplus.

All BMPs were sized using the "Static" method. The "Static" method assumes that there is no exfiltration until the entire recharge device is filled to the elevation associated with the Required Recharge Volume.

Recharge Calculations are included in Appendix B.

8.4 Water Quality Volume

The required water quality volume can be calculated using the following formula:
$V_{WQ} = (D_{WQ}/12 \text{ inches/foot}) * (A_{IMP} * 43{,}560 \text{ square feet/acre})$ ***Equation (1)***

V_{WQ} = *Required Water Quality Volume* (in cubic feet)
D_{WQ} = Water Quality Depth: one-inch for discharges within a Zone II or Interim Wellhead Protection Area, to or near another critical area, runoff from a LUHPPL, or exfiltration to soils with infiltration rate greater than 2.4 inches/hour or greater; ½-inch for discharges near or to other areas.

Impervious Area and Required Water Quality Volume			WQV Provided	
	Imp. Area (sf)	WQV (cf)	WQV (cf)	WQV Deficit (cf)
Watershed 2 (Basin 1)	111,053	9,254	15,567	-6,313
Watershed 3 (Basin 2)	158,140	13,178	9,568	3,610
Watershed 8 (Basin 3)	44,805	3,734	5,294	-1,560
Watershed 7	16,333	1,361	0	1,361
Totals	330,331	27,527	30,429	-2,902

The required water quality volume is met for the project as a whole. As depicted in the above table, the project is treating 2,902 cubic feet in excess of what is required. The overflow from Basin 2 (Watershed 3) and Watershed 7 both contribute flow to the existing Showcase Cinema drainage system. As previously shown, the proposed project will contribute much less flow to existing system under proposed conditions. In addition to the decrease in flow, the majority of the stormwater that is discharging to this system is now being treated. There is no treatment under existing conditions. Appendix D of the Stormwater Report includes the TSS Removal Worksheets, which indicate that Basin 1 and Basin 3 result in 97% and Basin 2 results in 89% TSS removal. Overall, the project well exceeds the required 80% removal requirement. The entire project watershed contributes flow to the Runnins River and is a part of the overall Narragansett Bay Watershed. The BMPs have been designed to improve the water quality within the project area and overall watershed under proposed conditions and therefore meets the intent of the DEP Stormwater Management Policy.

Water Quality Volume Calculations are included in Appendix B.

8.5 Drawdown

The same infiltration rate that is used for sizing the infiltration BMP was used to confirm that the BMP will drain completely within 72 hours. The following formula was used:

$$Time_{drawdown} = \frac{Rv}{(K)(Bottom\ Area)}$$

Where:
Rv = Storage Volume
K = Saturated Hydraulic Conductivity For "Static" and "Simple Dynamic" Methods, use Rawls Rate (see Table 2.3.3).
Bottom Area = Bottom Area of Recharge Structure

Provided BMP Drawdown		
BMP Name	K (in/hr) (Table 2.3.3)	Drawdown (Hours)
Infiltration Basin 1	2.41	17.4
Infiltration Basin 2	2.41	15.2
Infiltration Basin 3	2.41	8.9

Drawdown Calculations are included in Appendix B.

8.6 Groundwater Mounding Analysis

A mounding analysis was performed, as the estimated seasonal high groundwater elevations are within four feet of the bottom of both infiltration basins. The analysis can be found in Appendix B. The results of the mounding analysis indicate that the mound does not reach the infiltration basin bottom and therefore the credit for stormwater recharge is valid.

Groundwater Mounding Analyses Results			
Basin	SHGW Elevation (ft)	Bottom Basin Elevation (ft)	Mounding Elevation (ft)
Basin 1	43.4	45.5	43.4+1.89=45.3
Basin 2A	40.1	42.5	40.1+1.15=41.3
Basin 2B	36.7	39.0	36.7+1.14=37.84
Basin 3	39.1	41.5	39.1+1.71=40.81

Mounding elevation equals seasonal high groundwater elevation plus mounding elevation (from analysis). Initial thickness of saturated zone for analysis was determined based on hydrogeologic study performed for Greenbrier Phase 1.

9.0 CONCLUSION

Phase II of the Greenbrier Residential Condominium and Apartment Community will develop two parcels to provide a significant amount of Chapter 40 B affordable housing in the town of Seekonk. It will also provide significant aesthetic benefits both for the tenants themselves, as well as the broader community, as the project area encompasses a former gravel-removal operation that had been previously abandoned.

As part of the project, the proposed stormwater management system has been designed in compliance with the Massachusetts Stormwater Handbook. The site design proposes the use of a number of effective and context-appropriate stormwater best management practices (BMPs) that will provide in excess of the groundwater recharge and prescribed water quality volume requirements for the site.

Figure 2
Soils Map

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Bristol County, Massachusetts, Northern Part

January 7, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:4,350 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 200, 400, 800, 1200

N

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

MAP LEGEND

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

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

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

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

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

Soil Survey Area: Bristol County, Massachusetts, Northern Part
Survey Area Data: Version 13, Jun 9, 2020

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

Date(s) aerial images were photographed: Jul 3, 2019—Aug 2, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
32A	Wareham loamy sand, 0 to 3 percent slopes	7.0	8.9%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	1.6	2.1%
245B	Hinckley loamy sand, 3 to 8 percent slopes	1.2	1.5%
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	9.3	11.8%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	12.1	15.3%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	17.7	22.5%
306B	Paxton fine sandy loam, 0 to 8 percent slopes, very stony	7.3	9.3%
617	Pits - Udorthents complex, gravelly	21.9	27.8%
656	Udorthents - Urban land complex	0.7	0.9%
Totals for Area of Interest		**78.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Bristol County, Massachusetts, Northern Part

32A—Wareham loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 999d
Elevation: 100 to 1,000 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Wareham and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wareham

Setting

Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loose sandy glaciofluvial deposits

Typical profile

H1 - 0 to 4 inches: loamy sand
H2 - 4 to 36 inches: loamy coarse sand
H3 - 36 to 60 inches: coarse sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

Minor Components

Scarboro

Percent of map unit: 10 percent
Landform: Terraces
Hydric soil rating: Yes

Pipestone

Percent of map unit: 5 percent
Landform: Terraces
Hydric soil rating: Yes

Walpole

Percent of map unit: 5 percent
Landform: Terraces
Hydric soil rating: Yes

73A—Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w695
Elevation: 0 to 1,580 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Whitman, extremely stony, and similar soils: 81 percent
Minor components: 19 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Whitman, Extremely Stony

Setting

Landform: Drumlins, depressions, drainageways, hills, ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 1 inches: peat
A - 1 to 10 inches: fine sandy loam
Bg - 10 to 17 inches: gravelly fine sandy loam
Cdg - 17 to 61 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 7 to 38 inches to densic material
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY041MA - Very Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Ridgebury, extremely stony
Percent of map unit: 10 percent
Landform: Hills, ground moraines, depressions, drumlins, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro
Percent of map unit: 5 percent
Landform: Outwash deltas, outwash terraces, depressions, drainageways
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Swansea
Percent of map unit: 3 percent
Landform: Swamps, bogs, marshes
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Woodbridge, extremely stony
Percent of map unit: 1 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

245B—Hinckley loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2svm8
Elevation: 0 to 1,430 feet
Mean annual precipitation: 36 to 53 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Kames, outwash terraces, outwash deltas, outwash plains, eskers, moraines, kame terraces
Landform position (two-dimensional): Summit, backslope, footslope, shoulder
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 8 percent
Landform: Eskers, moraines, outwash terraces, outwash deltas, kame terraces, outwash plains, kames
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Outwash deltas, kame terraces, outwash plains, moraines, outwash terraces
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope, base slope, head slope, tread
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

Agawam

Percent of map unit: 2 percent
Landform: Outwash terraces, outwash deltas, kame terraces, outwash plains, kames, eskers, moraines
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

254A—Merrimac fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2tyqr
Elevation: 0 to 1,100 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Merrimac and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Kames, eskers, moraines, outwash terraces, outwash plains
Landform position (two-dimensional): Backslope, footslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Sudbury

Percent of map unit: 5 percent
Landform: Terraces, deltas, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Outwash plains, eskers, kames, deltas
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Agawam

Percent of map unit: 3 percent
Landform: Eskers, moraines, outwash plains, outwash terraces, stream terraces, kames
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Windsor

Percent of map unit: 2 percent
Landform: Outwash plains, outwash terraces, deltas, dunes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

254B—Merrimac fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyqs
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Merrimac and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Outwash terraces, outwash plains, kames, eskers, moraines
Landform position (two-dimensional): Backslope, footslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex

Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile
Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities
Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Low (about 4.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Sudbury
Percent of map unit: 5 percent
Landform: Outwash plains, terraces, deltas
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley
Percent of map unit: 5 percent
Landform: Eskers, kames, deltas, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Windsor
Percent of map unit: 3 percent
Landform: Deltas, dunes, outwash terraces, outwash plains

Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Agawam

Percent of map unit: 2 percent
Landform: Eskers, stream terraces, moraines, outwash terraces, outwash plains, kames
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

256A—Deerfield loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2xfg8
Elevation: 0 to 1,100 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Deerfield and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Deerfield

Setting

Landform: Kame terraces, outwash plains, outwash deltas, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex, linear, concave
Across-slope shape: Concave, linear, convex
Parent material: Sandy outwash derived from granite, gneiss, and/or quartzite

Typical profile

Ap - 0 to 9 inches: loamy fine sand
Bw - 9 to 25 inches: loamy fine sand
BC - 25 to 33 inches: fine sand
Cg - 33 to 60 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: About 15 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Sodium adsorption ratio, maximum: 11.0
Available water capacity: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A
Ecological site: F144AY027MA - Moist Sandy Outwash
Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 7 percent
Landform: Outwash deltas, kame terraces, outwash terraces, outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear, concave, convex
Across-slope shape: Concave, linear, convex
Hydric soil rating: No

Wareham

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Sudbury

Percent of map unit: 2 percent
Landform: Kame terraces, outwash plains, outwash terraces, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Convex, linear, concave
Across-slope shape: Concave, linear, convex
Hydric soil rating: No

Ninigret

Percent of map unit: 1 percent
Landform: Outwash terraces, outwash plains, kame terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear, convex
Across-slope shape: Concave, convex
Hydric soil rating: No

306B—Paxton fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w673
Elevation: 0 to 1,340 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Paxton, very stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Very Stony

Setting

Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Woodbridge, very stony

Percent of map unit: 8 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 4 percent
Landform: Ground moraines, hills, depressions, drainageways, drumlins
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Charlton, very stony

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

617—Pits - Udorthents complex, gravelly

Map Unit Setting

National map unit symbol: tghf
Elevation: 0 to 3,000 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 120 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Pits, gravelly: 60 percent
Udorthents, gravelly, and similar soils: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pits, Gravelly

Typical profile

H1 - 0 to 6 inches: extremely gravelly sand
H2 - 6 to 60 inches: very gravelly coarse sand

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Description of Udorthents, Gravelly

Typical profile

H1 - 0 to 6 inches: variable
H2 - 6 to 60 inches: variable

Properties and qualities

Slope: 0 to 25 percent
Depth to restrictive feature: More than 80 inches
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Hydric soil rating: Unranked

656—Udorthents - Urban land complex

Map Unit Setting

National map unit symbol: tghg
Elevation: 0 to 250 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 120 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 55 percent
Urban land: 45 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Properties and qualities

Slope: 0 to 8 percent

Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

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

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

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

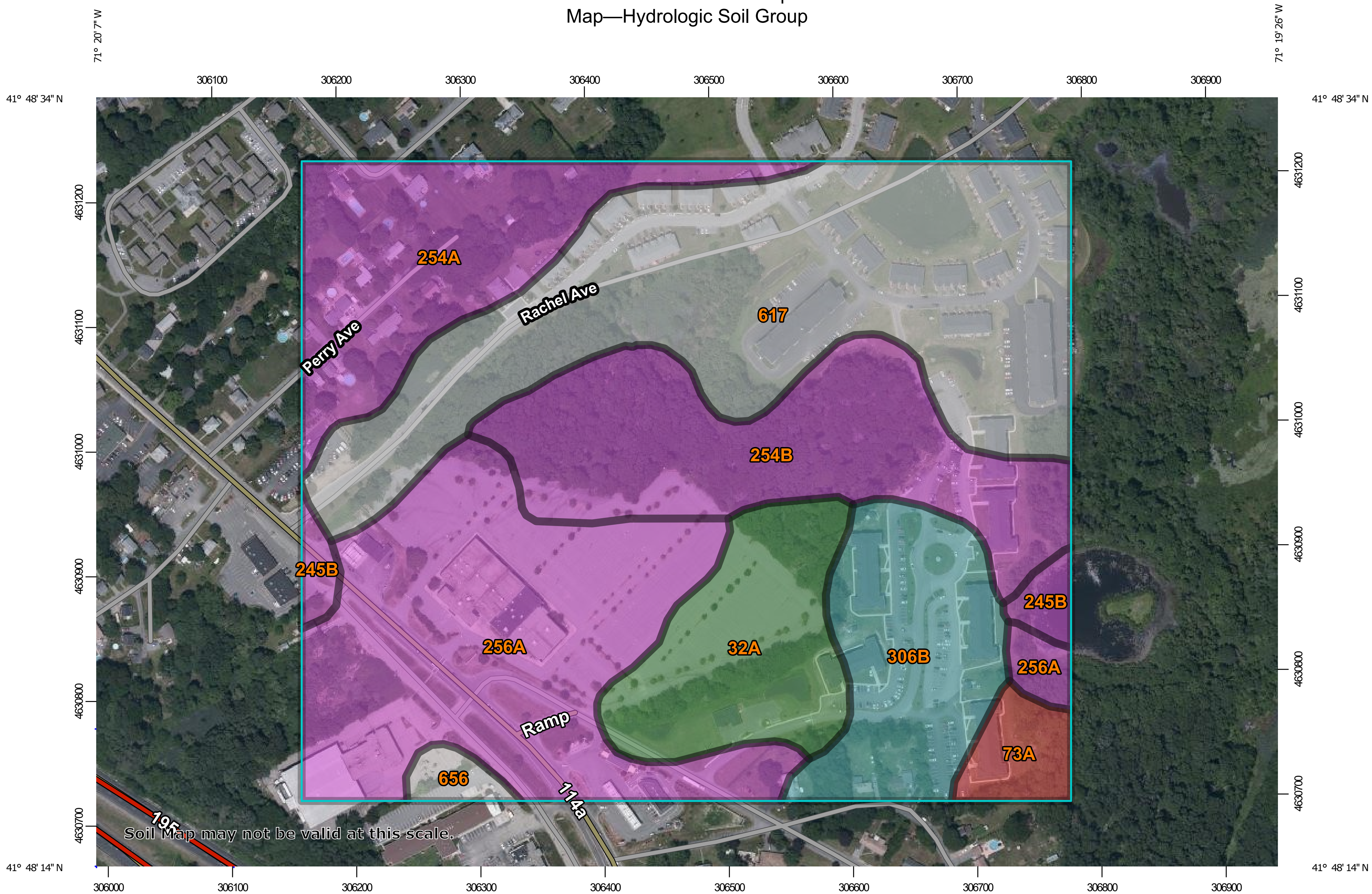
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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

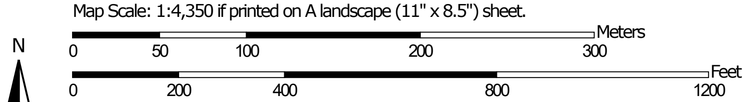
Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over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

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

Custom Soil Resource Report
Map—Hydrologic Soil Group



Map Scale: 1:4,350 if printed on A landscape (11" x 8.5") sheet.



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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil 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 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

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

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

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

Soil Survey Area: Bristol County, Massachusetts, Northern Part
Survey Area Data: Version 13, Jun 9, 2020

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

Date(s) aerial images were photographed: Jul 3, 2019—Aug 2, 2019

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

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
32A	Wareham loamy sand, 0 to 3 percent slopes	A/D	7.0	8.9%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	D	1.6	2.1%
245B	Hinckley loamy sand, 3 to 8 percent slopes	A	1.2	1.5%
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	A	9.3	11.8%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	12.1	15.3%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	A	17.7	22.5%
306B	Paxton fine sandy loam, 0 to 8 percent slopes, very stony	C	7.3	9.3%
617	Pits - Udorthents complex, gravelly		21.9	27.8%
656	Udorthents - Urban land complex		0.7	0.9%
Totals for Area of Interest			**78.9**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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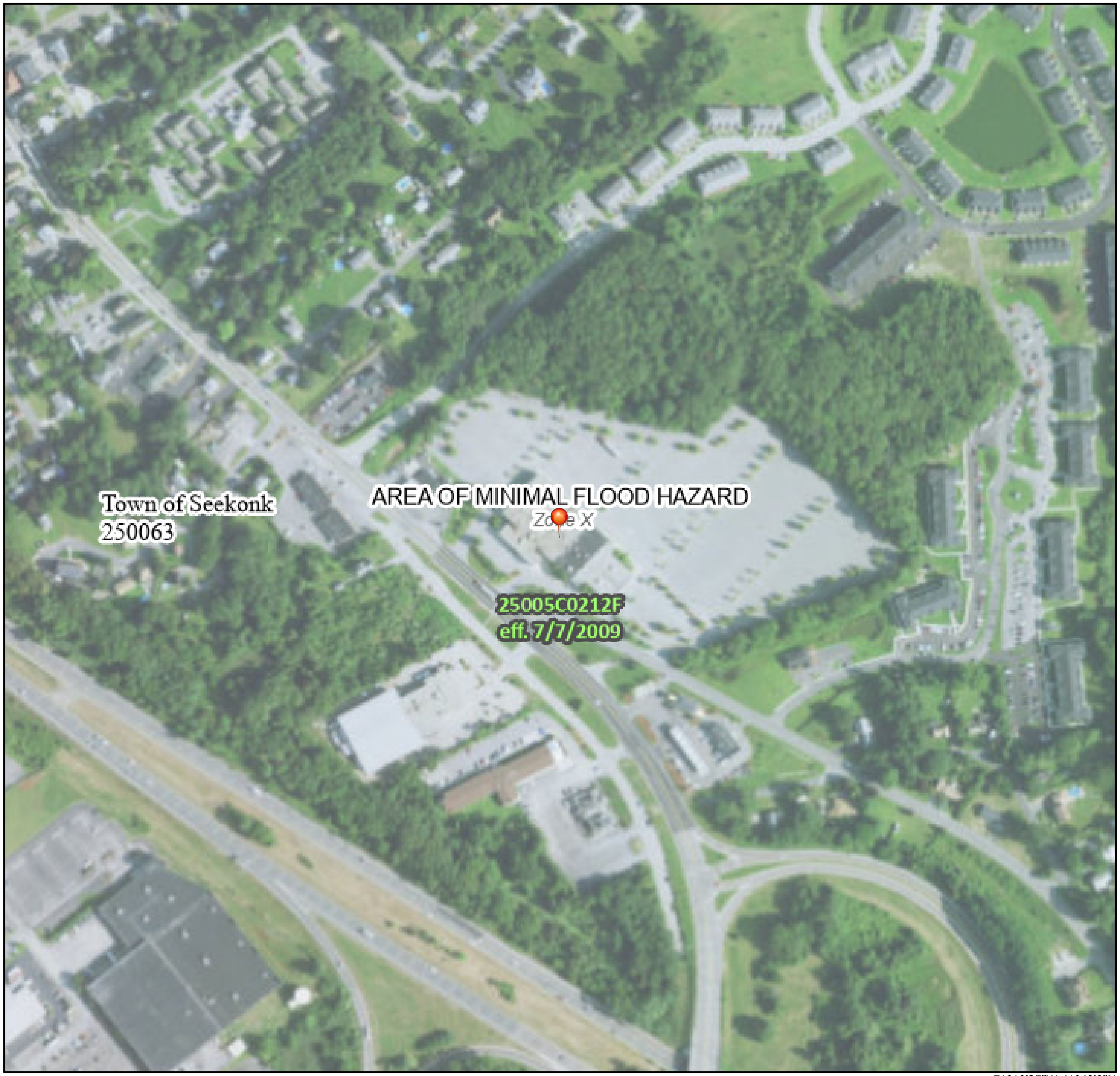
Figure 3
FEMA Flood Zones

National Flood Hazard Layer FIRMette

FEMA

71°20'12"W 41°48'35"N



71°19'35"W 41°48'8"N

Feet 0 250 500 1,000 1,500 2,000

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/20/2021 at 4:46 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix A
Operation & Maintenance Plan

Seekonk, MA

Greenbrier Residential Condominium and Apartment Community – Phase II

January 2022

STORMWATER MANAGEMENT SYSTEM AND OPERATION & MAINTENANCE PLAN

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APPENDICES:

INTRODUCTION

On behalf of RI Seekonk Holdings LLC, BETA Group, Inc., (BETA) has prepared the following Stormwater Management System Operation and Maintenance (O&M) Plan for the proposed Stormwater Management System associated with the Greenbrier Residential Condominium and Apartment Community. This plan has been prepared in accordance with the guidance provided in the Massachusetts Stormwater Handbook.

I – GENERAL INFORMATION

I-A - Applicant

RI Seekonk Holdings LLC
44 Davis Street
Seekonk, MA 02771
Project Contact: H. Charles Tapalian
(401) 447-0847 Phone

I-B - Site Plan / Stormwater Management Designer

BETA Group, Inc.
701 George Washington Highway
Lincoln, RI 02865
Project Manager: Todd Undzis, P.E.
(401) 333-2382 Phone
(401) 333-9225 Fax

I-C - Address of Site

800 Fall River Avenue, Seekonk, MA

I-D - Locus Map

Please refer to Figure I-1 – Locus Map.

II – STORMWATER MANAGEMENT SYSTEM SUMMARY

The Stormwater Management System developed for the Greenbrier Residential Condominium and Apartment Project consists of the following components that require routine inspection and periodic maintenance:

Stormwater Collection & Conveyance	Stormwater Mitigation and Treatment
Deep-Sump Catch Basins	Stormceptor Pretreatment Unit
Drain Manholes	Sediment Forebay
	Infiltration Basin

The overall system has been designed to conform (to the maximum extent practicable) to the applicable requirements of the Massachusetts Department of Environmental Protection (MassDEP) for environmental and stormwater quality elements. The implementation of this O&M plan will have significant bearing on the proper function and overall life cycle of the stormwater management system, and must be adhered to in its entirety to insure that the system will operate as intended.

III - OPERATION AND MAINTENANCE PLAN

All components of the stormwater management system within the project area, whether new, rehabilitated, or existing to remain, shall be owned by RI Seekonk Holdings LLC, and shall be the responsibility of the RI Seekonk Holdings LLC, its heirs, assigns or duly authorized agents to operate and maintain. The following summarizes the actions specific to this project that will be part of operation and maintenance plan of the Greenbrier Community Drainage System.

III-A GENERAL:

III-A.1 Inspections

Inspections shall assess the following for all components of the stormwater management system:

Structural Elements – The condition of all elements of the particular component being inspected shall be assessed, and if deemed to be deficient or compromised by routine wear and deterioration, shall be scheduled for repair or replacement as soon as possible.

Accumulated Materials – The volume and nature of accumulated materials shall be noted during all inspections. The accumulation of excessive levels of materials (sediments, trash and other debris) and/or the presence of atypical materials or contaminants within the structure shall be cause for further inspection of the stormwater system and/or the land area tributary thereto, to locate and identify the source of the excessive or atypical material and to correct the cause of same.

III-A.2 Cleaning

Cleaning shall include completely removing all accumulated material (e.g. sediments, trash, debris, and organic material) by means appropriate to the particular component of the stormwater system and legally disposing of the material at an off-site location.

In the case of atypical materials or contaminants in the stormwater system, said materials may require additional sampling, testing and analysis to determine the nature of the contamination and the appropriate methods of handling and disposal for same.

III-A.3 Access & Safety

Access to the stormwater management system for inspections and cleaning shall be made at the designated locations for same, and shall be made in a manner that avoids or minimizes interference with the operation of the roadway and the stormwater management system.

Inspections and cleaning of all elements of the stormwater management system shall be performed by properly-trained personnel using appropriate tools and equipment, and shall at all times be performed in a manner which prioritizes safety for both the personnel performing the inspections and/or cleaning, as well as the travelling public.

In instances where impacts to roadway or the stormwater management system cannot be avoided during inspections and/or cleaning, all reasonable measures and precautions shall be taken to protect the personnel performing the inspections and/or cleaning as well as the travelling public using the roadway. Such measures may include, but not be limited to:

Roadway Impacts:

- Warning signage;
- Attenuator boards;
- Barriers;

Stormwater Management System Impacts:

- Temporary stormwater flow diversion;
- Bypass pumping

III-B EASEMENTS:

For the purposes of this project, the stormwater management system associated with Greenbrier Residential Condominium and Apartment Community is located on and within RI Seekonk Holdings LLC property. Therefore, there will be no easements or land acquisition by the owner

III-C SPECIFIC COMPONENTS:

III-C.1 – Stormceptor Pretreatment Unit

Inspections: For the first year of operation, the Pretreatment Units shall be inspected quarterly, then two (2) times per year in the following years.

Scheduled Maintenance:
- Pretreatment Units shall be cleaned a minimum of one (1) time per year; any accumulated material shall be removed completely to ensure that the filtration capacity of the unit is maintained or restored in all locations. The accumulated material shall be legally disposed of at an off-site location.

Corrective Maintenance:
- Refer to Manufacturer's Specifications for all corrective maintenance.

III-C.2 – Infiltration Basins/Swales

Inspections: Infiltration basins and swales shall be inspected a minimum of two (2) times per year, preferably once in the spring and once in the fall. In addition, the infiltration swales shall be inspected after any storm greater than or equal to the 1-year storm event.

Scheduled Maintenance:
- Infiltration basin/swale grass shall be mowed two (2) to four (4) times per year (as needed) to maintain the height of the grass between four (4) inches and ten (10) inches.
- Work within infiltration basins/swales shall be performed manually or by motorized equipment with sufficient reach to operate from outside of the basins/swales. Under no circumstances should heavy equipment (motorized or otherwise) or materials be driven or placed within infiltration BMP's, as the weight of same shall over-compact the infiltration media within the basin and reduce the stormwater uptake capacity of the basin/swale.

Corrective Maintenance:
- If concentrated stormwater flows result in erosion along any portion of the infiltration basin/swale, the impacted areas shall be immediately loamed, reseeded and/or replanted with appropriate wetland vegetation and stabilized (straw mulch, bio-degradable erosion control blanket, etc.) until such time as the new vegetation has sufficiently established itself.
- If standing water remains on the surface for 48 hours after a storm event, the top six (6) inches of soils on bottom of the infiltration basin shall be removed, and the material beneath roto-tilled to a depth of twelve (12) inches. The material removed shall be legally disposed of at an off-site location, and the affected area re-loamed, reseeded and stabilized until such time as an acceptable level of growth has been established.

III-C.3 – Deep-Sump Catch Basins

Inspections: Catch basins shall be inspected a minimum of two (2) times per year preferably once in the spring and once in the fall.

Corrective Maintenance: If sediment depth within the catch basin is greater than or equal to two (2) feet, the sediments and any accumulated material (e.g. trash, debris, and organic material) shall be removed and legally disposed of at an off-site location.

Scheduled Maintenance: Catch basins shall be cleaned a minimum of one (1) time per year. Cleaning shall include removing any accumulated material (e.g. sediments, trash, debris, and organic material) and legally disposing the material at an off-site location.

III-C.4 – Drain Manholes

Inspections: Drain manholes shall be inspected a minimum of two (2) times per year, typically simultaneously with the inspection of catch basins.

Scheduled Maintenance: Drain manholes do not typically require routine cleaning when used in conjunction with off-line deep-sump catch basins with hoods, assuming that the catch basins are functioning properly.

Corrective Maintenance: Any sediments or accumulated material (e.g. trash, debris, and organic material) discovered in drain manholes shall be immediately removed and legally disposed of at an off-site location. In addition, the source of the sediments or materials shall be located and repaired or otherwise corrected.

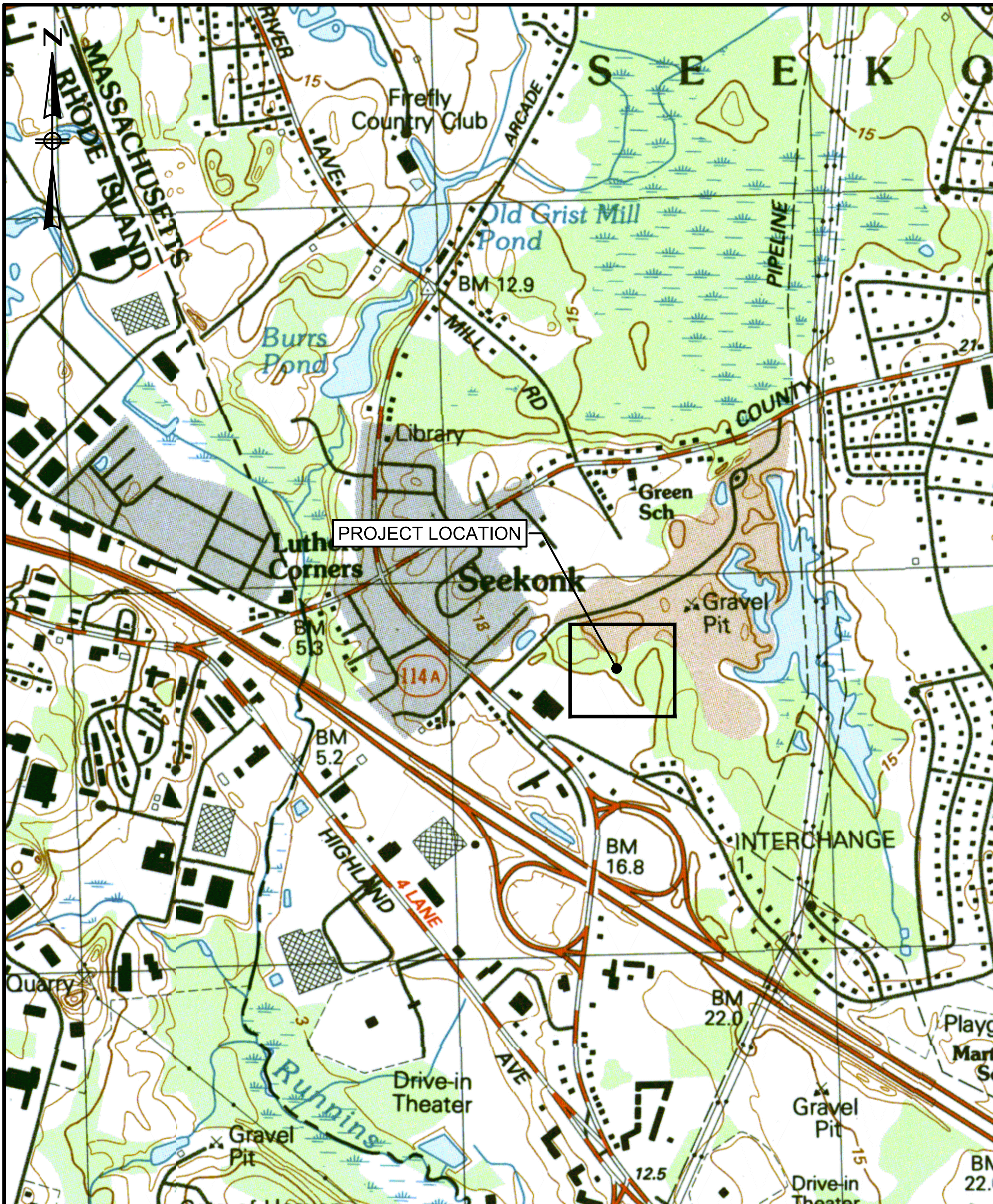

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FIGURE 1 - LOCUS MAP

GREENBRIER II

SEEKONK, MA

O&M Appendix A
Inspection Logs

LOCATION (STREET ADDRESS / POLE #): ____________________

MUNICIPALITY: ____________________

DATE & TIME: ____________________

INSPECTOR/AGENCY:

MAINTENANCE ITEM	SATIS-FACTORY	UNSATIS-FACTORY	COMMENTS
1. Structural Condition			
Frame & Grate			
Brick & Mortar Leveling			
Steps			
Walls & Section Joints			
Pipes & Outlet Hood			
2. Sediment Cleaning			
Accumulated Sediment in Sump			
Greater than 50% of storage volume remaining			
No evidence of contaminated material/stormwater			

Comments:

____

____

Actions to be Taken:

____

____

LOCATION (STREET ADDRESS / POLE #): ______________________

MUNICIPALITY: ______________________

DATE & TIME: ______________________

INSPECTOR/AGENCY:

MAINTENANCE ITEM	SATIS-FACTORY	UNSATIS-FACTORY	COMMENTS
1. Debris Cleanout			
Trench/chamber or basin surface clear of debris			
Inflow pipes clear of debris			
Overflow spillway clear of debris			
Inlet area clear of debris			
2. Sediment Traps or Forebays			
Obviously trapping sediment			
Greater than 50% of storage volume remaining			
3. Dewatering			
Trench/chamber or basin dewaters between storms			
4. Sediment Cleanout of Trench/Chamber or Basin			
No evidence of sedimentation in trench/chamber or basin			
Sediment accumulation doesn't yet require cleanout			
5. Inlets			
Good condition			
No evidence of erosion			
6. Outlet/Overflow Spillway			
Good condition, no need for repair			
No evidence of erosion			
Surface of aggregate clean			
Top layer of stone does not need replacement			
Trench/Chamber or basin does not need rehabilitation			

Comments:

____

____

Actions to be Taken:

____

____

LOCATION (STREET ADDRESS / POLE #): ______________________
MUNICIPALITY: ______________________
DATE & TIME: ______________________
INSPECTOR/AGENCY:

MAINTENANCE ITEM	SATIS-FACTORY	UNSATIS-FACTORY	COMMENTS
1. Debris Cleanout			
Bioretention and contributing areas clean of debris			
No dumping of yard wastes into practice			
Litter (branches, etc.) have been removed			
2. Vegetation			
Plant height not less than design water depth			
Fertilized per specifications			
Plant composition according to approved plans			
No placement of inappropriate plants			
Grass height not greater than 10 inches			
No evidence of erosion			
3. Check Dams/Energy Dissipaters/Sumps			
No evidence of sediment buildup			
Sumps < 50% full of sediment			
No evidence of erosion at downstream toe of drop structure			
4. Dewatering			
Dewaters between storms			
No evidence of standing water			
5. Sediment Deposition			
Swale clean of sediments			
Sediments < 20% of swale design depth			
6. Outflow/Overflow Spillway			
Good condition, no need for repair			
No evidence of erosion			
No evidence of any blockages			
7. Integrity of Filter Bed			
Filter bed has not been blocked or filled inappropriately			

Comments:

____

____

Actions to be Taken:

____

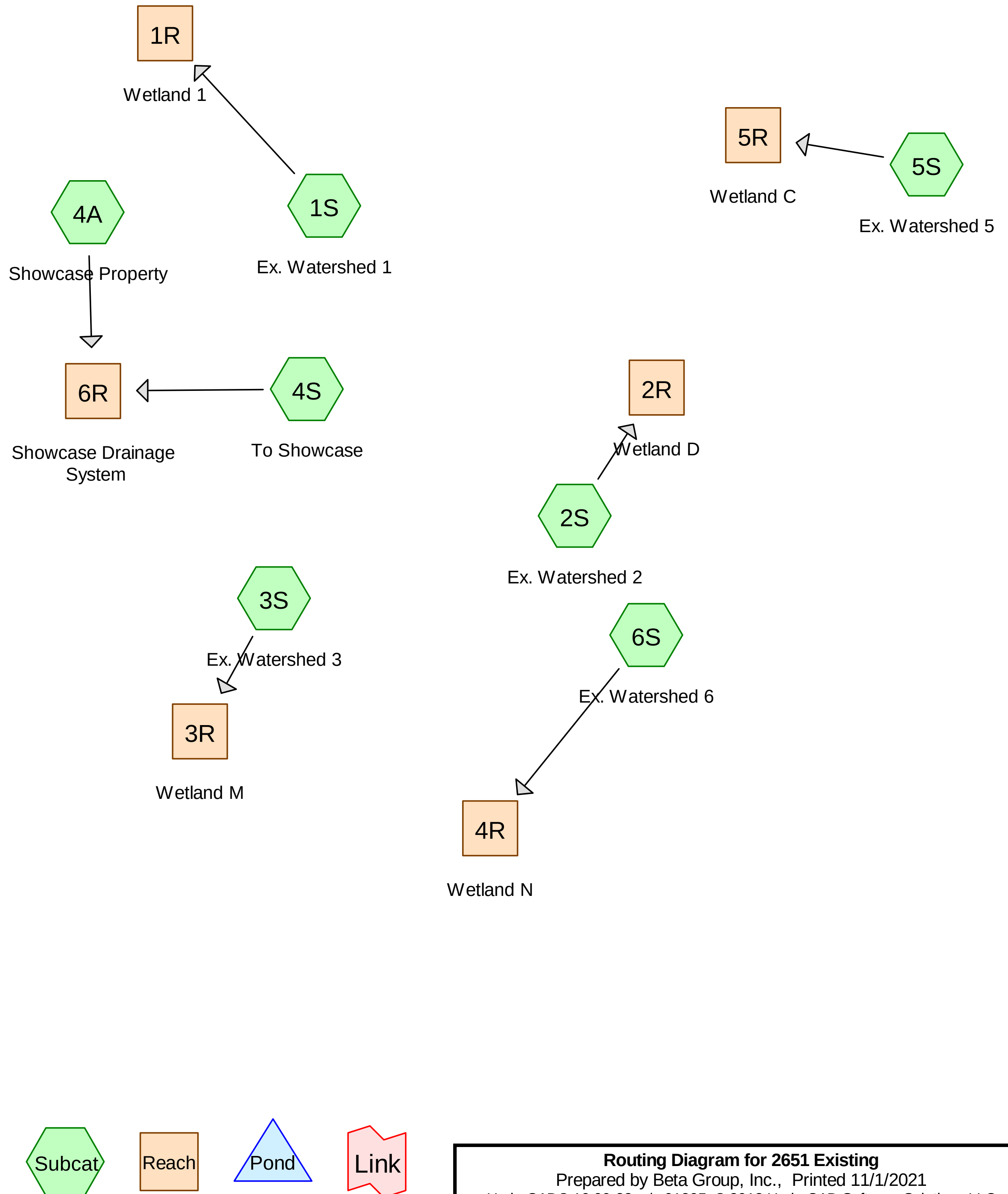
____

Appendix B

Stormwater Analysis

Section B-1

HydroCAD Printouts – Existing Conditions



Routing Diagram for 2651 Existing
Prepared by Beta Group, Inc., Printed 11/1/2021

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

Subcatchment 1S: Ex. Watershed 1 Runoff Area=44,735 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=220' Tc=18.0 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment 2S: Ex. Watershed 2 Runoff Area=21,360 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=183' Tc=11.2 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment 3S: Ex. Watershed 3 Runoff Area=4,860 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=39 Runoff=0.00 cfs 1 cf

Subcatchment 4A: Showcase Property Runoff Area=231,789 sf 88.20% Impervious Runoff Depth=2.26"
Tc=5.0 min CN=90 Runoff=15.47 cfs 43,680 cf

Subcatchment 4S: To Showcase Runoff Area=341,348 sf 73.22% Impervious Runoff Depth=1.48"
Flow Length=737' Tc=19.5 min CN=80 Runoff=9.31 cfs 42,078 cf

Subcatchment 5S: Ex. Watershed 5 Runoff Area=34,445 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=199' Tc=23.0 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment 6S: Ex. Watershed 6 Runoff Area=117,367 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=309' Slope=0.0350 '/' Tc=19.0 min CN=30 Runoff=0.00 cfs 0 cf

Reach 1R: Wetland 1 Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach 2R: Wetland D Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach 3R: Wetland M Inflow=0.00 cfs 1 cf
Outflow=0.00 cfs 1 cf

Reach 4R: Wetland N Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach 5R: Wetland C Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach 6R: Showcase Drainage System Inflow=20.66 cfs 85,759 cf
Outflow=20.66 cfs 85,759 cf

Total Runoff Area = 795,904 sf Runoff Volume = 85,759 cf Average Runoff Depth = 1.29"
42.91% Pervious = 341,512 sf 57.09% Impervious = 454,392 sf

Summary for Subcatchment 1S: Ex. Watershed 1

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
44,735	30	Woods, Good, HSG A
44,735		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0250	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
1.2	120	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.3	50	0.0400	3.00		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.0	220	Total			

Summary for Subcatchment 2S: Ex. Watershed 2

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
21,360	30	Woods, Good, HSG A
21,360		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.1000	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
1.7	133	0.0700	1.32		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.2	183	Total			

Summary for Subcatchment 3S: Ex. Watershed 3

Runoff = 0.00 cfs @ 24.01 hrs, Volume= 1 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
4,860	39	>75% Grass cover, Good, HSG A
4,860		100.00% Pervious Area

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

Summary for Subcatchment 4A: Showcase Property

Runoff = 15.47 cfs @ 12.12 hrs, Volume= 43,680 cf, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
27,341	32	Woods/grass comb., Good, HSG A
204,448	98	Paved roads w/curbs & sewers, HSG A
231,789	90	Weighted Average
27,341		11.80% Pervious Area
204,448		88.20% Impervious Area

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

Summary for Subcatchment 4S: To Showcase

Runoff = 9.31 cfs @ 12.29 hrs, Volume= 42,078 cf, Depth= 1.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
91,404	30	Woods, Good, HSG A
249,944	98	Paved roads w/curbs & sewers, HSG A
341,348	80	Weighted Average
91,404		26.78% Pervious Area
249,944		73.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	50	0.0300	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
3.4	257	0.0640	1.26		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.8	430	0.0100	9.05	44.44	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.012 Concrete pipe, finished
19.5	737	Total			

Summary for Subcatchment 5S: Ex. Watershed 5

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
34,445	30	Woods, Good, HSG A
34,445		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0200	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
5.0	149	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.0	199	Total			

Summary for Subcatchment 6S: Ex. Watershed 6

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
0	98	Paved roads w/curbs & sewers, HSG A
117,367	30	Woods, Good, HSG A
117,367	30	Weighted Average
117,367		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.4	50	0.0350	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
4.6	259	0.0350	0.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.0	309	Total			

Summary for Reach 1R: Wetland 1

Inflow Area =	44,735 sf,	0.00% Impervious,	Inflow Depth = 0.00"	for 2-Year event
Inflow =	0.00 cfs @	0.00 hrs, Volume=	0 cf	
Outflow =	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Wetland D

Inflow Area =	21,360 sf,	0.00% Impervious,	Inflow Depth = 0.00"	for 2-Year event
Inflow =	0.00 cfs @	0.00 hrs, Volume=	0 cf	
Outflow =	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 3R: Wetland M

Inflow Area =	4,860 sf, 0.00% Impervious,	Inflow Depth = 0.00"	for 2-Year event
Inflow =	0.00 cfs @ 24.01 hrs, Volume=	1 cf	
Outflow =	0.00 cfs @ 24.01 hrs, Volume=	1 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 4R: Wetland N

Inflow Area =	117,367 sf,	0.00% Impervious,	Inflow Depth = 0.00"	for 2-Year event
Inflow =	0.00 cfs @	0.00 hrs, Volume=	0 cf	
Outflow =	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 5R: Wetland C

Inflow Area =	34,445 sf,	0.00% Impervious,	Inflow Depth = 0.00"	for 2-Year event
Inflow =	0.00 cfs @	0.00 hrs, Volume=	0 cf	
Outflow =	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 6R: Showcase Drainage System

Inflow Area = 573,137 sf, 79.28% Impervious, Inflow Depth = 1.80" for 2-Year event
Inflow = 20.66 cfs @ 12.13 hrs, Volume= 85,759 cf
Outflow = 20.66 cfs @ 12.13 hrs, Volume= 85,759 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

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

Subcatchment 1S: Ex. Watershed 1 Runoff Area=44,735 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=220' Tc=18.0 min CN=30 Runoff=0.00 cfs 7 cf

Subcatchment 2S: Ex. Watershed 2 Runoff Area=21,360 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=183' Tc=11.2 min CN=30 Runoff=0.00 cfs 3 cf

Subcatchment 3S: Ex. Watershed 3 Runoff Area=4,860 sf 0.00% Impervious Runoff Depth=0.18"
Tc=6.0 min CN=39 Runoff=0.00 cfs 71 cf

Subcatchment 4A: Showcase Property Runoff Area=231,789 sf 88.20% Impervious Runoff Depth=3.76"
Tc=5.0 min CN=90 Runoff=24.98 cfs 72,640 cf

Subcatchment 4S: To Showcase Runoff Area=341,348 sf 73.22% Impervious Runoff Depth=2.79"
Flow Length=737' Tc=19.5 min CN=80 Runoff=17.69 cfs 79,319 cf

Subcatchment 5S: Ex. Watershed 5 Runoff Area=34,445 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=199' Tc=23.0 min CN=30 Runoff=0.00 cfs 6 cf

Subcatchment 6S: Ex. Watershed 6 Runoff Area=117,367 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=309' Slope=0.0350 '/' Tc=19.0 min CN=30 Runoff=0.00 cfs 19 cf

Reach 1R: Wetland 1 Inflow=0.00 cfs 7 cf
Outflow=0.00 cfs 7 cf

Reach 2R: Wetland D Inflow=0.00 cfs 3 cf
Outflow=0.00 cfs 3 cf

Reach 3R: Wetland M Inflow=0.00 cfs 71 cf
Outflow=0.00 cfs 71 cf

Reach 4R: Wetland N Inflow=0.00 cfs 19 cf
Outflow=0.00 cfs 19 cf

Reach 5R: Wetland C Inflow=0.00 cfs 6 cf
Outflow=0.00 cfs 6 cf

Reach 6R: Showcase Drainage System Inflow=35.39 cfs 151,959 cf
Outflow=35.39 cfs 151,959 cf

Total Runoff Area = 795,904 sf Runoff Volume = 152,065 cf Average Runoff Depth = 2.29"
42.91% Pervious = 341,512 sf 57.09% Impervious = 454,392 sf

Summary for Subcatchment 1S: Ex. Watershed 1

Runoff = 0.00 cfs @ 24.05 hrs, Volume= 7 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
44,735	30	Woods, Good, HSG A
44,735		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0250	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
1.2	120	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.3	50	0.0400	3.00		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.0	220	Total			

Summary for Subcatchment 2S: Ex. Watershed 2

Runoff = 0.00 cfs @ 24.03 hrs, Volume= 3 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
21,360	30	Woods, Good, HSG A
21,360		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.1000	0.09		**Sheet Flow,**
					Woods: Light underbrush n= 0.400 P2= 1.50"
1.7	133	0.0700	1.32		**Shallow Concentrated Flow,**
					Woodland Kv= 5.0 fps
11.2	183	Total			

Summary for Subcatchment 3S: Ex. Watershed 3

Runoff = 0.00 cfs @ 12.95 hrs, Volume= 71 cf, Depth= 0.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
4,860	39	>75% Grass cover, Good, HSG A
4,860		100.00% Pervious Area

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

Summary for Subcatchment 4A: Showcase Property

Runoff = 24.98 cfs @ 12.12 hrs, Volume= 72,640 cf, Depth= 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
27,341	32	Woods/grass comb., Good, HSG A
204,448	98	Paved roads w/curbs & sewers, HSG A
231,789	90	Weighted Average
27,341		11.80% Pervious Area
204,448		88.20% Impervious Area

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

Summary for Subcatchment 4S: To Showcase

Runoff = 17.69 cfs @ 12.29 hrs, Volume= 79,319 cf, Depth= 2.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
91,404	30	Woods, Good, HSG A
249,944	98	Paved roads w/curbs & sewers, HSG A
341,348	80	Weighted Average
91,404		26.78% Pervious Area
249,944		73.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	50	0.0300	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
3.4	257	0.0640	1.26		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.8	430	0.0100	9.05	44.44	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.012 Concrete pipe, finished
19.5	737	Total			

Summary for Subcatchment 5S: Ex. Watershed 5

Runoff = 0.00 cfs @ 24.05 hrs, Volume= 6 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
34,445	30	Woods, Good, HSG A
34,445		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0200	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
5.0	149	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.0	199	Total			

Summary for Subcatchment 6S: Ex. Watershed 6

Runoff = 0.00 cfs @ 24.05 hrs, Volume= 19 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
0	98	Paved roads w/curbs & sewers, HSG A
117,367	30	Woods, Good, HSG A
117,367	30	Weighted Average
117,367		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.4	50	0.0350	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
4.6	259	0.0350	0.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.0	309	Total			

Summary for Reach 1R: Wetland 1

Inflow Area =	44,735 sf,	0.00% Impervious,	Inflow Depth = 0.00"	for 10-Year event
Inflow =	0.00 cfs @	24.05 hrs, Volume=	7 cf	
Outflow =	0.00 cfs @	24.05 hrs, Volume=	7 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Wetland D

Inflow Area =	21,360 sf, 0.00% Impervious,	Inflow Depth = 0.00"	for 10-Year event
Inflow =	0.00 cfs @ 24.03 hrs, Volume=	3 cf	
Outflow =	0.00 cfs @ 24.03 hrs, Volume=	3 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 3R: Wetland M

Inflow Area = 4,860 sf, 0.00% Impervious, Inflow Depth = 0.18" for 10-Year event
Inflow = 0.00 cfs @ 12.95 hrs, Volume= 71 cf
Outflow = 0.00 cfs @ 12.95 hrs, Volume= 71 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 4R: Wetland N

Inflow Area =	117,367 sf, 0.00% Impervious,	Inflow Depth = 0.00"	for 10-Year event
Inflow =	0.00 cfs @ 24.05 hrs, Volume=	19 cf	
Outflow =	0.00 cfs @ 24.05 hrs, Volume=	19 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 5R: Wetland C

Inflow Area =	34,445 sf,	0.00% Impervious,	Inflow Depth = 0.00"	for 10-Year event	
Inflow =	0.00 cfs @	24.05 hrs,	Volume=	6 cf	
Outflow =	0.00 cfs @	24.05 hrs,	Volume=	6 cf,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 6R: Showcase Drainage System

Inflow Area =	573,137 sf,	79.28% Impervious,	Inflow Depth = 3.18"	for 10-Year event
Inflow =	35.39 cfs @	12.13 hrs, Volume=	151,959 cf	
Outflow =	35.39 cfs @	12.13 hrs, Volume=	151,959 cf,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

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

Subcatchment 1S: Ex. Watershed 1 Runoff Area=44,735 sf 0.00% Impervious Runoff Depth=0.08"
Flow Length=220' Tc=18.0 min CN=30 Runoff=0.01 cfs 309 cf

Subcatchment 2S: Ex. Watershed 2 Runoff Area=21,360 sf 0.00% Impervious Runoff Depth=0.08"
Flow Length=183' Tc=11.2 min CN=30 Runoff=0.00 cfs 148 cf

Subcatchment 3S: Ex. Watershed 3 Runoff Area=4,860 sf 0.00% Impervious Runoff Depth=0.47"
Tc=6.0 min CN=39 Runoff=0.02 cfs 192 cf

Subcatchment 4A: Showcase Property Runoff Area=231,789 sf 88.20% Impervious Runoff Depth=4.94"
Tc=5.0 min CN=90 Runoff=32.25 cfs 95,484 cf

Subcatchment 4S: To Showcase Runoff Area=341,348 sf 73.22% Impervious Runoff Depth=3.87"
Flow Length=737' Tc=19.5 min CN=80 Runoff=24.44 cfs 110,130 cf

Subcatchment 5S: Ex. Watershed 5 Runoff Area=34,445 sf 0.00% Impervious Runoff Depth=0.08"
Flow Length=199' Tc=23.0 min CN=30 Runoff=0.01 cfs 238 cf

Subcatchment 6S: Ex. Watershed 6 Runoff Area=117,367 sf 0.00% Impervious Runoff Depth=0.08"
Flow Length=309' Slope=0.0350 '/' Tc=19.0 min CN=30 Runoff=0.02 cfs 811 cf

Reach 1R: Wetland 1 Inflow=0.01 cfs 309 cf
Outflow=0.01 cfs 309 cf

Reach 2R: Wetland D Inflow=0.00 cfs 148 cf
Outflow=0.00 cfs 148 cf

Reach 3R: Wetland M Inflow=0.02 cfs 192 cf
Outflow=0.02 cfs 192 cf

Reach 4R: Wetland N Inflow=0.02 cfs 811 cf
Outflow=0.02 cfs 811 cf

Reach 5R: Wetland C Inflow=0.01 cfs 238 cf
Outflow=0.01 cfs 238 cf

Reach 6R: Showcase Drainage System Inflow=46.97 cfs 205,614 cf
Outflow=46.97 cfs 205,614 cf

Total Runoff Area = 795,904 sf Runoff Volume = 207,313 cf Average Runoff Depth = 3.13"
42.91% Pervious = 341,512 sf 57.09% Impervious = 454,392 sf

Summary for Subcatchment 1S: Ex. Watershed 1

Runoff = 0.01 cfs @ 16.94 hrs, Volume= 309 cf, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
44,735	30	Woods, Good, HSG A
44,735		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0250	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
1.2	120	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.3	50	0.0400	3.00		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.0	220	Total			

Summary for Subcatchment 2S: Ex. Watershed 2

Runoff = 0.00 cfs @ 16.86 hrs, Volume= 148 cf, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
21,360	30	Woods, Good, HSG A
21,360		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.1000	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
1.7	133	0.0700	1.32		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.2	183	Total			

Summary for Subcatchment 3S: Ex. Watershed 3

Runoff = 0.02 cfs @ 12.18 hrs, Volume= 192 cf, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
4,860	39	>75% Grass cover, Good, HSG A
4,860		100.00% Pervious Area

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

Summary for Subcatchment 4A: Showcase Property

Runoff = 32.25 cfs @ 12.12 hrs, Volume= 95,484 cf, Depth= 4.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
27,341	32	Woods/grass comb., Good, HSG A
204,448	98	Paved roads w/curbs & sewers, HSG A
231,789	90	Weighted Average
27,341		11.80% Pervious Area
204,448		88.20% Impervious Area

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

Summary for Subcatchment 4S: To Showcase

Runoff = 24.44 cfs @ 12.28 hrs, Volume= 110,130 cf, Depth= 3.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
91,404	30	Woods, Good, HSG A
249,944	98	Paved roads w/curbs & sewers, HSG A
341,348	80	Weighted Average
91,404		26.78% Pervious Area
249,944		73.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	50	0.0300	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
3.4	257	0.0640	1.26		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.8	430	0.0100	9.05	44.44	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.012 Concrete pipe, finished
19.5	737	Total			

Summary for Subcatchment 5S: Ex. Watershed 5

Runoff = 0.01 cfs @ 16.99 hrs, Volume= 238 cf, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
34,445	30	Woods, Good, HSG A
34,445		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0200	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
5.0	149	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.0	199	Total			

Summary for Subcatchment 6S: Ex. Watershed 6

Runoff = 0.02 cfs @ 16.95 hrs, Volume= 811 cf, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
0	98	Paved roads w/curbs & sewers, HSG A
117,367	30	Woods, Good, HSG A
117,367	30	Weighted Average
117,367		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.4	50	0.0350	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
4.6	259	0.0350	0.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.0	309	Total			

Summary for Reach 1R: Wetland 1

Inflow Area =	44,735 sf,	0.00% Impervious, Inflow Depth = 0.08"	for 25-Year event
Inflow =	0.01 cfs @ 16.94 hrs, Volume=	309 cf	
Outflow =	0.01 cfs @ 16.94 hrs, Volume=	309 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Wetland D

Inflow Area =	21,360 sf, 0.00% Impervious, Inflow Depth = 0.08" for 25-Year event		
Inflow =	0.00 cfs @ 16.86 hrs, Volume=	148 cf	
Outflow =	0.00 cfs @ 16.86 hrs, Volume=	148 cf,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 3R: Wetland M

Inflow Area =	4,860 sf,	0.00% Impervious,	Inflow Depth = 0.47"	for 25-Year event
Inflow =	0.02 cfs @	12.18 hrs, Volume=	192 cf	
Outflow =	0.02 cfs @	12.18 hrs, Volume=	192 cf,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 4R: Wetland N

Inflow Area =	117,367 sf,	0.00% Impervious,	Inflow Depth = 0.08"	for 25-Year event
Inflow =	0.02 cfs @	16.95 hrs, Volume=	811 cf	
Outflow =	0.02 cfs @	16.95 hrs, Volume=	811 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 5R: Wetland C

Inflow Area =	34,445 sf,	0.00% Impervious,	Inflow Depth = 0.08"	for 25-Year event
Inflow =	0.01 cfs @	16.99 hrs, Volume=	238 cf	
Outflow =	0.01 cfs @	16.99 hrs, Volume=	238 cf,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 6R: Showcase Drainage System

Inflow Area = 573,137 sf, 79.28% Impervious, Inflow Depth = 4.31" for 25-Year event
Inflow = 46.97 cfs @ 12.13 hrs, Volume= 205,614 cf
Outflow = 46.97 cfs @ 12.13 hrs, Volume= 205,614 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

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

Subcatchment 1S: Ex. Watershed 1 Runoff Area=44,735 sf 0.00% Impervious Runoff Depth=0.56"
Flow Length=220' Tc=18.0 min CN=30 Runoff=0.13 cfs 2,075 cf

Subcatchment 2S: Ex. Watershed 2 Runoff Area=21,360 sf 0.00% Impervious Runoff Depth=0.56"
Flow Length=183' Tc=11.2 min CN=30 Runoff=0.07 cfs 991 cf

Subcatchment 3S: Ex. Watershed 3 Runoff Area=4,860 sf 0.00% Impervious Runoff Depth=1.40"
Tc=6.0 min CN=39 Runoff=0.16 cfs 567 cf

Subcatchment 4A: Showcase Property Runoff Area=231,789 sf 88.20% Impervious Runoff Depth=7.36"
Tc=5.0 min CN=90 Runoff=46.77 cfs 142,112 cf

Subcatchment 4S: To Showcase Runoff Area=341,348 sf 73.22% Impervious Runoff Depth=6.15"
Flow Length=737' Tc=19.5 min CN=80 Runoff=38.26 cfs 174,994 cf

Subcatchment 5S: Ex. Watershed 5 Runoff Area=34,445 sf 0.00% Impervious Runoff Depth=0.56"
Flow Length=199' Tc=23.0 min CN=30 Runoff=0.10 cfs 1,598 cf

Subcatchment 6S: Ex. Watershed 6 Runoff Area=117,367 sf 0.00% Impervious Runoff Depth=0.56"
Flow Length=309' Slope=0.0350 '/' Tc=19.0 min CN=30 Runoff=0.34 cfs 5,445 cf

Reach 1R: Wetland 1 Inflow=0.13 cfs 2,075 cf
Outflow=0.13 cfs 2,075 cf

Reach 2R: Wetland D Inflow=0.07 cfs 991 cf
Outflow=0.07 cfs 991 cf

Reach 3R: Wetland M Inflow=0.16 cfs 567 cf
Outflow=0.16 cfs 567 cf

Reach 4R: Wetland N Inflow=0.34 cfs 5,445 cf
Outflow=0.34 cfs 5,445 cf

Reach 5R: Wetland C Inflow=0.10 cfs 1,598 cf
Outflow=0.10 cfs 1,598 cf

Reach 6R: Showcase Drainage System Inflow=70.39 cfs 317,106 cf
Outflow=70.39 cfs 317,106 cf

Total Runoff Area = 795,904 sf Runoff Volume = 327,783 cf Average Runoff Depth = 4.94"
42.91% Pervious = 341,512 sf 57.09% Impervious = 454,392 sf

Summary for Subcatchment 1S: Ex. Watershed 1

Runoff = 0.13 cfs @ 12.62 hrs, Volume= 2,075 cf, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
44,735	30	Woods, Good, HSG A
44,735		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0250	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
1.2	120	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.3	50	0.0400	3.00		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.0	220	Total			

Summary for Subcatchment 2S: Ex. Watershed 2

Runoff = 0.07 cfs @ 12.40 hrs, Volume= 991 cf, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
21,360	30	Woods, Good, HSG A
21,360		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.1000	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
1.7	133	0.0700	1.32		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.2	183	Total			

Summary for Subcatchment 3S: Ex. Watershed 3

Runoff = 0.16 cfs @ 12.14 hrs, Volume= 567 cf, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
4,860	39	>75% Grass cover, Good, HSG A
4,860		100.00% Pervious Area

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

Summary for Subcatchment 4A: Showcase Property

Runoff = 46.77 cfs @ 12.12 hrs, Volume= 142,112 cf, Depth= 7.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
27,341	32	Woods/grass comb., Good, HSG A
204,448	98	Paved roads w/curbs & sewers, HSG A
231,789	90	Weighted Average
27,341		11.80% Pervious Area
204,448		88.20% Impervious Area

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

Summary for Subcatchment 4S: To Showcase

Runoff = 38.26 cfs @ 12.28 hrs, Volume= 174,994 cf, Depth= 6.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
91,404	30	Woods, Good, HSG A
249,944	98	Paved roads w/curbs & sewers, HSG A
341,348	80	Weighted Average
91,404		26.78% Pervious Area
249,944		73.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	50	0.0300	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
3.4	257	0.0640	1.26		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.8	430	0.0100	9.05	44.44	**Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.012 Concrete pipe, finished
19.5	737	Total			

Summary for Subcatchment 5S: Ex. Watershed 5

Runoff = 0.10 cfs @ 12.70 hrs, Volume= 1,598 cf, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
34,445	30	Woods, Good, HSG A
34,445		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	50	0.0200	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
5.0	149	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.0	199	Total			

Summary for Subcatchment 6S: Ex. Watershed 6

Runoff = 0.34 cfs @ 12.64 hrs, Volume= 5,445 cf, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
0	98	Paved roads w/curbs & sewers, HSG A
117,367	30	Woods, Good, HSG A
117,367	30	Weighted Average
117,367		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.4	50	0.0350	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 1.50"
4.6	259	0.0350	0.94		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.0	309	Total			

Summary for Reach 1R: Wetland 1

Inflow Area =	44,735 sf,	0.00% Impervious,	Inflow Depth = 0.56"	for 100-Year event
Inflow =	0.13 cfs @	12.62 hrs, Volume=	2,075 cf	
Outflow =	0.13 cfs @	12.62 hrs, Volume=	2,075 cf,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Wetland D

Inflow Area =	21,360 sf,	0.00% Impervious, Inflow Depth = 0.56"	for 100-Year event
Inflow =	0.07 cfs @	12.40 hrs, Volume=	991 cf
Outflow =	0.07 cfs @	12.40 hrs, Volume=	991 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 3R: Wetland M

Inflow Area =	4,860 sf,	0.00% Impervious,	Inflow Depth = 1.40"	for 100-Year event
Inflow =	0.16 cfs @	12.14 hrs, Volume=	567 cf	
Outflow =	0.16 cfs @	12.14 hrs, Volume=	567 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 4R: Wetland N

Inflow Area = 117,367 sf, 0.00% Impervious, Inflow Depth = 0.56" for 100-Year event
Inflow = 0.34 cfs @ 12.64 hrs, Volume= 5,445 cf
Outflow = 0.34 cfs @ 12.64 hrs, Volume= 5,445 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 5R: Wetland C

Inflow Area =	34,445 sf,	0.00% Impervious,	Inflow Depth = 0.56"	for 100-Year event
Inflow =	0.10 cfs @	12.70 hrs, Volume=	1,598 cf	
Outflow =	0.10 cfs @	12.70 hrs, Volume=	1,598 cf,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

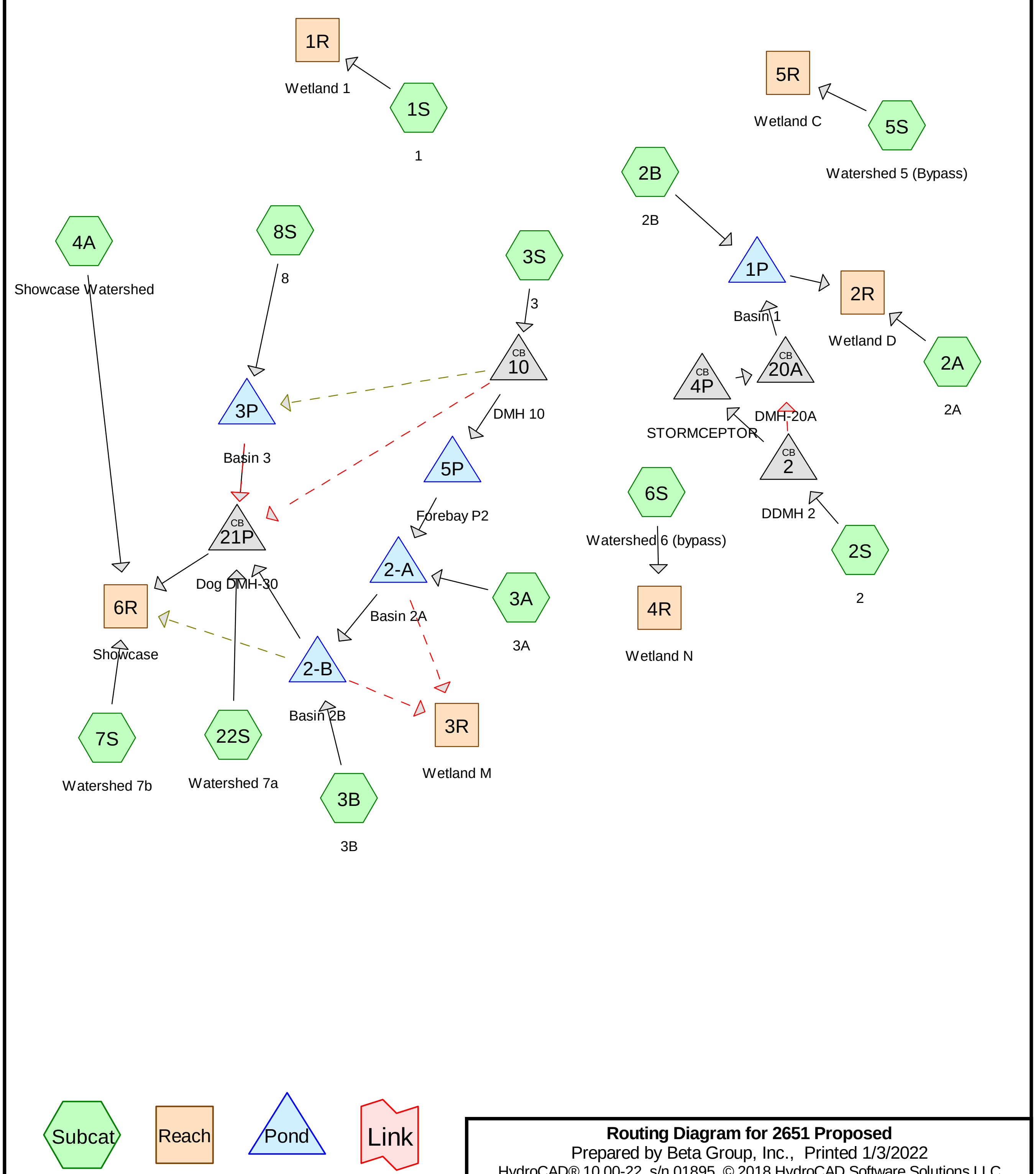
Summary for Reach 6R: Showcase Drainage System

Inflow Area = 573,137 sf, 79.28% Impervious, Inflow Depth = 6.64" for 100-Year event
Inflow = 70.39 cfs @ 12.13 hrs, Volume= 317,106 cf
Outflow = 70.39 cfs @ 12.13 hrs, Volume= 317,106 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Section B-2

HydroCAD Printouts – Proposed Conditions



Routing Diagram for 2651 Proposed
Prepared by Beta Group, Inc., Printed 1/3/2022
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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: 1 Runoff Area=6,437 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0 cf

Subcatchment 2A: 2A Runoff Area=15,914 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=75' Slope=0.0100 '/' Tc=11.4 min CN=41 Runoff=0.00 cfs 0 cf

Subcatchment 2B: 2B Runoff Area=49,490 sf 30.94% Impervious Runoff Depth=0.00"
Flow Length=163' Tc=9.0 min CN=57 Runoff=0.00 cfs 0 cf

Subcatchment 2S: 2 Runoff Area=142,548 sf 75.11% Impervious Runoff Depth=0.31"
Flow Length=325' Tc=16.6 min CN=86 Runoff=0.83 cfs 3,630 cf

Subcatchment 3A: 3A Runoff Area=9,995 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0 cf

Subcatchment 3B: 3B Runoff Area=10,701 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0 cf

Subcatchment 3S: 3 Runoff Area=189,389 sf 83.50% Impervious Runoff Depth=0.38"
Flow Length=200' Tc=13.3 min CN=88 Runoff=1.57 cfs 5,924 cf

Subcatchment 4A: Showcase Watershed Runoff Area=217,523 sf 63.08% Impervious Runoff Depth=0.09"
Tc=5.0 min CN=76 Runoff=0.16 cfs 1,572 cf

Subcatchment 5S: Watershed 5 (Bypass) Runoff Area=16,943 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=388' Tc=14.4 min CN=39 Runoff=0.00 cfs 0 cf

Subcatchment 6S: Watershed 6 (bypass) Runoff Area=23,402 sf 4.38% Impervious Runoff Depth=0.00"
Flow Length=125' Slope=0.0200 '/' Tc=9.5 min CN=42 Runoff=0.00 cfs 0 cf

Subcatchment 7S: Watershed 7b Runoff Area=12,533 sf 98.60% Impervious Runoff Depth=0.89"
Tc=5.0 min CN=97 Runoff=0.34 cfs 935 cf

Subcatchment 8S: 8 Runoff Area=99,444 sf 45.06% Impervious Runoff Depth=0.01"
Flow Length=457' Tc=20.2 min CN=66 Runoff=0.00 cfs 45 cf

Subcatchment 22S: Watershed 7a Runoff Area=3,975 sf 100.00% Impervious Runoff Depth=0.99"
Tc=5.0 min CN=98 Runoff=0.11 cfs 326 cf

Reach 1R: Wetland 1 Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach 2R: Wetland D Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach 3R: Wetland M Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach 4R: Wetland N Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach 5R: Wetland C Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach 6R: Showcase Inflow=0.57 cfs 2,833 cf
Outflow=0.57 cfs 2,833 cf

Pond 1P: Basin 1 Peak Elev=43.73' Storage=0 cf Inflow=0.83 cfs 3,630 cf
Discarded=0.83 cfs 3,630 cf Primary=0.00 cfs 0 cf Outflow=0.83 cfs 3,630 cf

Pond 2: DDMH 2 Peak Elev=46.46' Inflow=0.83 cfs 3,630 cf
Primary=0.83 cfs 3,630 cf Secondary=0.00 cfs 0 cf Outflow=0.83 cfs 3,630 cf

Pond 2-A: Basin 2A Peak Elev=40.50' Storage=0 cf Inflow=0.00 cfs 0 cf
Discarded=0.00 cfs 0 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=0.00 cfs 0 cf

Pond 2-B: Basin 2B Peak Elev=36.75' Storage=0 cf Inflow=0.00 cfs 0 cf
Discarded=0.00 cfs 0 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Tertiary=0.00 cfs 0 cf Outflow=0.00 cfs 0 cf

Pond 3P: Basin 3 Peak Elev=39.50' Storage=0 cf Inflow=0.00 cfs 45 cf
Discarded=0.00 cfs 45 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=0.00 cfs 45 cf

Pond 4P: STORMCEPTOR Peak Elev=46.40' Inflow=0.83 cfs 3,630 cf
12.0" Round Culvert n=0.012 L=3.0' S=0.0167 '/' Outflow=0.83 cfs 3,630 cf

Pond 5P: Forebay P2 Peak Elev=43.43' Storage=2,773 cf Inflow=1.57 cfs 5,914 cf
Discarded=0.15 cfs 5,914 cf Primary=0.00 cfs 0 cf Outflow=0.15 cfs 5,914 cf

Pond 10: DMH 10 Peak Elev=43.43' Inflow=1.57 cfs 5,924 cf
Primary=1.57 cfs 5,914 cf Secondary=0.00 cfs 0 cf Tertiary=0.00 cfs 0 cf Outflow=1.57 cfs 5,914 cf

Pond 20A: DMH-20A Peak Elev=46.16' Inflow=0.83 cfs 3,630 cf
18.0" Round Culvert x 2.00 n=0.012 L=20.0' S=0.0075 '/' Outflow=0.83 cfs 3,630 cf

Pond 21P: Dog DMH-30 Peak Elev=34.61' Inflow=0.11 cfs 326 cf
30.0" Round Culvert n=0.012 L=96.8' S=0.0036 '/' Outflow=0.11 cfs 327 cf

Total Runoff Area = 798,294 sf Runoff Volume = 12,431 cf Average Runoff Depth = 0.19"
39.89% Pervious = 318,405 sf 60.11% Impervious = 479,889 sf

Summary for Subcatchment 1S: 1

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 1.2 inch Rainfall=1.20"

Area (sf)	CN	Description
6,437	39	>75% Grass cover, Good, HSG A
6,437		100.00% Pervious Area

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

Summary for Subcatchment 2A: 2A

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 1.2 inch Rainfall=1.20"

	Area (sf)	CN	Description
*	1,487	65	Playground
	14,427	39	>75% Grass cover, Good, HSG A
	15,914	41	Weighted Average
	15,914		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
0.6	25	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.4	75	Total			

Summary for Subcatchment 2B: 2B

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 1.2 inch Rainfall=1.20"

Area (sf)	CN	Description
15,311	98	Paved roads w/curbs & sewers, HSG A
34,179	39	>75% Grass cover, Good, HSG A
49,490	57	Weighted Average
34,179		69.06% Pervious Area
15,311		30.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,**
					Grass: Short n= 0.150 P2= 1.50"
2.8	113	0.0090	0.66		**Shallow Concentrated Flow,**
					Short Grass Pasture Kv= 7.0 fps
9.0	163	Total			

Summary for Subcatchment 2S: 2

Runoff = 0.83 cfs @ 12.27 hrs, Volume= 3,630 cf, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 1.2 inch Rainfall=1.20"

	Area (sf)	CN	Description
	107,069	98	Paved roads w/curbs & sewers, HSG A
*	12,550	65	Playground
	22,929	39	>75% Grass cover, Good, HSG A
	142,548	86	Weighted Average
	35,479		24.89% Pervious Area
	107,069		75.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
5.7	250	0.0110	0.73		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.3300	4.02		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.6	325	Total			

Summary for Subcatchment 3A: 3A

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 1.2 inch Rainfall=1.20"

Area (sf)	CN	Description
9,995	39	>75% Grass cover, Good, HSG A
9,995		100.00% Pervious Area

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

Summary for Subcatchment 3B: 3B

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 1.2 inch Rainfall=1.20"

Area (sf)	CN	Description
10,701	39	>75% Grass cover, Good, HSG A
10,701		100.00% Pervious Area

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

Summary for Subcatchment 3S: 3

Runoff = 1.57 cfs @ 12.22 hrs, Volume= 5,924 cf, Depth= 0.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 1.2 inch Rainfall=1.20"

Area (sf)	CN	Description
158,140	98	Paved roads w/curbs & sewers, HSG A
31,249	39	>75% Grass cover, Good, HSG A
189,389	88	Weighted Average
31,249		16.50% Pervious Area
158,140		83.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	50	0.0120	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
3.2	150	0.0125	0.78		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
13.3	200	Total			

Summary for Subcatchment 4A: Showcase Watershed

Runoff = 0.16 cfs @ 12.24 hrs, Volume= 1,572 cf, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 1.2 inch Rainfall=1.20"

Area (sf)	CN	Description
80,318	39	>75% Grass cover, Good, HSG A
137,205	98	Paved roads w/curbs & sewers, HSG A
217,523	76	Weighted Average
80,318		36.92% Pervious Area
137,205		63.08% Impervious Area

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

Summary for Subcatchment 5S: Watershed 5 (Bypass)

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 1.2 inch Rainfall=1.20"

Area (sf)	CN	Description
0	98	Paved roads w/curbs & sewers, HSG A
16,943	39	>75% Grass cover, Good, HSG A
16,943	39	Weighted Average
16,943		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.3	80	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.3	258	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.4	388	Total			

Summary for Subcatchment 6S: Watershed 6 (bypass)

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 1.2 inch Rainfall=1.20"

Area (sf)	CN	Description
22,376	39	>75% Grass cover, Good, HSG A
1,026	98	Paved roads w/curbs & sewers, HSG A
23,402	42	Weighted Average
22,376		95.62% Pervious Area
1,026		4.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.3	75	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.5	125	Total			

Summary for Subcatchment 7S: Watershed 7b

Runoff = 0.34 cfs @ 12.12 hrs, Volume= 935 cf, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 1.2 inch Rainfall=1.20"

Area (sf)	CN	Description
12,358	98	Unconnected pavement, HSG A
175	39	>75% Grass cover, Good, HSG A
12,533	97	Weighted Average
175		1.40% Pervious Area
12,358		98.60% Impervious Area
12,358		100.00% Unconnected

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

Summary for Subcatchment 8S: 8

Runoff = 0.00 cfs @ 24.08 hrs, Volume= 45 cf, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 1.2 inch Rainfall=1.20"

Area (sf)	CN	Description
44,805	98	Paved roads w/curbs & sewers, HSG A
54,639	39	>75% Grass cover, Good, HSG A
99,444	66	Weighted Average
54,639		54.94% Pervious Area
44,805		45.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	50	0.0050	0.06		**Sheet Flow,**
					Grass: Short n= 0.150 P2= 1.50"
4.8	182	0.0080	0.63		**Shallow Concentrated Flow,**
					Short Grass Pasture Kv= 7.0 fps
1.1	225	0.0050	3.47	2.73	**Pipe Channel, 12" HDPE**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.012 Corrugated PP, smooth interior
20.2	457	Total			

Summary for Subcatchment 22S: Watershed 7a

Runoff = 0.11 cfs @ 12.12 hrs, Volume= 326 cf, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 1.2 inch Rainfall=1.20"

Area (sf)	CN	Description
3,975	98	Unconnected pavement, HSG A
3,975		100.00% Impervious Area
3,975		100.00% Unconnected

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

Summary for Reach 1R: Wetland 1

Inflow Area =	6,437 sf,	0.00% Impervious,	Inflow Depth = 0.00"	for 1.2 inch event
Inflow =	0.00 cfs @	0.00 hrs, Volume=	0 cf	
Outflow =	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Wetland D

Inflow Area =	207,952 sf,	58.85% Impervious,	Inflow Depth = 0.00"	for 1.2 inch event
Inflow =	0.00 cfs @	0.00 hrs, Volume=	0 cf	
Outflow =	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 3R: Wetland M

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 4R: Wetland N

Inflow Area =	23,402 sf,	4.38% Impervious,	Inflow Depth = 0.00"	for 1.2 inch event
Inflow =	0.00 cfs @	0.00 hrs, Volume=	0 cf	
Outflow =	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 5R: Wetland C

Inflow Area =	16,943 sf,	0.00% Impervious,	Inflow Depth = 0.00"		for 1.2 inch event
Inflow =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	
Outflow =	0.00 cfs @	0.00 hrs,	Volume=	0 cf,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 6R: Showcase

Inflow Area = 543,560 sf, 65.58% Impervious, Inflow Depth = 0.06" for 1.2 inch event
Inflow = 0.57 cfs @ 12.14 hrs, Volume= 2,833 cf
Outflow = 0.57 cfs @ 12.14 hrs, Volume= 2,833 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Basin 1

Inflow Area = 192,038 sf, 63.73% Impervious, Inflow Depth = 0.23" for 1.2 inch event
Inflow = 0.83 cfs @ 12.27 hrs, Volume= 3,630 cf
Outflow = 0.83 cfs @ 12.27 hrs, Volume= 3,630 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.83 cfs @ 12.27 hrs, Volume= 3,630 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 43.73' @ 12.27 hrs Surf.Area= 4,459 sf Storage= 0 cf
Flood Elev= 49.00' Surf.Area= 15,007 sf Storage= 24,955 cf

Plug-Flow detention time= 0.0 min calculated for 3,630 cf (100% of inflow)
Center-of-Mass det. time= 0.0 min (890.5 - 890.5)

Volume	Invert	Avail.Storage	Storage Description
#1	43.50'	0 cf	**ASTM C-33 Sand (Prismatic)** Listed below (Recalc) 6,689 cf Overall x 0.0% Voids
#2	45.50'	24,955 cf	**Basin (Prismatic)** Listed below (Recalc)
		24,955 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
43.50	4,459	0	0
44.50	4,459	4,459	4,459
45.00	4,459	2,230	6,689

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
45.50	4,459	0	0
46.00	5,124	2,396	2,396
47.00	6,495	5,810	8,205
48.00	8,228	7,362	15,567
49.00	10,548	9,388	24,955

Device	Routing	Invert	Outlet Devices
#1	Discarded	43.50'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 43.40'
#2	Device 1	43.50'	**8.270 in/hr Sand Exfiltration over Surface area** Conductivity to Groundwater Elevation = 43.40'
#3	Primary	48.00'	**13.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.83 cfs @ 12.27 hrs HW=43.73' (Free Discharge)
└**1=Exfiltration** (Controls 0.83 cfs)
  └**2=Sand Exfiltration** (Passes 0.83 cfs of 2.85 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=43.50' TW=0.00' (Dynamic Tailwater)
└**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2: DDMH 2

Inflow Area = 142,548 sf, 75.11% Impervious, Inflow Depth = 0.31" for 1.2 inch event
Inflow = 0.83 cfs @ 12.27 hrs, Volume= 3,630 cf
Outflow = 0.83 cfs @ 12.27 hrs, Volume= 3,630 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.83 cfs @ 12.27 hrs, Volume= 3,630 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 46.46' @ 12.28 hrs
Flood Elev= 49.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.72'	**12.0" Round 12" RCP** L= 3.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 45.72' / 45.70' S= 0.0067 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 3	46.50'	**3.0' long x 3.00' rise Sharp-Crested Rectangular Weir** 0 End Contraction(s)
#3	Secondary	46.00'	**18.0" Round 18" RCP X 2.00** L= 3.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 46.00' / 45.90' S= 0.0333 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf

Primary OutFlow Max=0.82 cfs @ 12.27 hrs HW=46.46' TW=46.40' (Dynamic Tailwater)
↑—**1=12" RCP** (Outlet Controls 0.82 cfs @ 1.83 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=45.72' TW=45.85' (Dynamic Tailwater)
↑—**3=18" RCP** (Controls 0.00 cfs)
  ↑—**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2-A: Basin 2A

Inflow Area = 199,384 sf, 79.31% Impervious, Inflow Depth = 0.00" for 1.2 inch event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 40.50' @ 0.00 hrs Surf.Area= 2,340 sf Storage= 0 cf
Flood Elev= 44.25' Surf.Area= 6,137 sf Storage= 5,356 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	40.50'	0 cf	**ASTM C-33 Sand (Prismatic)** Listed below (Recalc) 3,510 cf Overall x 0.0% Voids
#2	42.50'	5,356 cf	**Basin (Prismatic)** Listed below (Recalc)
		5,356 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.50	2,340	0	0
41.00	2,340	1,170	1,170
42.00	2,340	2,340	3,510

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
42.50	2,340	0	0
43.00	2,749	1,272	1,272
44.00	3,575	3,162	4,434
44.25	3,797	922	5,356

Device	Routing	Invert	Outlet Devices
#1	Primary	43.25'	**9.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	40.50'	**2.410 in/hr In-Situ Exfiltration over Surface area** Conductivity to Groundwater Elevation = 40.10'
#3	Device 2	40.50'	**8.270 in/hr Sand Exfiltration over Surface area** Conductivity to Groundwater Elevation = 40.10'
#4	Secondary	44.20'	**118.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 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

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=40.50' (Free Discharge)
└─**2=In-Situ Exfiltration** (Passes 0.00 cfs of 0.13 cfs potential flow)
  └─**3=Sand Exfiltration** (Passes 0.00 cfs of 0.45 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=40.50' TW=36.75' (Dynamic Tailwater)
└─**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=40.50' TW=0.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2-B: Basin 2B

Inflow Area =	210,085 sf, 75.27% Impervious,	Inflow Depth = 0.00" for 1.2 inch event	
Inflow =	0.00 cfs @ 0.00 hrs,	Volume=	0 cf
Outflow =	0.00 cfs @ 0.00 hrs,	Volume=	0 cf, Atten= 0%, Lag= 0.0 min
Discarded =	0.00 cfs @ 0.00 hrs,	Volume=	0 cf
Primary =	0.00 cfs @ 0.00 hrs,	Volume=	0 cf
Secondary =	0.00 cfs @ 0.00 hrs,	Volume=	0 cf
Tertiary =	0.00 cfs @ 0.00 hrs,	Volume=	0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 36.75' @ 0.00 hrs Surf.Area= 799 sf Storage= 0 cf
Flood Elev= 42.00' Surf.Area= 10,364 sf Storage= 10,316 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	36.75'	0 cf	**ASTM C-33 sand (Prismatic)** Listed below (Recalc) 4,726 cf Overall x 0.0% Voids
#2	39.00'	11,808 cf	**Basin (Prismatic)** Listed below (Recalc)
		11,808 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.75	799	0	0
37.50	2,459	1,222	1,222
38.50	4,550	3,505	4,726

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.00	799	0	0
40.00	2,459	1,629	1,629
41.00	4,550	3,505	5,134
42.00	5,814	5,182	10,316
42.25	6,125	1,492	11,808

Device	Routing	Invert	Outlet Devices
#1	Primary	36.60'	**12.0" Round 15" RCP** L= 9.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 36.60' / 36.20' S= 0.0444 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	36.75'	**2.410 in/hr In-Situ Exfiltration over Surface area** Conductivity to Groundwater Elevation = 36.70'
#3	Device 2	36.75'	**8.270 in/hr Sand Exfiltration over Surface area** Conductivity to Groundwater Elevation = 36.70'
#4	Device 1	40.00'	**12.0" Vert. Vertical Orifice** C= 0.600
#5	Device 1	41.00'	**32.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#6	Secondary	41.25'	**6.0' long Conc. Curb Overflow** 2 End Contraction(s)
#7	Tertiary	42.10'	**193.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

			2.50 3.00 3.50 4.00 4.50 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
#8	Tertiary	42.10'	**193.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 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

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=36.75' (Free Discharge)
└─**2=In-Situ Exfiltration** (Passes 0.00 cfs of 0.04 cfs potential flow)
  └─**3=Sand Exfiltration** (Passes 0.00 cfs of 0.15 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=36.75' TW=34.45' (Dynamic Tailwater)
└─**1=15" RCP** (Passes 0.00 cfs of 0.10 cfs potential flow)
  ├─**4=Vertical Orifice** (Controls 0.00 cfs)
  └─**5=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=36.75' TW=0.00' (Dynamic Tailwater)
└─**6=Conc. Curb Overflow** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=36.75' TW=0.00' (Dynamic Tailwater)
├─**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**8=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 3P: Basin 3

Inflow Area = 99,444 sf, 45.06% Impervious, Inflow Depth = 0.01" for 1.2 inch event
Inflow = 0.00 cfs @ 24.08 hrs, Volume= 45 cf
Outflow = 0.00 cfs @ 24.08 hrs, Volume= 45 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 24.08 hrs, Volume= 45 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 39.50' @ 0.00 hrs Surf.Area= 2,957 sf Storage= 0 cf
Flood Elev= 44.00' Surf.Area= 7,917 sf Storage= 9,832 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (1,238.2 - 1,238.2)

Volume	Invert	Avail.Storage	Storage Description
#1	39.50'	0 cf	**ASTM C-33 Sand (Prismatic)** Listed below (Recalc) 4,436 cf Overall x 0.0% Voids
#2	41.50'	9,832 cf	**Basin (Prismatic)** Listed below (Recalc)
		9,832 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.50	2,957	0	0
40.50	2,957	2,957	2,957
41.00	2,957	1,479	4,436

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	2,957	0	0
42.00	3,329	1,572	1,572
43.00	4,116	3,723	5,294
44.00	4,960	4,538	9,832

Device	Routing	Invert	Outlet Devices
#1	Primary	38.00'	**12.0" Round 12" RCP** L= 109.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 38.00' / 36.50' S= 0.0138 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	39.50'	**1.020 in/hr In Situ Exfiltration over Surface area** Conductivity to Groundwater Elevation = 39.10'
#3	Device 2	39.50'	**8.270 in/hr Sand Layer Exfiltration over Surface area** Conductivity to Groundwater Elevation = 39.10'
#4	Device 1	43.00'	**32.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	43.50'	**6.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.00 cfs @ 24.08 hrs HW=39.50' (Free Discharge)
↑—**2=In Situ Exfiltration** (Passes 0.00 cfs of 0.07 cfs potential flow)
↑—**3=Sand Layer Exfiltration** (Passes 0.00 cfs of 0.57 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=39.50' TW=34.45' (Dynamic Tailwater)
↑—**1=12" RCP** (Passes 0.00 cfs of 3.78 cfs potential flow)
↑—**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=39.50' TW=34.45' (Dynamic Tailwater)
↑—**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 4P: STORMCEPTOR

Inflow Area = 142,548 sf, 75.11% Impervious, Inflow Depth = 0.31" for 1.2 inch event
Inflow = 0.83 cfs @ 12.27 hrs, Volume= 3,630 cf
Outflow = 0.83 cfs @ 12.27 hrs, Volume= 3,630 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.83 cfs @ 12.27 hrs, Volume= 3,630 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 46.40' @ 12.27 hrs
Flood Elev= 49.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.85'	**12.0" Round 12" RCP** L= 3.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 45.85' / 45.80' S= 0.0167 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.83 cfs @ 12.27 hrs HW=46.40' TW=46.16' (Dynamic Tailwater)
↑—**1=12" RCP** (Barrel Controls 0.83 cfs @ 2.74 fps)

Summary for Pond 5P: Forebay P2

Inflow Area =	189,389 sf, 83.50% Impervious,	Inflow Depth = 0.37" for 1.2 inch event	
Inflow =	1.57 cfs @ 12.22 hrs,	Volume=	5,914 cf
Outflow =	0.15 cfs @ 13.80 hrs,	Volume=	5,914 cf, Atten= 91%, Lag= 94.5 min
Discarded =	0.15 cfs @ 13.80 hrs,	Volume=	5,914 cf
Primary =	0.00 cfs @ 0.00 hrs,	Volume=	0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 43.43' @ 13.80 hrs Surf.Area= 2,002 sf Storage= 2,773 cf
Flood Elev= 45.00' Surf.Area= 3,023 sf Storage= 6,708 cf

Plug-Flow detention time= 264.6 min calculated for 5,912 cf (100% of inflow)
Center-of-Mass det. time= 264.6 min (1,139.0 - 874.4)

Volume	Invert	Avail.Storage	Storage Description
#1	41.50'	6,708 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	912	0	0
42.00	1,170	521	521
43.00	1,727	1,449	1,969
44.00	2,364	2,046	4,015
45.00	3,023	2,694	6,708

Device	Routing	Invert	Outlet Devices
#1	Primary	43.75'	**9.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	41.50'	**0.520 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 41.30'

Discarded OutFlow Max=0.15 cfs @ 13.80 hrs HW=43.43' (Free Discharge)
└─**2=Exfiltration** (Controls 0.15 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=41.50' TW=40.50' (Dynamic Tailwater)
└─**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 10: DMH 10

Inflow Area = 189,389 sf, 83.50% Impervious, Inflow Depth = 0.38" for 1.2 inch event
Inflow = 1.57 cfs @ 12.22 hrs, Volume= 5,924 cf
Outflow = 1.57 cfs @ 12.22 hrs, Volume= 5,914 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.57 cfs @ 12.22 hrs, Volume= 5,914 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 43.43' @ 13.81 hrs
Flood Elev= 44.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	41.60'	**20.0" Round Double 20" DI X 2.00** L= 18.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 41.60' / 41.50' S= 0.0056 '/' Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 2.18 sf
#2	Tertiary	44.80'	**32.0" Horiz. Orifice/Grate Overflow** C= 0.600 Limited to weir flow at low heads
#3	Device 4	43.80'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Secondary	40.65'	**18.0" Round 18" RCP** L= 202.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 40.65' / 38.45' S= 0.0109 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 1.77 sf

Primary OutFlow Max=0.00 cfs @ 12.22 hrs HW=42.39' TW=42.40' (Dynamic Tailwater)
↑—**1=Double 20" DI** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=40.65' TW=34.45' (Dynamic Tailwater)
↑—**4=18" RCP** (Controls 0.00 cfs)
  ↑—**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=40.65' TW=39.50' (Dynamic Tailwater)
↑—**2=Orifice/Grate Overflow** (Controls 0.00 cfs)

Summary for Pond 20A: DMH-20A

Inflow Area = 142,548 sf, 75.11% Impervious, Inflow Depth = 0.31" for 1.2 inch event
Inflow = 0.83 cfs @ 12.27 hrs, Volume= 3,630 cf
Outflow = 0.83 cfs @ 12.27 hrs, Volume= 3,630 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.83 cfs @ 12.27 hrs, Volume= 3,630 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 46.16' @ 12.27 hrs
Flood Elev= 49.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.85'	**18.0" Round 18" RCP X 2.00** L= 20.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 45.85' / 45.70' S= 0.0075 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf

Primary OutFlow Max=0.83 cfs @ 12.27 hrs HW=46.16' TW=43.73' (Dynamic Tailwater)
↑—**1=18" RCP** (Barrel Controls 0.83 cfs @ 2.37 fps)

Summary for Pond 21P: Dog DMH-30

Inflow Area = 313,504 sf, 66.00% Impervious, Inflow Depth = 0.01" for 1.2 inch event
Inflow = 0.11 cfs @ 12.12 hrs, Volume= 326 cf
Outflow = 0.11 cfs @ 12.12 hrs, Volume= 327 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.11 cfs @ 12.12 hrs, Volume= 327 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 34.61' @ 12.12 hrs
Flood Elev= 41.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	34.45'	**30.0" Round Ex. 30" RCP** L= 96.8' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 34.45' / 34.10' S= 0.0036 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf

Primary OutFlow Max=0.11 cfs @ 12.12 hrs HW=34.61' TW=0.00' (Dynamic Tailwater)
↑—**1=Ex. 30" RCP** (Barrel Controls 0.11 cfs @ 1.34 fps)

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

Subcatchment 1S: 1 Runoff Area=6,437 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39 Runoff=0.00 cfs 1 cf

Subcatchment 2A: 2A Runoff Area=15,914 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=75' Slope=0.0100 '/' Tc=11.4 min CN=41 Runoff=0.00 cfs 16 cf

Subcatchment 2B: 2B Runoff Area=49,490 sf 30.94% Impervious Runoff Depth=0.34"
Flow Length=163' Tc=9.0 min CN=57 Runoff=0.23 cfs 1,417 cf

Subcatchment 2S: 2 Runoff Area=142,548 sf 75.11% Impervious Runoff Depth=1.92"
Flow Length=325' Tc=16.6 min CN=86 Runoff=5.80 cfs 22,835 cf

Subcatchment 3A: 3A Runoff Area=9,995 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39 Runoff=0.00 cfs 2 cf

Subcatchment 3B: 3B Runoff Area=10,701 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39 Runoff=0.00 cfs 2 cf

Subcatchment 3S: 3 Runoff Area=189,389 sf 83.50% Impervious Runoff Depth=2.09"
Flow Length=200' Tc=13.3 min CN=88 Runoff=9.10 cfs 32,940 cf

Subcatchment 4A: Showcase Watershed Runoff Area=217,523 sf 63.08% Impervious Runoff Depth=1.22"
Tc=5.0 min CN=76 Runoff=8.39 cfs 22,153 cf

Subcatchment 5S: Watershed 5 (Bypass) Runoff Area=16,943 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=388' Tc=14.4 min CN=39 Runoff=0.00 cfs 3 cf

Subcatchment 6S: Watershed 6 (bypass) Runoff Area=23,402 sf 4.38% Impervious Runoff Depth=0.02"
Flow Length=125' Slope=0.0200 '/' Tc=9.5 min CN=42 Runoff=0.00 cfs 39 cf

Subcatchment 7S: Watershed 7b Runoff Area=12,533 sf 98.60% Impervious Runoff Depth=2.96"
Tc=5.0 min CN=97 Runoff=1.03 cfs 3,087 cf

Subcatchment 8S: 8 Runoff Area=99,444 sf 45.06% Impervious Runoff Depth=0.69"
Flow Length=457' Tc=20.2 min CN=66 Runoff=1.12 cfs 5,753 cf

Subcatchment 22S: Watershed 7a Runoff Area=3,975 sf 100.00% Impervious Runoff Depth=3.07"
Tc=5.0 min CN=98 Runoff=0.33 cfs 1,016 cf

Reach 1R: Wetland 1 Inflow=0.00 cfs 1 cf
Outflow=0.00 cfs 1 cf

Reach 2R: Wetland D Inflow=0.00 cfs 16 cf
Outflow=0.00 cfs 16 cf

Reach 3R: Wetland M Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach 4R: Wetland N Inflow=0.00 cfs 39 cf
Outflow=0.00 cfs 39 cf

Reach 5R: Wetland C Inflow=0.00 cfs 3 cf
Outflow=0.00 cfs 3 cf

Reach 6R: Showcase Inflow=11.48 cfs 30,505 cf
Outflow=11.48 cfs 30,505 cf

Pond 1P: Basin 1 Peak Elev=45.53' Storage=142 cf Inflow=6.01 cfs 24,253 cf
Discarded=5.55 cfs 24,253 cf Primary=0.00 cfs 0 cf Outflow=5.55 cfs 24,253 cf

Pond 2: DDMH 2 Peak Elev=47.10' Inflow=5.80 cfs 22,835 cf
Primary=1.74 cfs 17,090 cf Secondary=4.11 cfs 5,746 cf Outflow=5.80 cfs 22,835 cf

Pond 2-A: Basin 2A Peak Elev=43.52' Storage=2,825 cf Inflow=6.14 cfs 16,716 cf
Discarded=1.36 cfs 12,203 cf Primary=4.18 cfs 4,519 cf Secondary=0.00 cfs 0 cf Outflow=5.54 cfs 16,722 cf

Pond 2-B: Basin 2B Peak Elev=39.30' Storage=320 cf Inflow=4.18 cfs 4,520 cf
Discarded=3.40 cfs 4,522 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Tertiary=0.00 cfs 0 cf Outflow=3.40 cfs 4,522 cf

Pond 3P: Basin 3 Peak Elev=41.73' Storage=692 cf Inflow=1.12 cfs 5,753 cf
Discarded=0.54 cfs 5,754 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=0.54 cfs 5,754 cf

Pond 4P: STORMCEPTOR Peak Elev=46.97' Inflow=1.74 cfs 17,090 cf
12.0" Round Culvert n=0.012 L=3.0' S=0.0167 '/' Outflow=1.74 cfs 17,090 cf

Pond 5P: Forebay P2 Peak Elev=44.10' Storage=4,263 cf Inflow=6.47 cfs 28,691 cf
Discarded=0.20 cfs 11,871 cf Primary=6.14 cfs 16,714 cf Outflow=6.34 cfs 28,585 cf

Pond 10: DMH 10 Peak Elev=44.15' Inflow=9.10 cfs 32,940 cf
Primary=6.47 cfs 28,691 cf Secondary=2.68 cfs 4,249 cf Tertiary=0.00 cfs 0 cf Outflow=9.10 cfs 32,940 cf

Pond 20A: DMH-20A Peak Elev=46.77' Inflow=5.80 cfs 22,835 cf
18.0" Round Culvert x 2.00 n=0.012 L=20.0' S=0.0075 '/' Outflow=5.80 cfs 22,835 cf

Pond 21P: Dog DMH-30 Peak Elev=35.22' Inflow=2.82 cfs 5,265 cf
30.0" Round Culvert n=0.012 L=96.8' S=0.0036 '/' Outflow=2.82 cfs 5,265 cf

Total Runoff Area = 798,294 sf Runoff Volume = 89,264 cf Average Runoff Depth = 1.34"
39.89% Pervious = 318,405 sf 60.11% Impervious = 479,889 sf

Summary for Subcatchment 1S: 1

Runoff = 0.00 cfs @ 24.01 hrs, Volume= 1 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
6,437	39	>75% Grass cover, Good, HSG A
6,437		100.00% Pervious Area

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

Summary for Subcatchment 2A: 2A

Runoff = 0.00 cfs @ 24.05 hrs, Volume= 16 cf, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

	Area (sf)	CN	Description
*	1,487	65	Playground
	14,427	39	>75% Grass cover, Good, HSG A
	15,914	41	Weighted Average
	15,914		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
0.6	25	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.4	75	Total			

Summary for Subcatchment 2B: 2B

Runoff = 0.23 cfs @ 12.21 hrs, Volume= 1,417 cf, Depth= 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
15,311	98	Paved roads w/curbs & sewers, HSG A
34,179	39	>75% Grass cover, Good, HSG A
49,490	57	Weighted Average
34,179		69.06% Pervious Area
15,311		30.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
2.8	113	0.0090	0.66		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.0	163	Total			

Summary for Subcatchment 2S: 2

Runoff = 5.80 cfs @ 12.25 hrs, Volume= 22,835 cf, Depth= 1.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

	Area (sf)	CN	Description
	107,069	98	Paved roads w/curbs & sewers, HSG A
*	12,550	65	Playground
	22,929	39	>75% Grass cover, Good, HSG A
	142,548	86	Weighted Average
	35,479		24.89% Pervious Area
	107,069		75.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
5.7	250	0.0110	0.73		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.3300	4.02		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.6	325	Total			

Summary for Subcatchment 3A: 3A

Runoff = 0.00 cfs @ 24.01 hrs, Volume= 2 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
9,995	39	>75% Grass cover, Good, HSG A
9,995		100.00% Pervious Area

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

Summary for Subcatchment 3B: 3B

Runoff = 0.00 cfs @ 24.01 hrs, Volume= 2 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
10,701	39	>75% Grass cover, Good, HSG A
10,701		100.00% Pervious Area

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

Summary for Subcatchment 3S: 3

Runoff = 9.10 cfs @ 12.21 hrs, Volume= 32,940 cf, Depth= 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
158,140	98	Paved roads w/curbs & sewers, HSG A
31,249	39	>75% Grass cover, Good, HSG A
189,389	88	Weighted Average
31,249		16.50% Pervious Area
158,140		83.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	50	0.0120	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
3.2	150	0.0125	0.78		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
13.3	200	Total			

Summary for Subcatchment 4A: Showcase Watershed

Runoff = 8.39 cfs @ 12.13 hrs, Volume= 22,153 cf, Depth= 1.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
80,318	39	>75% Grass cover, Good, HSG A
137,205	98	Paved roads w/curbs & sewers, HSG A
217,523	76	Weighted Average
80,318		36.92% Pervious Area
137,205		63.08% Impervious Area

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

Summary for Subcatchment 5S: Watershed 5 (Bypass)

Runoff = 0.00 cfs @ 24.07 hrs, Volume= 3 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
0	98	Paved roads w/curbs & sewers, HSG A
16,943	39	>75% Grass cover, Good, HSG A
16,943	39	Weighted Average
16,943		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.3	80	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.3	258	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.4	388	Total			

Summary for Subcatchment 6S: Watershed 6 (bypass)

Runoff = 0.00 cfs @ 24.04 hrs, Volume= 39 cf, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
22,376	39	>75% Grass cover, Good, HSG A
1,026	98	Paved roads w/curbs & sewers, HSG A
23,402	42	Weighted Average
22,376		95.62% Pervious Area
1,026		4.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.3	75	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.5	125	Total			

Summary for Subcatchment 7S: Watershed 7b

Runoff = 1.03 cfs @ 12.12 hrs, Volume= 3,087 cf, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
12,358	98	Unconnected pavement, HSG A
175	39	>75% Grass cover, Good, HSG A
12,533	97	Weighted Average
175		1.40% Pervious Area
12,358		98.60% Impervious Area
12,358		100.00% Unconnected

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

Summary for Subcatchment 8S: 8

Runoff = 1.12 cfs @ 12.34 hrs, Volume= 5,753 cf, Depth= 0.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
44,805	98	Paved roads w/curbs & sewers, HSG A
54,639	39	>75% Grass cover, Good, HSG A
99,444	66	Weighted Average
54,639		54.94% Pervious Area
44,805		45.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	50	0.0050	0.06		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
4.8	182	0.0080	0.63		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.1	225	0.0050	3.47	2.73	**Pipe Channel, 12" HDPE** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
20.2	457	Total			

Summary for Subcatchment 22S: Watershed 7a

Runoff = 0.33 cfs @ 12.12 hrs, Volume= 1,016 cf, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.30"

Area (sf)	CN	Description
3,975	98	Unconnected pavement, HSG A
3,975		100.00% Impervious Area
3,975		100.00% Unconnected

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

Summary for Reach 1R: Wetland 1

Inflow Area =	6,437 sf,	0.00% Impervious, Inflow Depth = 0.00"	for 2-Year event	
Inflow =	0.00 cfs @	24.01 hrs, Volume=	1 cf	
Outflow =	0.00 cfs @	24.01 hrs, Volume=	1 cf,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Wetland D

Inflow Area =	207,952 sf,	58.85% Impervious,	Inflow Depth = 0.00"	for 2-Year event
Inflow =	0.00 cfs @	24.05 hrs, Volume=	16 cf	
Outflow =	0.00 cfs @	24.05 hrs, Volume=	16 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 3R: Wetland M

Inflow	=	0.00 cfs @	0.00 hrs,	Volume=	0 cf
Outflow	=	0.00 cfs @	0.00 hrs,	Volume=	0 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 4R: Wetland N

Inflow Area =	23,402 sf,	4.38% Impervious,	Inflow Depth = 0.02"	for 2-Year event
Inflow =	0.00 cfs @	24.04 hrs, Volume=	39 cf	
Outflow =	0.00 cfs @	24.04 hrs, Volume=	39 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 5R: Wetland C

Inflow Area = 16,943 sf, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 24.07 hrs, Volume= 3 cf
Outflow = 0.00 cfs @ 24.07 hrs, Volume= 3 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 6R: Showcase

Inflow Area = 543,560 sf, 65.58% Impervious, Inflow Depth = 0.67" for 2-Year event
Inflow = 11.48 cfs @ 12.13 hrs, Volume= 30,505 cf
Outflow = 11.48 cfs @ 12.13 hrs, Volume= 30,505 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Basin 1

Inflow Area = 192,038 sf, 63.73% Impervious, Inflow Depth = 1.52" for 2-Year event
Inflow = 6.01 cfs @ 12.25 hrs, Volume= 24,253 cf
Outflow = 5.55 cfs @ 12.31 hrs, Volume= 24,253 cf, Atten= 8%, Lag= 3.7 min
Discarded = 5.55 cfs @ 12.31 hrs, Volume= 24,253 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 45.53' @ 12.31 hrs Surf.Area= 8,960 sf Storage= 142 cf
Flood Elev= 49.00' Surf.Area= 15,007 sf Storage= 24,955 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (840.6 - 840.6)

Volume	Invert	Avail.Storage	Storage Description
#1	43.50'	0 cf	**ASTM C-33 Sand (Prismatic)** Listed below (Recalc) 6,689 cf Overall x 0.0% Voids
#2	45.50'	24,955 cf	**Basin (Prismatic)** Listed below (Recalc)
		24,955 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
43.50	4,459	0	0
44.50	4,459	4,459	4,459
45.00	4,459	2,230	6,689

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
45.50	4,459	0	0
46.00	5,124	2,396	2,396
47.00	6,495	5,810	8,205
48.00	8,228	7,362	15,567
49.00	10,548	9,388	24,955

Device	Routing	Invert	Outlet Devices
#1	Discarded	43.50'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 43.40'
#2	Device 1	43.50'	**8.270 in/hr Sand Exfiltration over Surface area** Conductivity to Groundwater Elevation = 43.40'
#3	Primary	48.00'	**13.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=5.55 cfs @ 12.31 hrs HW=45.53' (Free Discharge)
1=Exfiltration (Controls 5.55 cfs)
2=Sand Exfiltration (Passes 5.55 cfs of 19.06 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=43.50' TW=0.00' (Dynamic Tailwater)
3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 2: DDMH 2

Inflow Area = 142,548 sf, 75.11% Impervious, Inflow Depth = 1.92" for 2-Year event
Inflow = 5.80 cfs @ 12.25 hrs, Volume= 22,835 cf
Outflow = 5.80 cfs @ 12.25 hrs, Volume= 22,835 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.74 cfs @ 12.19 hrs, Volume= 17,090 cf
Secondary = 4.11 cfs @ 12.25 hrs, Volume= 5,746 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 47.10' @ 12.25 hrs
Flood Elev= 49.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.72'	**12.0" Round 12" RCP** L= 3.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 45.72' / 45.70' S= 0.0067 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 3	46.50'	**3.0' long x 3.00' rise Sharp-Crested Rectangular Weir** 0 End Contraction(s)
#3	Secondary	46.00'	**18.0" Round 18" RCP X 2.00** L= 3.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 46.00' / 45.90' S= 0.0333 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf

Primary OutFlow Max=1.60 cfs @ 12.19 hrs HW=47.02' TW=46.91' (Dynamic Tailwater)
↑—**1=12" RCP** (Inlet Controls 1.60 cfs @ 2.04 fps)

Secondary OutFlow Max=4.10 cfs @ 12.25 hrs HW=47.10' TW=46.77' (Dynamic Tailwater)
↑—**3=18" RCP** (Passes 4.10 cfs of 7.32 cfs potential flow)
  ↑—**2=Sharp-Crested Rectangular Weir** (Weir Controls 4.10 cfs @ 2.29 fps)

Summary for Pond 2-A: Basin 2A

Inflow Area = 199,384 sf, 79.31% Impervious, Inflow Depth = 1.01" for 2-Year event
Inflow = 6.14 cfs @ 12.23 hrs, Volume= 16,716 cf
Outflow = 5.54 cfs @ 12.29 hrs, Volume= 16,722 cf, Atten= 10%, Lag= 3.7 min
Discarded = 1.36 cfs @ 12.29 hrs, Volume= 12,203 cf
Primary = 4.18 cfs @ 12.29 hrs, Volume= 4,519 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 43.52' @ 12.29 hrs Surf.Area= 5,521 sf Storage= 2,825 cf
Flood Elev= 44.25' Surf.Area= 6,137 sf Storage= 5,356 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 12.2 min (794.4 - 782.2)

Volume	Invert	Avail.Storage	Storage Description
#1	40.50'	0 cf	**ASTM C-33 Sand (Prismatic)** Listed below (Recalc) 3,510 cf Overall x 0.0% Voids
#2	42.50'	5,356 cf	**Basin (Prismatic)** Listed below (Recalc)
		5,356 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.50	2,340	0	0
41.00	2,340	1,170	1,170
42.00	2,340	2,340	3,510

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
42.50	2,340	0	0
43.00	2,749	1,272	1,272
44.00	3,575	3,162	4,434
44.25	3,797	922	5,356

Device	Routing	Invert	Outlet Devices
#1	Primary	43.25'	**9.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	40.50'	**2.410 in/hr In-Situ Exfiltration over Surface area** Conductivity to Groundwater Elevation = 40.10'
#3	Device 2	40.50'	**8.270 in/hr Sand Exfiltration over Surface area** Conductivity to Groundwater Elevation = 40.10'
#4	Secondary	44.20'	**118.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 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

Discarded OutFlow Max=1.36 cfs @ 12.29 hrs HW=43.52' (Free Discharge)
└─**2=In-Situ Exfiltration** (Controls 1.36 cfs)
  └─**3=Sand Exfiltration** (Passes 1.36 cfs of 4.66 cfs potential flow)

Primary OutFlow Max=4.18 cfs @ 12.29 hrs HW=43.52' TW=39.18' (Dynamic Tailwater)
└─**1=Sharp-Crested Rectangular Weir** (Weir Controls 4.18 cfs @ 1.71 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=40.50' TW=0.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2-B: Basin 2B

Inflow Area = 210,085 sf, 75.27% Impervious, Inflow Depth = 0.26" for 2-Year event
Inflow = 4.18 cfs @ 12.29 hrs, Volume= 4,520 cf
Outflow = 3.40 cfs @ 12.37 hrs, Volume= 4,522 cf, Atten= 19%, Lag= 4.7 min
Discarded = 3.40 cfs @ 12.37 hrs, Volume= 4,522 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 39.30' @ 12.37 hrs Surf.Area= 5,855 sf Storage= 320 cf
Flood Elev= 42.00' Surf.Area= 10,364 sf Storage= 10,316 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.7 min (745.1 - 744.4)

Volume	Invert	Avail.Storage	Storage Description
#1	36.75'	0 cf	**ASTM C-33 sand (Prismatic)** Listed below (Recalc) 4,726 cf Overall x 0.0% Voids
#2	39.00'	11,808 cf	**Basin (Prismatic)** Listed below (Recalc)
		11,808 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.75	799	0	0
37.50	2,459	1,222	1,222
38.50	4,550	3,505	4,726

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.00	799	0	0
40.00	2,459	1,629	1,629
41.00	4,550	3,505	5,134
42.00	5,814	5,182	10,316
42.25	6,125	1,492	11,808

Device	Routing	Invert	Outlet Devices
#1	Primary	36.60'	**12.0" Round 15" RCP** L= 9.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 36.60' / 36.20' S= 0.0444 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	36.75'	**2.410 in/hr In-Situ Exfiltration over Surface area** Conductivity to Groundwater Elevation = 36.70'
#3	Device 2	36.75'	**8.270 in/hr Sand Exfiltration over Surface area** Conductivity to Groundwater Elevation = 36.70'
#4	Device 1	40.00'	**12.0" Vert. Vertical Orifice** C= 0.600
#5	Device 1	41.00'	**32.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#6	Secondary	41.25'	**6.0' long Conc. Curb Overflow** 2 End Contraction(s)
#7	Tertiary	42.10'	**193.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

			2.50 3.00 3.50 4.00 4.50 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
#8	Tertiary	42.10'	**193.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 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

Discarded OutFlow Max=3.40 cfs @ 12.37 hrs HW=39.30' (Free Discharge)
└─**2=In-Situ Exfiltration** (Controls 3.40 cfs)
  └─**3=Sand Exfiltration** (Passes 3.40 cfs of 11.66 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=36.75' TW=34.45' (Dynamic Tailwater)
└─**1=15" RCP** (Passes 0.00 cfs of 0.10 cfs potential flow)
  ├─**4=Vertical Orifice** (Controls 0.00 cfs)
  └─**5=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=36.75' TW=0.00' (Dynamic Tailwater)
└─**6=Conc. Curb Overflow** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=36.75' TW=0.00' (Dynamic Tailwater)
├─**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**8=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 3P: Basin 3

Inflow Area =	99,444 sf,	45.06% Impervious,	Inflow Depth = 0.69"	for 2-Year event
Inflow =	1.12 cfs @	12.34 hrs, Volume=	5,753 cf	
Outflow =	0.54 cfs @	12.74 hrs, Volume=	5,754 cf,	Atten= 52%, Lag= 24.4 min
Discarded =	0.54 cfs @	12.74 hrs, Volume=	5,754 cf	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0 cf	
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 41.73' @ 12.74 hrs Surf.Area= 6,083 sf Storage= 692 cf
Flood Elev= 44.00' Surf.Area= 7,917 sf Storage= 9,832 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 6.7 min (912.4 - 905.8)

Volume	Invert	Avail.Storage	Storage Description
#1	39.50'	0 cf	**ASTM C-33 Sand (Prismatic)** Listed below (Recalc) 4,436 cf Overall x 0.0% Voids
#2	41.50'	9,832 cf	**Basin (Prismatic)** Listed below (Recalc)
		9,832 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.50	2,957	0	0
40.50	2,957	2,957	2,957
41.00	2,957	1,479	4,436

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	2,957	0	0
42.00	3,329	1,572	1,572
43.00	4,116	3,723	5,294
44.00	4,960	4,538	9,832

Device	Routing	Invert	Outlet Devices
#1	Primary	38.00'	**12.0" Round 12" RCP** L= 109.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 38.00' / 36.50' S= 0.0138 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	39.50'	**1.020 in/hr In Situ Exfiltration over Surface area** Conductivity to Groundwater Elevation = 39.10'
#3	Device 2	39.50'	**8.270 in/hr Sand Layer Exfiltration over Surface area** Conductivity to Groundwater Elevation = 39.10'
#4	Device 1	43.00'	**32.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	43.50'	**6.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.54 cfs @ 12.74 hrs HW=41.73' (Free Discharge)
└─**2=In Situ Exfiltration** (Controls 0.54 cfs)
  └─**3=Sand Layer Exfiltration** (Passes 0.54 cfs of 4.37 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=39.50' TW=34.45' (Dynamic Tailwater)
└─**1=12" RCP** (Passes 0.00 cfs of 3.78 cfs potential flow)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=39.50' TW=34.45' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 4P: STORMCEPTOR

Inflow Area = 142,548 sf, 75.11% Impervious, Inflow Depth = 1.44" for 2-Year event
Inflow = 1.74 cfs @ 12.19 hrs, Volume= 17,090 cf
Outflow = 1.74 cfs @ 12.19 hrs, Volume= 17,090 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.74 cfs @ 12.19 hrs, Volume= 17,090 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 46.97' @ 12.26 hrs
Flood Elev= 49.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.85'	**12.0" Round 12" RCP** L= 3.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 45.85' / 45.80' S= 0.0167 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=1.66 cfs @ 12.19 hrs HW=46.91' TW=46.71' (Dynamic Tailwater)
└─**1=12" RCP** (Inlet Controls 1.66 cfs @ 2.11 fps)

Summary for Pond 5P: Forebay P2

Inflow Area =	189,389 sf, 83.50% Impervious,	Inflow Depth = 1.82"	for 2-Year event
Inflow =	6.47 cfs @ 12.20 hrs, Volume=	28,691 cf	
Outflow =	6.34 cfs @ 12.23 hrs, Volume=	28,585 cf, Atten= 2%, Lag= 1.6 min	
Discarded =	0.20 cfs @ 12.23 hrs, Volume=	11,871 cf	
Primary =	6.14 cfs @ 12.23 hrs, Volume=	16,714 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 44.10' @ 12.23 hrs Surf.Area= 2,432 sf Storage= 4,263 cf
Flood Elev= 45.00' Surf.Area= 3,023 sf Storage= 6,708 cf

Plug-Flow detention time= 124.2 min calculated for 28,585 cf (100% of inflow)
Center-of-Mass det. time= 122.0 min (957.7 - 835.7)

Volume	Invert	Avail.Storage	Storage Description
#1	41.50'	6,708 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	912	0	0
42.00	1,170	521	521
43.00	1,727	1,449	1,969
44.00	2,364	2,046	4,015
45.00	3,023	2,694	6,708

Device	Routing	Invert	Outlet Devices
#1	Primary	43.75'	**9.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	41.50'	**0.520 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 41.30'

Discarded OutFlow Max=0.20 cfs @ 12.23 hrs HW=44.10' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.20 cfs)

Primary OutFlow Max=6.13 cfs @ 12.23 hrs HW=44.10' TW=43.47' (Dynamic Tailwater)
↑—**1=Sharp-Crested Rectangular Weir** (Weir Controls 6.13 cfs @ 1.94 fps)

Summary for Pond 10: DMH 10

Inflow Area =	189,389 sf,	83.50% Impervious,	Inflow Depth = 2.09"	for 2-Year event
Inflow =	9.10 cfs @	12.21 hrs, Volume=	32,940 cf	
Outflow =	9.10 cfs @	12.21 hrs, Volume=	32,940 cf,	Atten= 0%, Lag= 0.0 min
Primary =	6.47 cfs @	12.20 hrs, Volume=	28,691 cf	
Secondary =	2.68 cfs @	12.23 hrs, Volume=	4,249 cf	
Tertiary =	0.00 cfs @	0.00 hrs, Volume=	0 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 44.15' @ 12.23 hrs
Flood Elev= 44.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	41.60'	**20.0" Round Double 20" DI X 2.00** L= 18.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 41.60' / 41.50' S= 0.0056 '/' Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 2.18 sf
#2	Tertiary	44.80'	**32.0" Horiz. Orifice/Grate Overflow** C= 0.600 Limited to weir flow at low heads
#3	Device 4	43.80'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Secondary	40.65'	**18.0" Round 18" RCP** L= 202.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 40.65' / 38.45' S= 0.0109 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 1.77 sf

Primary OutFlow Max=6.14 cfs @ 12.20 hrs HW=44.14' TW=44.10' (Dynamic Tailwater)
└─**1=Double 20" DI** (Inlet Controls 6.14 cfs @ 1.41 fps)

Secondary OutFlow Max=2.68 cfs @ 12.23 hrs HW=44.15' TW=35.22' (Dynamic Tailwater)
└─**4=18" RCP** (Passes 2.68 cfs of 11.47 cfs potential flow)
  └─**3=Sharp-Crested Rectangular Weir** (Weir Controls 2.68 cfs @ 1.94 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=40.65' TW=39.50' (Dynamic Tailwater)
└─**2=Orifice/Grate Overflow** (Controls 0.00 cfs)

Summary for Pond 20A: DMH-20A

Inflow Area = 142,548 sf, 75.11% Impervious, Inflow Depth = 1.92" for 2-Year event
Inflow = 5.80 cfs @ 12.25 hrs, Volume= 22,835 cf
Outflow = 5.80 cfs @ 12.25 hrs, Volume= 22,835 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.80 cfs @ 12.25 hrs, Volume= 22,835 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 46.77' @ 12.25 hrs
Flood Elev= 49.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.85'	**18.0" Round 18" RCP X 2.00** L= 20.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 45.85' / 45.70' S= 0.0075 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf

Primary OutFlow Max=5.80 cfs @ 12.25 hrs HW=46.77' TW=45.52' (Dynamic Tailwater)
└─**1=18" RCP** (Barrel Controls 5.80 cfs @ 3.65 fps)

Summary for Pond 21P: Dog DMH-30

Inflow Area = 313,504 sf, 66.00% Impervious, Inflow Depth = 0.20" for 2-Year event
Inflow = 2.82 cfs @ 12.22 hrs, Volume= 5,265 cf
Outflow = 2.82 cfs @ 12.22 hrs, Volume= 5,265 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.82 cfs @ 12.22 hrs, Volume= 5,265 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 35.22' @ 12.22 hrs
Flood Elev= 41.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	34.45'	**30.0" Round Ex. 30" RCP** L= 96.8' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 34.45' / 34.10' S= 0.0036 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf

Primary OutFlow Max=2.82 cfs @ 12.22 hrs HW=35.22' TW=0.00' (Dynamic Tailwater)
└─**1=Ex. 30" RCP** (Barrel Controls 2.82 cfs @ 3.30 fps)

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

Subcatchment 1S: 1 Runoff Area=6,437 sf 0.00% Impervious Runoff Depth=0.18"
Tc=5.0 min CN=39 Runoff=0.00 cfs 95 cf

Subcatchment 2A: 2A Runoff Area=15,914 sf 0.00% Impervious Runoff Depth=0.24"
Flow Length=75' Slope=0.0100 '/' Tc=11.4 min CN=41 Runoff=0.02 cfs 324 cf

Subcatchment 2B: 2B Runoff Area=49,490 sf 30.94% Impervious Runoff Depth=1.04"
Flow Length=163' Tc=9.0 min CN=57 Runoff=1.22 cfs 4,294 cf

Subcatchment 2S: 2 Runoff Area=142,548 sf 75.11% Impervious Runoff Depth=3.36"
Flow Length=325' Tc=16.6 min CN=86 Runoff=9.98 cfs 39,856 cf

Subcatchment 3A: 3A Runoff Area=9,995 sf 0.00% Impervious Runoff Depth=0.18"
Tc=5.0 min CN=39 Runoff=0.01 cfs 147 cf

Subcatchment 3B: 3B Runoff Area=10,701 sf 0.00% Impervious Runoff Depth=0.18"
Tc=5.0 min CN=39 Runoff=0.01 cfs 157 cf

Subcatchment 3S: 3 Runoff Area=189,389 sf 83.50% Impervious Runoff Depth=3.56"
Flow Length=200' Tc=13.3 min CN=88 Runoff=15.19 cfs 56,107 cf

Subcatchment 4A: Showcase Watershed Runoff Area=217,523 sf 63.08% Impervious Runoff Depth=2.44"
Tc=5.0 min CN=76 Runoff=16.81 cfs 44,175 cf

Subcatchment 5S: Watershed 5 (Bypass) Runoff Area=16,943 sf 0.00% Impervious Runoff Depth=0.18"
Flow Length=388' Tc=14.4 min CN=39 Runoff=0.01 cfs 249 cf

Subcatchment 6S: Watershed 6 (bypass) Runoff Area=23,402 sf 4.38% Impervious Runoff Depth=0.28"
Flow Length=125' Slope=0.0200 '/' Tc=9.5 min CN=42 Runoff=0.04 cfs 549 cf

Subcatchment 7S: Watershed 7b Runoff Area=12,533 sf 98.60% Impervious Runoff Depth=4.53"
Tc=5.0 min CN=97 Runoff=1.54 cfs 4,729 cf

Subcatchment 8S: 8 Runoff Area=99,444 sf 45.06% Impervious Runoff Depth=1.65"
Flow Length=457' Tc=20.2 min CN=66 Runoff=3.03 cfs 13,644 cf

Subcatchment 22S: Watershed 7a Runoff Area=3,975 sf 100.00% Impervious Runoff Depth=4.64"
Tc=5.0 min CN=98 Runoff=0.49 cfs 1,538 cf

Reach 1R: Wetland 1 Inflow=0.00 cfs 95 cf
Outflow=0.00 cfs 95 cf

Reach 2R: Wetland D Inflow=0.02 cfs 324 cf
Outflow=0.02 cfs 324 cf

Reach 3R: Wetland M Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach 4R: Wetland N Inflow=0.04 cfs 549 cf
Outflow=0.04 cfs 549 cf

Reach 5R: Wetland C Inflow=0.01 cfs 249 cf
Outflow=0.01 cfs 249 cf

Reach 6R: Showcase Inflow=22.37 cfs 60,207 cf
Outflow=22.37 cfs 60,207 cf

Pond 1P: Basin 1 Peak Elev=46.16' Storage=3,254 cf Inflow=10.98 cfs 44,150 cf
Discarded=7.25 cfs 44,192 cf Primary=0.00 cfs 0 cf Outflow=7.25 cfs 44,192 cf

Pond 2: DDMH 2 Peak Elev=47.52' Inflow=9.98 cfs 39,856 cf
Primary=1.90 cfs 25,977 cf Secondary=8.17 cfs 13,879 cf Outflow=9.98 cfs 39,856 cf

Pond 2-A: Basin 2A Peak Elev=43.67' Storage=3,306 cf Inflow=9.70 cfs 33,462 cf
Discarded=1.42 cfs 21,202 cf Primary=7.99 cfs 12,267 cf Secondary=0.00 cfs 0 cf Outflow=9.42 cfs 33,469 cf

Pond 2-B: Basin 2B Peak Elev=40.32' Storage=2,530 cf Inflow=7.99 cfs 12,424 cf
carded=4.84 cfs 12,178 cf Primary=0.42 cfs 265 cf Secondary=0.00 cfs 0 cf Tertiary=0.00 cfs 0 cf Outflow=5.27 cfs 12,443 cf

Pond 3P: Basin 3 Peak Elev=42.65' Storage=3,906 cf Inflow=3.03 cfs 13,644 cf
Discarded=0.75 cfs 13,645 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=0.75 cfs 13,645 cf

Pond 4P: STORMCEPTOR Peak Elev=47.38' Inflow=1.90 cfs 25,977 cf
12.0" Round Culvert n=0.012 L=3.0' S=0.0167 '/' Outflow=1.90 cfs 25,977 cf

Pond 5P: Forebay P2 Peak Elev=44.23' Storage=4,577 cf Inflow=10.07 cfs 46,607 cf
Discarded=0.21 cfs 13,161 cf Primary=9.70 cfs 33,315 cf Outflow=9.91 cfs 46,475 cf

Pond 10: DMH 10 Peak Elev=44.35' Inflow=15.19 cfs 56,107 cf
Primary=10.07 cfs 46,607 cf Secondary=5.18 cfs 9,500 cf Tertiary=0.00 cfs 0 cf Outflow=15.19 cfs 56,107 cf

Pond 20A: DMH-20A Peak Elev=47.14' Inflow=9.98 cfs 39,856 cf
18.0" Round Culvert x 2.00 n=0.012 L=20.0' S=0.0075 '/' Outflow=9.98 cfs 39,856 cf

Pond 21P: Dog DMH-30 Peak Elev=35.54' Inflow=5.40 cfs 11,303 cf
30.0" Round Culvert n=0.012 L=96.8' S=0.0036 '/' Outflow=5.40 cfs 11,303 cf

Total Runoff Area = 798,294 sf Runoff Volume = 165,865 cf Average Runoff Depth = 2.49"
39.89% Pervious = 318,405 sf 60.11% Impervious = 479,889 sf

Summary for Subcatchment 1S: 1

Runoff = 0.00 cfs @ 12.54 hrs, Volume= 95 cf, Depth= 0.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
6,437	39	>75% Grass cover, Good, HSG A
6,437		100.00% Pervious Area

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

Summary for Subcatchment 2A: 2A

Runoff = 0.02 cfs @ 12.58 hrs, Volume= 324 cf, Depth= 0.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

	Area (sf)	CN	Description
*	1,487	65	Playground
	14,427	39	>75% Grass cover, Good, HSG A
	15,914	41	Weighted Average
	15,914		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
0.6	25	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.4	75	Total			

Summary for Subcatchment 2B: 2B

Runoff = 1.22 cfs @ 12.17 hrs, Volume= 4,294 cf, Depth= 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
15,311	98	Paved roads w/curbs & sewers, HSG A
34,179	39	>75% Grass cover, Good, HSG A
49,490	57	Weighted Average
34,179		69.06% Pervious Area
15,311		30.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,**
					Grass: Short n= 0.150 P2= 1.50"
2.8	113	0.0090	0.66		**Shallow Concentrated Flow,**
					Short Grass Pasture Kv= 7.0 fps
9.0	163	Total			

Summary for Subcatchment 2S: 2

Runoff = 9.98 cfs @ 12.25 hrs, Volume= 39,856 cf, Depth= 3.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

	Area (sf)	CN	Description
	107,069	98	Paved roads w/curbs & sewers, HSG A
*	12,550	65	Playground
	22,929	39	>75% Grass cover, Good, HSG A
	142,548	86	Weighted Average
	35,479		24.89% Pervious Area
	107,069		75.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
5.7	250	0.0110	0.73		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.3300	4.02		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.6	325	Total			

Summary for Subcatchment 3A: 3A

Runoff = 0.01 cfs @ 12.54 hrs, Volume= 147 cf, Depth= 0.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
9,995	39	>75% Grass cover, Good, HSG A
9,995		100.00% Pervious Area

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

Summary for Subcatchment 3B: 3B

Runoff = 0.01 cfs @ 12.54 hrs, Volume= 157 cf, Depth= 0.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
10,701	39	>75% Grass cover, Good, HSG A
10,701		100.00% Pervious Area

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

Summary for Subcatchment 3S: 3

Runoff = 15.19 cfs @ 12.21 hrs, Volume= 56,107 cf, Depth= 3.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
158,140	98	Paved roads w/curbs & sewers, HSG A
31,249	39	>75% Grass cover, Good, HSG A
189,389	88	Weighted Average
31,249		16.50% Pervious Area
158,140		83.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	50	0.0120	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
3.2	150	0.0125	0.78		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
13.3	200	Total			

Summary for Subcatchment 4A: Showcase Watershed

Runoff = 16.81 cfs @ 12.13 hrs, Volume= 44,175 cf, Depth= 2.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
80,318	39	>75% Grass cover, Good, HSG A
137,205	98	Paved roads w/curbs & sewers, HSG A
217,523	76	Weighted Average
80,318		36.92% Pervious Area
137,205		63.08% Impervious Area

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

Summary for Subcatchment 5S: Watershed 5 (Bypass)

Runoff = 0.01 cfs @ 13.01 hrs, Volume= 249 cf, Depth= 0.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
0	98	Paved roads w/curbs & sewers, HSG A
16,943	39	>75% Grass cover, Good, HSG A
16,943	39	Weighted Average
16,943		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.3	80	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.3	258	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.4	388	Total			

Summary for Subcatchment 6S: Watershed 6 (bypass)

Runoff = 0.04 cfs @ 12.55 hrs, Volume= 549 cf, Depth= 0.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
22,376	39	>75% Grass cover, Good, HSG A
1,026	98	Paved roads w/curbs & sewers, HSG A
23,402	42	Weighted Average
22,376		95.62% Pervious Area
1,026		4.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.3	75	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.5	125	Total			

Summary for Subcatchment 7S: Watershed 7b

Runoff = 1.54 cfs @ 12.12 hrs, Volume= 4,729 cf, Depth= 4.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
12,358	98	Unconnected pavement, HSG A
175	39	>75% Grass cover, Good, HSG A
12,533	97	Weighted Average
175		1.40% Pervious Area
12,358		98.60% Impervious Area
12,358		100.00% Unconnected

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

Summary for Subcatchment 8S: 8

Runoff = 3.03 cfs @ 12.32 hrs, Volume= 13,644 cf, Depth= 1.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
44,805	98	Paved roads w/curbs & sewers, HSG A
54,639	39	>75% Grass cover, Good, HSG A
99,444	66	Weighted Average
54,639		54.94% Pervious Area
44,805		45.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	50	0.0050	0.06		**Sheet Flow,**
					Grass: Short n= 0.150 P2= 1.50"
4.8	182	0.0080	0.63		**Shallow Concentrated Flow,**
					Short Grass Pasture Kv= 7.0 fps
1.1	225	0.0050	3.47	2.73	**Pipe Channel, 12" HDPE**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.012 Corrugated PP, smooth interior
20.2	457	Total			

Summary for Subcatchment 22S: Watershed 7a

Runoff = 0.49 cfs @ 12.12 hrs, Volume= 1,538 cf, Depth= 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=4.88"

Area (sf)	CN	Description
3,975	98	Unconnected pavement, HSG A
3,975		100.00% Impervious Area
3,975		100.00% Unconnected

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

Summary for Reach 1R: Wetland 1

Inflow Area =	6,437 sf,	0.00% Impervious, Inflow Depth = 0.18"	for 10-Year event
Inflow =	0.00 cfs @ 12.54 hrs, Volume=	95 cf	
Outflow =	0.00 cfs @ 12.54 hrs, Volume=	95 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Wetland D

Inflow Area =	207,952 sf,	58.85% Impervious,	Inflow Depth = 0.02"	for 10-Year event
Inflow =	0.02 cfs @	12.58 hrs, Volume=	324 cf	
Outflow =	0.02 cfs @	12.58 hrs, Volume=	324 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 3R: Wetland M

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf	
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 4R: Wetland N

Inflow Area =	23,402 sf,	4.38% Impervious, Inflow Depth = 0.28"	for 10-Year event
Inflow =	0.04 cfs @ 12.55 hrs, Volume=	549 cf	
Outflow =	0.04 cfs @ 12.55 hrs, Volume=	549 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 5R: Wetland C

Inflow Area =	16,943 sf,	0.00% Impervious,	Inflow Depth = 0.18"	for 10-Year event
Inflow =	0.01 cfs @	13.01 hrs, Volume=	249 cf	
Outflow =	0.01 cfs @	13.01 hrs, Volume=	249 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 6R: Showcase

Inflow Area =	543,560 sf,	65.58% Impervious,	Inflow Depth = 1.33"	for 10-Year event
Inflow =	22.37 cfs @	12.13 hrs, Volume=	60,207 cf	
Outflow =	22.37 cfs @	12.13 hrs, Volume=	60,207 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Basin 1

Inflow Area = 192,038 sf, 63.73% Impervious, Inflow Depth = 2.76" for 10-Year event
Inflow = 10.98 cfs @ 12.23 hrs, Volume= 44,150 cf
Outflow = 7.25 cfs @ 12.40 hrs, Volume= 44,192 cf, Atten= 34%, Lag= 10.2 min
Discarded = 7.25 cfs @ 12.40 hrs, Volume= 44,192 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 46.16' @ 12.40 hrs Surf.Area= 9,808 sf Storage= 3,254 cf
Flood Elev= 49.00' Surf.Area= 15,007 sf Storage= 24,955 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.9 min (827.4 - 825.5)

Volume	Invert	Avail.Storage	Storage Description
#1	43.50'	0 cf	**ASTM C-33 Sand (Prismatic)** Listed below (Recalc) 6,689 cf Overall x 0.0% Voids
#2	45.50'	24,955 cf	**Basin (Prismatic)** Listed below (Recalc)
		24,955 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
43.50	4,459	0	0
44.50	4,459	4,459	4,459
45.00	4,459	2,230	6,689

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
45.50	4,459	0	0
46.00	5,124	2,396	2,396
47.00	6,495	5,810	8,205
48.00	8,228	7,362	15,567
49.00	10,548	9,388	24,955

Device	Routing	Invert	Outlet Devices
#1	Discarded	43.50'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 43.40'
#2	Device 1	43.50'	**8.270 in/hr Sand Exfiltration over Surface area** Conductivity to Groundwater Elevation = 43.40'
#3	Primary	48.00'	**13.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=7.25 cfs @ 12.40 hrs HW=46.16' (Free Discharge)
└─**1=Exfiltration** (Controls 7.25 cfs)
  └─**2=Sand Exfiltration** (Passes 7.25 cfs of 24.89 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=43.50' TW=0.00' (Dynamic Tailwater)
└─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2: DDMH 2

Inflow Area = 142,548 sf, 75.11% Impervious, Inflow Depth = 3.36" for 10-Year event
Inflow = 9.98 cfs @ 12.25 hrs, Volume= 39,856 cf
Outflow = 9.98 cfs @ 12.25 hrs, Volume= 39,856 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.90 cfs @ 12.18 hrs, Volume= 25,977 cf
Secondary = 8.17 cfs @ 12.25 hrs, Volume= 13,879 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 47.52' @ 12.25 hrs
Flood Elev= 49.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.72'	**12.0" Round 12" RCP** L= 3.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 45.72' / 45.70' S= 0.0067 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 3	46.50'	**3.0' long x 3.00' rise Sharp-Crested Rectangular Weir** 0 End Contraction(s)
#3	Secondary	46.00'	**18.0" Round 18" RCP X 2.00** L= 3.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 46.00' / 45.90' S= 0.0333 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf

Primary OutFlow Max=1.69 cfs @ 12.18 hrs HW=47.39' TW=47.27' (Dynamic Tailwater)
└─**1=12" RCP** (Inlet Controls 1.69 cfs @ 2.16 fps)

Secondary OutFlow Max=8.16 cfs @ 12.25 hrs HW=47.52' TW=47.14' (Dynamic Tailwater)
└─**3=18" RCP** (Passes 8.16 cfs of 10.57 cfs potential flow)
  └─**2=Sharp-Crested Rectangular Weir** (Weir Controls 8.16 cfs @ 2.66 fps)

Summary for Pond 2-A: Basin 2A

Inflow Area = 199,384 sf, 79.31% Impervious, Inflow Depth = 2.01" for 10-Year event
Inflow = 9.70 cfs @ 12.22 hrs, Volume= 33,462 cf
Outflow = 9.42 cfs @ 12.26 hrs, Volume= 33,469 cf, Atten= 3%, Lag= 1.9 min
Discarded = 1.42 cfs @ 12.26 hrs, Volume= 21,202 cf
Primary = 7.99 cfs @ 12.26 hrs, Volume= 12,267 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 43.67' @ 12.26 hrs Surf.Area= 5,644 sf Storage= 3,306 cf
Flood Elev= 44.25' Surf.Area= 6,137 sf Storage= 5,356 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 9.7 min (813.5 - 803.8)

Volume	Invert	Avail.Storage	Storage Description
#1	40.50'	0 cf	**ASTM C-33 Sand (Prismatic)** Listed below (Recalc) 3,510 cf Overall x 0.0% Voids
#2	42.50'	5,356 cf	**Basin (Prismatic)** Listed below (Recalc)
		5,356 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.50	2,340	0	0
41.00	2,340	1,170	1,170
42.00	2,340	2,340	3,510

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
42.50	2,340	0	0
43.00	2,749	1,272	1,272
44.00	3,575	3,162	4,434
44.25	3,797	922	5,356

Device	Routing	Invert	Outlet Devices
#1	Primary	43.25'	**9.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	40.50'	**2.410 in/hr In-Situ Exfiltration over Surface area** Conductivity to Groundwater Elevation = 40.10'
#3	Device 2	40.50'	**8.270 in/hr Sand Exfiltration over Surface area** Conductivity to Groundwater Elevation = 40.10'
#4	Secondary	44.20'	**118.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 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

Discarded OutFlow Max=1.42 cfs @ 12.26 hrs HW=43.67' (Free Discharge)
└─**2=In-Situ Exfiltration** (Controls 1.42 cfs)
  └─**3=Sand Exfiltration** (Passes 1.42 cfs of 4.88 cfs potential flow)

Primary OutFlow Max=7.99 cfs @ 12.26 hrs HW=43.67' TW=39.96' (Dynamic Tailwater)
└─**1=Sharp-Crested Rectangular Weir** (Weir Controls 7.99 cfs @ 2.12 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=40.50' TW=0.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2-B: Basin 2B

Inflow Area =	210,085 sf,	75.27% Impervious,	Inflow Depth = 0.71"	for 10-Year event
Inflow =	7.99 cfs @	12.26 hrs, Volume=	12,424 cf	
Outflow =	5.27 cfs @	12.40 hrs, Volume=	12,443 cf,	Atten= 34%, Lag= 8.5 min
Discarded =	4.84 cfs @	12.40 hrs, Volume=	12,178 cf	
Primary =	0.42 cfs @	12.40 hrs, Volume=	265 cf	
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0 cf	
Tertiary =	0.00 cfs @	0.00 hrs, Volume=	0 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 40.32' @ 12.40 hrs Surf.Area= 7,683 sf Storage= 2,530 cf
Flood Elev= 42.00' Surf.Area= 10,364 sf Storage= 10,316 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.9 min (751.2 - 746.3)

Volume	Invert	Avail.Storage	Storage Description
#1	36.75'	0 cf	**ASTM C-33 sand (Prismatic)** Listed below (Recalc) 4,726 cf Overall x 0.0% Voids
#2	39.00'	11,808 cf	**Basin (Prismatic)** Listed below (Recalc)
		11,808 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.75	799	0	0
37.50	2,459	1,222	1,222
38.50	4,550	3,505	4,726

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.00	799	0	0
40.00	2,459	1,629	1,629
41.00	4,550	3,505	5,134
42.00	5,814	5,182	10,316
42.25	6,125	1,492	11,808

Device	Routing	Invert	Outlet Devices
#1	Primary	36.60'	**12.0" Round 15" RCP** L= 9.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 36.60' / 36.20' S= 0.0444 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	36.75'	**2.410 in/hr In-Situ Exfiltration over Surface area** Conductivity to Groundwater Elevation = 36.70'
#3	Device 2	36.75'	**8.270 in/hr Sand Exfiltration over Surface area** Conductivity to Groundwater Elevation = 36.70'
#4	Device 1	40.00'	**12.0" Vert. Vertical Orifice** C= 0.600
#5	Device 1	41.00'	**32.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#6	Secondary	41.25'	**6.0' long Conc. Curb Overflow** 2 End Contraction(s)
#7	Tertiary	42.10'	**193.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

			2.50 3.00 3.50 4.00 4.50 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
#8	Tertiary	42.10'	**193.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 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

Discarded OutFlow Max=4.84 cfs @ 12.40 hrs HW=40.32' (Free Discharge)
└─**2=In-Situ Exfiltration** (Controls 4.84 cfs)
  └─**3=Sand Exfiltration** (Passes 4.84 cfs of 16.62 cfs potential flow)

Primary OutFlow Max=0.42 cfs @ 12.40 hrs HW=40.32' TW=35.25' (Dynamic Tailwater)
└─**1=15" RCP** (Passes 0.42 cfs of 6.79 cfs potential flow)
  ├─**4=Vertical Orifice** (Orifice Controls 0.42 cfs @ 1.93 fps)
  └─**5=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=36.75' TW=0.00' (Dynamic Tailwater)
└─**6=Conc. Curb Overflow** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=36.75' TW=0.00' (Dynamic Tailwater)
├─**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**8=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 3P: Basin 3

Inflow Area = 99,444 sf, 45.06% Impervious, Inflow Depth = 1.65" for 10-Year event
Inflow = 3.03 cfs @ 12.32 hrs, Volume= 13,644 cf
Outflow = 0.75 cfs @ 13.04 hrs, Volume= 13,645 cf, Atten= 75%, Lag= 43.3 min
Discarded = 0.75 cfs @ 13.04 hrs, Volume= 13,645 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 42.65' @ 13.04 hrs Surf.Area= 6,798 sf Storage= 3,906 cf
Flood Elev= 44.00' Surf.Area= 7,917 sf Storage= 9,832 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 41.6 min (918.0 - 876.4)

Volume	Invert	Avail.Storage	Storage Description
#1	39.50'	0 cf	**ASTM C-33 Sand (Prismatic)** Listed below (Recalc) 4,436 cf Overall x 0.0% Voids
#2	41.50'	9,832 cf	**Basin (Prismatic)** Listed below (Recalc)
		9,832 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.50	2,957	0	0
40.50	2,957	2,957	2,957
41.00	2,957	1,479	4,436

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	2,957	0	0
42.00	3,329	1,572	1,572
43.00	4,116	3,723	5,294
44.00	4,960	4,538	9,832

Device	Routing	Invert	Outlet Devices
#1	Primary	38.00'	**12.0" Round 12" RCP** L= 109.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 38.00' / 36.50' S= 0.0138 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	39.50'	**1.020 in/hr In Situ Exfiltration over Surface area** Conductivity to Groundwater Elevation = 39.10'
#3	Device 2	39.50'	**8.270 in/hr Sand Layer Exfiltration over Surface area** Conductivity to Groundwater Elevation = 39.10'
#4	Device 1	43.00'	**32.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	43.50'	**6.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.75 cfs @ 13.04 hrs HW=42.65' (Free Discharge)
↑—**2=In Situ Exfiltration** (Controls 0.75 cfs)
  ↑—**3=Sand Layer Exfiltration** (Passes 0.75 cfs of 6.06 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=39.50' TW=34.45' (Dynamic Tailwater)
↑—**1=12" RCP** (Passes 0.00 cfs of 3.78 cfs potential flow)
  ↑—**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=39.50' TW=34.45' (Dynamic Tailwater)
↑—**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 4P: STORMCEPTOR

Inflow Area = 142,548 sf, 75.11% Impervious, Inflow Depth = 2.19" for 10-Year event
Inflow = 1.90 cfs @ 12.18 hrs, Volume= 25,977 cf
Outflow = 1.90 cfs @ 12.18 hrs, Volume= 25,977 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.90 cfs @ 12.18 hrs, Volume= 25,977 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 47.38' @ 12.26 hrs
Flood Elev= 49.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.85'	**12.0" Round 12" RCP** L= 3.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 45.85' / 45.80' S= 0.0167 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=1.79 cfs @ 12.18 hrs HW=47.27' TW=47.04' (Dynamic Tailwater)
↑—**1=12" RCP** (Inlet Controls 1.79 cfs @ 2.28 fps)

Summary for Pond 5P: Forebay P2

Inflow Area = 189,389 sf, 83.50% Impervious, Inflow Depth = 2.95" for 10-Year event
Inflow = 10.07 cfs @ 12.20 hrs, Volume= 46,607 cf
Outflow = 9.91 cfs @ 12.22 hrs, Volume= 46,475 cf, Atten= 2%, Lag= 1.5 min
Discarded = 0.21 cfs @ 12.22 hrs, Volume= 13,161 cf
Primary = 9.70 cfs @ 12.22 hrs, Volume= 33,315 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 44.23' @ 12.22 hrs Surf.Area= 2,516 sf Storage= 4,577 cf
Flood Elev= 45.00' Surf.Area= 3,023 sf Storage= 6,708 cf

Plug-Flow detention time= 85.4 min calculated for 46,475 cf (100% of inflow)
Center-of-Mass det. time= 83.6 min (905.4 - 821.8)

Volume	Invert	Avail.Storage	Storage Description
#1	41.50'	6,708 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	912	0	0
42.00	1,170	521	521
43.00	1,727	1,449	1,969
44.00	2,364	2,046	4,015
45.00	3,023	2,694	6,708

Device	Routing	Invert	Outlet Devices
#1	Primary	43.75'	**9.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	41.50'	**0.520 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 41.30'

Discarded OutFlow Max=0.21 cfs @ 12.22 hrs HW=44.23' (Free Discharge)
2=Exfiltration (Controls 0.21 cfs)

Primary OutFlow Max=9.69 cfs @ 12.22 hrs HW=44.23' TW=43.66' (Dynamic Tailwater)
1=Sharp-Crested Rectangular Weir (Weir Controls 9.69 cfs @ 2.27 fps)

Summary for Pond 10: DMH 10

Inflow Area = 189,389 sf, 83.50% Impervious, Inflow Depth = 3.56" for 10-Year event
Inflow = 15.19 cfs @ 12.21 hrs, Volume= 56,107 cf
Outflow = 15.19 cfs @ 12.21 hrs, Volume= 56,107 cf, Atten= 0%, Lag= 0.0 min
Primary = 10.07 cfs @ 12.20 hrs, Volume= 46,607 cf
Secondary = 5.18 cfs @ 12.22 hrs, Volume= 9,500 cf
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 44.35' @ 12.22 hrs
Flood Elev= 44.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	41.60'	**20.0" Round Double 20" DI X 2.00** L= 18.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 41.60' / 41.50' S= 0.0056 '/' Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 2.18 sf
#2	Tertiary	44.80'	**32.0" Horiz. Orifice/Grate Overflow** C= 0.600 Limited to weir flow at low heads
#3	Device 4	43.80'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Secondary	40.65'	**18.0" Round 18" RCP** L= 202.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 40.65' / 38.45' S= 0.0109 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 1.77 sf

Primary OutFlow Max=9.81 cfs @ 12.20 hrs HW=44.34' TW=44.22' (Dynamic Tailwater)
└─**1=Double 20" DI** (Inlet Controls 9.81 cfs @ 2.25 fps)

Secondary OutFlow Max=5.18 cfs @ 12.22 hrs HW=44.35' TW=35.54' (Dynamic Tailwater)
└─**4=18" RCP** (Passes 5.18 cfs of 11.74 cfs potential flow)
  └─**3=Sharp-Crested Rectangular Weir** (Weir Controls 5.18 cfs @ 2.42 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=40.65' TW=39.50' (Dynamic Tailwater)
└─**2=Orifice/Grate Overflow** (Controls 0.00 cfs)

Summary for Pond 20A: DMH-20A

Inflow Area = 142,548 sf, 75.11% Impervious, Inflow Depth = 3.36" for 10-Year event
Inflow = 9.98 cfs @ 12.25 hrs, Volume= 39,856 cf
Outflow = 9.98 cfs @ 12.25 hrs, Volume= 39,856 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.98 cfs @ 12.25 hrs, Volume= 39,856 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 47.14' @ 12.25 hrs
Flood Elev= 49.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.85'	**18.0" Round 18" RCP X 2.00** L= 20.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 45.85' / 45.70' S= 0.0075 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf

Primary OutFlow Max=9.98 cfs @ 12.25 hrs HW=47.14' TW=45.91' (Dynamic Tailwater)
↑—**1=18" RCP** (Barrel Controls 9.98 cfs @ 4.15 fps)

Summary for Pond 21P: Dog DMH-30

Inflow Area = 313,504 sf, 66.00% Impervious, Inflow Depth = 0.43" for 10-Year event
Inflow = 5.40 cfs @ 12.22 hrs, Volume= 11,303 cf
Outflow = 5.40 cfs @ 12.22 hrs, Volume= 11,303 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.40 cfs @ 12.22 hrs, Volume= 11,303 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 35.54' @ 12.22 hrs
Flood Elev= 41.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	34.45'	**30.0" Round Ex. 30" RCP** L= 96.8' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 34.45' / 34.10' S= 0.0036 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf

Primary OutFlow Max=5.40 cfs @ 12.22 hrs HW=35.54' TW=0.00' (Dynamic Tailwater)
1=Ex. 30" RCP (Barrel Controls 5.40 cfs @ 3.88 fps)

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

Subcatchment 1S: 1 Runoff Area=6,437 sf 0.00% Impervious Runoff Depth=0.47"
Tc=5.0 min CN=39 Runoff=0.03 cfs 255 cf

Subcatchment 2A: 2A Runoff Area=15,914 sf 0.00% Impervious Runoff Depth=0.59"
Flow Length=75' Slope=0.0100 '/' Tc=11.4 min CN=41 Runoff=0.11 cfs 782 cf

Subcatchment 2B: 2B Runoff Area=49,490 sf 30.94% Impervious Runoff Depth=1.74"
Flow Length=163' Tc=9.0 min CN=57 Runoff=2.21 cfs 7,164 cf

Subcatchment 2S: 2 Runoff Area=142,548 sf 75.11% Impervious Runoff Depth=4.50"
Flow Length=325' Tc=16.6 min CN=86 Runoff=13.24 cfs 53,509 cf

Subcatchment 3A: 3A Runoff Area=9,995 sf 0.00% Impervious Runoff Depth=0.47"
Tc=5.0 min CN=39 Runoff=0.05 cfs 395 cf

Subcatchment 3B: 3B Runoff Area=10,701 sf 0.00% Impervious Runoff Depth=0.47"
Tc=5.0 min CN=39 Runoff=0.05 cfs 423 cf

Subcatchment 3S: 3 Runoff Area=189,389 sf 83.50% Impervious Runoff Depth=4.72"
Flow Length=200' Tc=13.3 min CN=88 Runoff=19.89 cfs 74,528 cf

Subcatchment 4A: Showcase Watershed Runoff Area=217,523 sf 63.08% Impervious Runoff Depth=3.47"
Tc=5.0 min CN=76 Runoff=23.70 cfs 62,838 cf

Subcatchment 5S: Watershed 5 (Bypass) Runoff Area=16,943 sf 0.00% Impervious Runoff Depth=0.47"
Flow Length=388' Tc=14.4 min CN=39 Runoff=0.07 cfs 670 cf

Subcatchment 6S: Watershed 6 (bypass) Runoff Area=23,402 sf 4.38% Impervious Runoff Depth=0.65"
Flow Length=125' Slope=0.0200 '/' Tc=9.5 min CN=42 Runoff=0.21 cfs 1,267 cf

Subcatchment 7S: Watershed 7b Runoff Area=12,533 sf 98.60% Impervious Runoff Depth=5.74"
Tc=5.0 min CN=97 Runoff=1.93 cfs 5,999 cf

Subcatchment 8S: 8 Runoff Area=99,444 sf 45.06% Impervious Runoff Depth=2.51"
Flow Length=457' Tc=20.2 min CN=66 Runoff=4.75 cfs 20,838 cf

Subcatchment 22S: Watershed 7a Runoff Area=3,975 sf 100.00% Impervious Runoff Depth=5.86"
Tc=5.0 min CN=98 Runoff=0.62 cfs 1,942 cf

Reach 1R: Wetland 1 Inflow=0.03 cfs 255 cf
Outflow=0.03 cfs 255 cf

Reach 2R: Wetland D Inflow=0.11 cfs 782 cf
Outflow=0.11 cfs 782 cf

Reach 3R: Wetland M Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach 4R: Wetland N Inflow=0.21 cfs 1,267 cf
Outflow=0.21 cfs 1,267 cf

Reach 5R: Wetland C Inflow=0.07 cfs 670 cf
Outflow=0.07 cfs 670 cf

Reach 6R: Showcase Inflow=31.40 cfs 88,854 cf
Outflow=31.40 cfs 88,854 cf

Pond 1P: Basin 1 Peak Elev=46.73' Storage=6,530 cf Inflow=15.00 cfs 60,673 cf
Discarded=8.80 cfs 60,676 cf Primary=0.00 cfs 0 cf Outflow=8.80 cfs 60,676 cf

Pond 2: DDMH 2 Peak Elev=47.85' Inflow=13.24 cfs 53,509 cf
Primary=2.00 cfs 32,118 cf Secondary=11.27 cfs 21,391 cf Outflow=13.24 cfs 53,509 cf

Pond 2-A: Basin 2A Peak Elev=43.76' Storage=3,588 cf Inflow=12.24 cfs 46,689 cf
Discarded=1.46 cfs 27,844 cf Primary=10.48 cfs 18,847 cf Secondary=0.00 cfs 0 cf Outflow=11.94 cfs 46,691 cf

Pond 2-B: Basin 2B Peak Elev=40.73' Storage=3,997 cf Inflow=10.53 cfs 19,270 cf
rded=5.44 cfs 17,422 cf Primary=1.80 cfs 1,853 cf Secondary=0.00 cfs 0 cf Tertiary=0.00 cfs 0 cf Outflow=7.25 cfs 19,275 cf

Pond 3P: Basin 3 Peak Elev=43.13' Storage=5,857 cf Inflow=4.75 cfs 20,838 cf
Discarded=0.86 cfs 18,819 cf Primary=1.36 cfs 2,022 cf Secondary=0.00 cfs 0 cf Outflow=2.21 cfs 20,841 cf

Pond 4P: STORMCEPTOR Peak Elev=47.68' Inflow=2.00 cfs 32,118 cf
12.0" Round Culvert n=0.012 L=3.0' S=0.0167 '/' Outflow=2.00 cfs 32,118 cf

Pond 5P: Forebay P2 Peak Elev=44.31' Storage=4,780 cf Inflow=12.58 cfs 60,328 cf
Discarded=0.22 cfs 13,901 cf Primary=12.19 cfs 46,294 cf Outflow=12.41 cfs 60,194 cf

Pond 10: DMH 10 Peak Elev=44.50' Inflow=19.89 cfs 74,528 cf
Primary=12.58 cfs 60,328 cf Secondary=7.36 cfs 14,200 cf Tertiary=0.00 cfs 0 cf Outflow=19.89 cfs 74,528 cf

Pond 20A: DMH-20A Peak Elev=47.41' Inflow=13.24 cfs 53,509 cf
18.0" Round Culvert x 2.00 n=0.012 L=20.0' S=0.0075 '/' Outflow=13.24 cfs 53,509 cf

Pond 21P: Dog DMH-30 Peak Elev=35.79' Inflow=7.87 cfs 20,017 cf
30.0" Round Culvert n=0.012 L=96.8' S=0.0036 '/' Outflow=7.87 cfs 20,017 cf

Total Runoff Area = 798,294 sf Runoff Volume = 230,610 cf Average Runoff Depth = 3.47"
39.89% Pervious = 318,405 sf 60.11% Impervious = 479,889 sf

Summary for Subcatchment 1S: 1

Runoff = 0.03 cfs @ 12.16 hrs, Volume= 255 cf, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
6,437	39	>75% Grass cover, Good, HSG A
6,437		100.00% Pervious Area

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

Summary for Subcatchment 2A: 2A

Runoff = 0.11 cfs @ 12.27 hrs, Volume= 782 cf, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

	Area (sf)	CN	Description
*	1,487	65	Playground
	14,427	39	>75% Grass cover, Good, HSG A
	15,914	41	Weighted Average
	15,914		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
0.6	25	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.4	75	Total			

Summary for Subcatchment 2B: 2B

Runoff = 2.21 cfs @ 12.17 hrs, Volume= 7,164 cf, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
15,311	98	Paved roads w/curbs & sewers, HSG A
34,179	39	>75% Grass cover, Good, HSG A
49,490	57	Weighted Average
34,179		69.06% Pervious Area
15,311		30.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
2.8	113	0.0090	0.66		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.0	163	Total			

Summary for Subcatchment 2S: 2

Runoff = 13.24 cfs @ 12.24 hrs, Volume= 53,509 cf, Depth= 4.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

	Area (sf)	CN	Description
	107,069	98	Paved roads w/curbs & sewers, HSG A
*	12,550	65	Playground
	22,929	39	>75% Grass cover, Good, HSG A
	142,548	86	Weighted Average
	35,479		24.89% Pervious Area
	107,069		75.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
5.7	250	0.0110	0.73		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.3300	4.02		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.6	325	Total			

Summary for Subcatchment 3A: 3A

Runoff = 0.05 cfs @ 12.16 hrs, Volume= 395 cf, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
9,995	39	>75% Grass cover, Good, HSG A
9,995		100.00% Pervious Area

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

Summary for Subcatchment 3B: 3B

Runoff = 0.05 cfs @ 12.16 hrs, Volume= 423 cf, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
10,701	39	>75% Grass cover, Good, HSG A
10,701		100.00% Pervious Area

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

Summary for Subcatchment 3S: 3

Runoff = 19.89 cfs @ 12.21 hrs, Volume= 74,528 cf, Depth= 4.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
158,140	98	Paved roads w/curbs & sewers, HSG A
31,249	39	>75% Grass cover, Good, HSG A
189,389	88	Weighted Average
31,249		16.50% Pervious Area
158,140		83.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	50	0.0120	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
3.2	150	0.0125	0.78		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
13.3	200	Total			

Summary for Subcatchment 4A: Showcase Watershed

Runoff = 23.70 cfs @ 12.12 hrs, Volume= 62,838 cf, Depth= 3.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
80,318	39	>75% Grass cover, Good, HSG A
137,205	98	Paved roads w/curbs & sewers, HSG A
217,523	76	Weighted Average
80,318		36.92% Pervious Area
137,205		63.08% Impervious Area

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

Summary for Subcatchment 5S: Watershed 5 (Bypass)

Runoff = 0.07 cfs @ 12.41 hrs, Volume= 670 cf, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
0	98	Paved roads w/curbs & sewers, HSG A
16,943	39	>75% Grass cover, Good, HSG A
16,943	39	Weighted Average
16,943		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.3	80	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.3	258	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.4	388	Total			

Summary for Subcatchment 6S: Watershed 6 (bypass)

Runoff = 0.21 cfs @ 12.21 hrs, Volume= 1,267 cf, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
22,376	39	>75% Grass cover, Good, HSG A
1,026	98	Paved roads w/curbs & sewers, HSG A
23,402	42	Weighted Average
22,376		95.62% Pervious Area
1,026		4.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.3	75	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.5	125	Total			

Summary for Subcatchment 7S: Watershed 7b

Runoff = 1.93 cfs @ 12.12 hrs, Volume= 5,999 cf, Depth= 5.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
12,358	98	Unconnected pavement, HSG A
175	39	>75% Grass cover, Good, HSG A
12,533	97	Weighted Average
175		1.40% Pervious Area
12,358		98.60% Impervious Area
12,358		100.00% Unconnected

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

Summary for Subcatchment 8S: 8

Runoff = 4.75 cfs @ 12.31 hrs, Volume= 20,838 cf, Depth= 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
44,805	98	Paved roads w/curbs & sewers, HSG A
54,639	39	>75% Grass cover, Good, HSG A
99,444	66	Weighted Average
54,639		54.94% Pervious Area
44,805		45.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	50	0.0050	0.06		**Sheet Flow,**
					Grass: Short n= 0.150 P2= 1.50"
4.8	182	0.0080	0.63		**Shallow Concentrated Flow,**
					Short Grass Pasture Kv= 7.0 fps
1.1	225	0.0050	3.47	2.73	**Pipe Channel, 12" HDPE**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.012 Corrugated PP, smooth interior
20.2	457	Total			

Summary for Subcatchment 22S: Watershed 7a

Runoff = 0.62 cfs @ 12.12 hrs, Volume= 1,942 cf, Depth= 5.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.10"

Area (sf)	CN	Description
3,975	98	Unconnected pavement, HSG A
3,975		100.00% Impervious Area
3,975		100.00% Unconnected

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

Summary for Reach 1R: Wetland 1

Inflow Area =	6,437 sf,	0.00% Impervious,	Inflow Depth = 0.47"	for 25-Year event
Inflow =	0.03 cfs @	12.16 hrs, Volume=	255 cf	
Outflow =	0.03 cfs @	12.16 hrs, Volume=	255 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Wetland D

Inflow Area = 207,952 sf, 58.85% Impervious, Inflow Depth = 0.05" for 25-Year event
Inflow = 0.11 cfs @ 12.27 hrs, Volume= 782 cf
Outflow = 0.11 cfs @ 12.27 hrs, Volume= 782 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 3R: Wetland M

Inflow	=	0.00 cfs @	0.00 hrs,	Volume=	0 cf
Outflow	=	0.00 cfs @	0.00 hrs,	Volume=	0 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 4R: Wetland N

Inflow Area =	23,402 sf,	4.38% Impervious,	Inflow Depth = 0.65"	for 25-Year event
Inflow =	0.21 cfs @	12.21 hrs, Volume=	1,267 cf	
Outflow =	0.21 cfs @	12.21 hrs, Volume=	1,267 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 5R: Wetland C

Inflow Area =	16,943 sf,	0.00% Impervious,	Inflow Depth = 0.47"	for 25-Year event
Inflow =	0.07 cfs @	12.41 hrs, Volume=	670 cf	
Outflow =	0.07 cfs @	12.41 hrs, Volume=	670 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 6R: Showcase

Inflow Area =	543,560 sf,	65.58% Impervious,	Inflow Depth = 1.96"	for 25-Year event
Inflow =	31.40 cfs @	12.13 hrs, Volume=	88,854 cf	
Outflow =	31.40 cfs @	12.13 hrs, Volume=	88,854 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Basin 1

Inflow Area = 192,038 sf, 63.73% Impervious, Inflow Depth = 3.79" for 25-Year event
Inflow = 15.00 cfs @ 12.23 hrs, Volume= 60,673 cf
Outflow = 8.80 cfs @ 12.43 hrs, Volume= 60,676 cf, Atten= 41%, Lag= 12.0 min
Discarded = 8.80 cfs @ 12.43 hrs, Volume= 60,676 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 46.73' @ 12.43 hrs Surf.Area= 10,590 sf Storage= 6,530 cf
Flood Elev= 49.00' Surf.Area= 15,007 sf Storage= 24,955 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 3.6 min (821.1 - 817.5)

Volume	Invert	Avail.Storage	Storage Description
#1	43.50'	0 cf	**ASTM C-33 Sand (Prismatic)** Listed below (Recalc) 6,689 cf Overall x 0.0% Voids
#2	45.50'	24,955 cf	**Basin (Prismatic)** Listed below (Recalc)
		24,955 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
43.50	4,459	0	0
44.50	4,459	4,459	4,459
45.00	4,459	2,230	6,689

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
45.50	4,459	0	0
46.00	5,124	2,396	2,396
47.00	6,495	5,810	8,205
48.00	8,228	7,362	15,567
49.00	10,548	9,388	24,955

Device	Routing	Invert	Outlet Devices
#1	Discarded	43.50'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 43.40'
#2	Device 1	43.50'	**8.270 in/hr Sand Exfiltration over Surface area** Conductivity to Groundwater Elevation = 43.40'
#3	Primary	48.00'	**13.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=8.80 cfs @ 12.43 hrs HW=46.73' (Free Discharge)
└─**1=Exfiltration** (Controls 8.80 cfs)
  └─**2=Sand Exfiltration** (Passes 8.80 cfs of 30.19 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=43.50' TW=0.00' (Dynamic Tailwater)
└─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2: DDMH 2

Inflow Area = 142,548 sf, 75.11% Impervious, Inflow Depth = 4.50" for 25-Year event
Inflow = 13.24 cfs @ 12.24 hrs, Volume= 53,509 cf
Outflow = 13.24 cfs @ 12.24 hrs, Volume= 53,509 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.00 cfs @ 12.23 hrs, Volume= 32,118 cf
Secondary = 11.27 cfs @ 12.25 hrs, Volume= 21,391 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 47.85' @ 12.25 hrs
Flood Elev= 49.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.72'	**12.0" Round 12" RCP** L= 3.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 45.72' / 45.70' S= 0.0067 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 3	46.50'	**3.0' long x 3.00' rise Sharp-Crested Rectangular Weir** 0 End Contraction(s)
#3	Secondary	46.00'	**18.0" Round 18" RCP X 2.00** L= 3.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 46.00' / 45.90' S= 0.0333 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf

Primary OutFlow Max=1.85 cfs @ 12.23 hrs HW=47.82' TW=47.67' (Dynamic Tailwater)
└─**1=12" RCP** (Inlet Controls 1.85 cfs @ 2.35 fps)

Secondary OutFlow Max=11.25 cfs @ 12.25 hrs HW=47.85' TW=47.41' (Dynamic Tailwater)
└─**3=18" RCP** (Inlet Controls 11.25 cfs @ 3.18 fps)
  └─**2=Sharp-Crested Rectangular Weir** (Passes 11.25 cfs of 11.70 cfs potential flow)

Summary for Pond 2-A: Basin 2A

Inflow Area =	199,384 sf, 79.31% Impervious,	Inflow Depth = 2.81" for 25-Year event	
Inflow =	12.24 cfs @ 12.22 hrs,	Volume=	46,689 cf
Outflow =	11.94 cfs @ 12.25 hrs,	Volume=	46,691 cf, Atten= 2%, Lag= 1.8 min
Discarded =	1.46 cfs @ 12.25 hrs,	Volume=	27,844 cf
Primary =	10.48 cfs @ 12.25 hrs,	Volume=	18,847 cf
Secondary =	0.00 cfs @ 0.00 hrs,	Volume=	0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 43.76' @ 12.25 hrs Surf.Area= 5,714 sf Storage= 3,588 cf
Flood Elev= 44.25' Surf.Area= 6,137 sf Storage= 5,356 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 8.9 min (817.4 - 808.4)

Volume	Invert	Avail.Storage	Storage Description
#1	40.50'	0 cf	**ASTM C-33 Sand (Prismatic)** Listed below (Recalc) 3,510 cf Overall x 0.0% Voids
#2	42.50'	5,356 cf	**Basin (Prismatic)** Listed below (Recalc)
		5,356 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.50	2,340	0	0
41.00	2,340	1,170	1,170
42.00	2,340	2,340	3,510

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
42.50	2,340	0	0
43.00	2,749	1,272	1,272
44.00	3,575	3,162	4,434
44.25	3,797	922	5,356

Device	Routing	Invert	Outlet Devices
#1	Primary	43.25'	**9.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	40.50'	**2.410 in/hr In-Situ Exfiltration over Surface area** Conductivity to Groundwater Elevation = 40.10'
#3	Device 2	40.50'	**8.270 in/hr Sand Exfiltration over Surface area** Conductivity to Groundwater Elevation = 40.10'
#4	Secondary	44.20'	**118.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 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

Discarded OutFlow Max=1.46 cfs @ 12.25 hrs HW=43.76' (Free Discharge)
↑—**2=In-Situ Exfiltration** (Controls 1.46 cfs)
↑—**3=Sand Exfiltration** (Passes 1.46 cfs of 5.01 cfs potential flow)

Primary OutFlow Max=10.48 cfs @ 12.25 hrs HW=43.76' TW=40.40' (Dynamic Tailwater)
↑—**1=Sharp-Crested Rectangular Weir** (Weir Controls 10.48 cfs @ 2.33 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=40.50' TW=0.00' (Dynamic Tailwater)
↑—**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2-B: Basin 2B

Inflow Area = 210,085 sf, 75.27% Impervious, Inflow Depth = 1.10" for 25-Year event
Inflow = 10.53 cfs @ 12.25 hrs, Volume= 19,270 cf
Outflow = 7.25 cfs @ 12.39 hrs, Volume= 19,275 cf, Atten= 31%, Lag= 8.2 min
Discarded = 5.44 cfs @ 12.39 hrs, Volume= 17,422 cf
Primary = 1.80 cfs @ 12.39 hrs, Volume= 1,853 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 40.73' @ 12.39 hrs Surf.Area= 8,544 sf Storage= 3,997 cf
Flood Elev= 42.00' Surf.Area= 10,364 sf Storage= 10,316 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 6.0 min (753.2 - 747.2)

Volume	Invert	Avail.Storage	Storage Description
#1	36.75'	0 cf	**ASTM C-33 sand (Prismatic)** Listed below (Recalc) 4,726 cf Overall x 0.0% Voids
#2	39.00'	11,808 cf	**Basin (Prismatic)** Listed below (Recalc)
		11,808 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.75	799	0	0
37.50	2,459	1,222	1,222
38.50	4,550	3,505	4,726

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.00	799	0	0
40.00	2,459	1,629	1,629
41.00	4,550	3,505	5,134
42.00	5,814	5,182	10,316
42.25	6,125	1,492	11,808

Device	Routing	Invert	Outlet Devices
#1	Primary	36.60'	**12.0" Round 15" RCP** L= 9.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 36.60' / 36.20' S= 0.0444 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	36.75'	**2.410 in/hr In-Situ Exfiltration over Surface area** Conductivity to Groundwater Elevation = 36.70'
#3	Device 2	36.75'	**8.270 in/hr Sand Exfiltration over Surface area** Conductivity to Groundwater Elevation = 36.70'
#4	Device 1	40.00'	**12.0" Vert. Vertical Orifice** C= 0.600
#5	Device 1	41.00'	**32.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#6	Secondary	41.25'	**6.0' long Conc. Curb Overflow** 2 End Contraction(s)
#7	Tertiary	42.10'	**193.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

			2.50 3.00 3.50 4.00 4.50 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
#8	Tertiary	42.10'	**193.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 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

Discarded OutFlow Max=5.44 cfs @ 12.39 hrs HW=40.73' (Free Discharge)
└─**2=In-Situ Exfiltration** (Controls 5.44 cfs)
  └─**3=Sand Exfiltration** (Passes 5.44 cfs of 18.68 cfs potential flow)

Primary OutFlow Max=1.80 cfs @ 12.39 hrs HW=40.73' TW=35.55' (Dynamic Tailwater)
└─**1=15" RCP** (Passes 1.80 cfs of 7.21 cfs potential flow)
  ├─**4=Vertical Orifice** (Orifice Controls 1.80 cfs @ 2.92 fps)
  └─**5=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=36.75' TW=0.00' (Dynamic Tailwater)
└─**6=Conc. Curb Overflow** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=36.75' TW=0.00' (Dynamic Tailwater)
├─**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**8=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 3P: Basin 3

Inflow Area =	99,444 sf,	45.06% Impervious,	Inflow Depth = 2.51"	for 25-Year event
Inflow =	4.75 cfs @	12.31 hrs, Volume=	20,838 cf	
Outflow =	2.21 cfs @	12.66 hrs, Volume=	20,841 cf, Atten= 53%, Lag= 20.9 min	
Discarded =	0.86 cfs @	12.66 hrs, Volume=	18,819 cf	
Primary =	1.36 cfs @	12.66 hrs, Volume=	2,022 cf	
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 43.13' @ 12.66 hrs Surf.Area= 7,187 sf Storage= 5,857 cf
Flood Elev= 44.00' Surf.Area= 7,917 sf Storage= 9,832 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 51.8 min (915.2 - 863.5)

Volume	Invert	Avail.Storage	Storage Description
#1	39.50'	0 cf	**ASTM C-33 Sand (Prismatic)** Listed below (Recalc) 4,436 cf Overall x 0.0% Voids
#2	41.50'	9,832 cf	**Basin (Prismatic)** Listed below (Recalc)
		9,832 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.50	2,957	0	0
40.50	2,957	2,957	2,957
41.00	2,957	1,479	4,436

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	2,957	0	0
42.00	3,329	1,572	1,572
43.00	4,116	3,723	5,294
44.00	4,960	4,538	9,832

Device	Routing	Invert	Outlet Devices
#1	Primary	38.00'	**12.0" Round 12" RCP** L= 109.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 38.00' / 36.50' S= 0.0138 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	39.50'	**1.020 in/hr In Situ Exfiltration over Surface area** Conductivity to Groundwater Elevation = 39.10'
#3	Device 2	39.50'	**8.270 in/hr Sand Layer Exfiltration over Surface area** Conductivity to Groundwater Elevation = 39.10'
#4	Device 1	43.00'	**32.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	43.50'	**6.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.86 cfs @ 12.66 hrs HW=43.13' (Free Discharge)
└─**2=In Situ Exfiltration** (Controls 0.86 cfs)
  └─**3=Sand Layer Exfiltration** (Passes 0.86 cfs of 6.96 cfs potential flow)

Primary OutFlow Max=1.36 cfs @ 12.66 hrs HW=43.13' TW=35.24' (Dynamic Tailwater)
└─**1=12" RCP** (Passes 1.36 cfs of 7.12 cfs potential flow)
  └─**4=Orifice/Grate** (Weir Controls 1.36 cfs @ 1.20 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=39.50' TW=34.45' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 4P: STORMCEPTOR

Inflow Area = 142,548 sf, 75.11% Impervious, Inflow Depth = 2.70" for 25-Year event
Inflow = 2.00 cfs @ 12.23 hrs, Volume= 32,118 cf
Outflow = 2.00 cfs @ 12.23 hrs, Volume= 32,118 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.00 cfs @ 12.23 hrs, Volume= 32,118 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 47.68' @ 12.25 hrs
Flood Elev= 49.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.85'	**12.0" Round 12" RCP** L= 3.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 45.85' / 45.80' S= 0.0167 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=1.95 cfs @ 12.23 hrs HW=47.67' TW=47.41' (Dynamic Tailwater)
↑—**1=12" RCP** (Inlet Controls 1.95 cfs @ 2.48 fps)

Summary for Pond 5P: Forebay P2

Inflow Area = 189,389 sf, 83.50% Impervious, Inflow Depth = 3.82" for 25-Year event
Inflow = 12.58 cfs @ 12.20 hrs, Volume= 60,328 cf
Outflow = 12.41 cfs @ 12.22 hrs, Volume= 60,194 cf, Atten= 1%, Lag= 1.4 min
Discarded = 0.22 cfs @ 12.22 hrs, Volume= 13,901 cf
Primary = 12.19 cfs @ 12.22 hrs, Volume= 46,294 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 44.31' @ 12.22 hrs Surf.Area= 2,569 sf Storage= 4,780 cf
Flood Elev= 45.00' Surf.Area= 3,023 sf Storage= 6,708 cf

Plug-Flow detention time= 70.1 min calculated for 60,194 cf (100% of inflow)
Center-of-Mass det. time= 68.7 min (882.5 - 813.8)

Volume	Invert	Avail.Storage	Storage Description
#1	41.50'	6,708 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	912	0	0
42.00	1,170	521	521
43.00	1,727	1,449	1,969
44.00	2,364	2,046	4,015
45.00	3,023	2,694	6,708

Device	Routing	Invert	Outlet Devices
#1	Primary	43.75'	**9.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	41.50'	**0.520 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 41.30'

Discarded OutFlow Max=0.22 cfs @ 12.22 hrs HW=44.31' (Free Discharge)
2=Exfiltration (Controls 0.22 cfs)

Primary OutFlow Max=12.19 cfs @ 12.22 hrs HW=44.31' TW=43.75' (Dynamic Tailwater)
1=Sharp-Crested Rectangular Weir (Weir Controls 12.19 cfs @ 2.45 fps)

Summary for Pond 10: DMH 10

Inflow Area =	189,389 sf,	83.50% Impervious,	Inflow Depth = 4.72"	for 25-Year event
Inflow =	19.89 cfs @	12.21 hrs, Volume=	74,528 cf	
Outflow =	19.89 cfs @	12.21 hrs, Volume=	74,528 cf,	Atten= 0%, Lag= 0.0 min
Primary =	12.58 cfs @	12.20 hrs, Volume=	60,328 cf	
Secondary =	7.36 cfs @	12.22 hrs, Volume=	14,200 cf	
Tertiary =	0.00 cfs @	0.00 hrs, Volume=	0 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 44.50' @ 12.22 hrs
Flood Elev= 44.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	41.60'	**20.0" Round Double 20" DI X 2.00** L= 18.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 41.60' / 41.50' S= 0.0056 '/' Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 2.18 sf
#2	Tertiary	44.80'	**32.0" Horiz. Orifice/Grate Overflow** C= 0.600 Limited to weir flow at low heads
#3	Device 4	43.80'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Secondary	40.65'	**18.0" Round 18" RCP** L= 202.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 40.65' / 38.45' S= 0.0109 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 1.77 sf

Primary OutFlow Max=12.37 cfs @ 12.20 hrs HW=44.49' TW=44.30' (Dynamic Tailwater)
└─**1=Double 20" DI** (Inlet Controls 12.37 cfs @ 2.83 fps)

Secondary OutFlow Max=7.35 cfs @ 12.22 hrs HW=44.50' TW=35.78' (Dynamic Tailwater)
└─**4=18" RCP** (Passes 7.35 cfs of 11.94 cfs potential flow)
  └─**3=Sharp-Crested Rectangular Weir** (Weir Controls 7.35 cfs @ 2.73 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=40.65' TW=39.50' (Dynamic Tailwater)
└─**2=Orifice/Grate Overflow** (Controls 0.00 cfs)

Summary for Pond 20A: DMH-20A

Inflow Area = 142,548 sf, 75.11% Impervious, Inflow Depth = 4.50" for 25-Year event
Inflow = 13.24 cfs @ 12.24 hrs, Volume= 53,509 cf
Outflow = 13.24 cfs @ 12.24 hrs, Volume= 53,509 cf, Atten= 0%, Lag= 0.0 min
Primary = 13.24 cfs @ 12.24 hrs, Volume= 53,509 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 47.41' @ 12.24 hrs
Flood Elev= 49.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.85'	**18.0" Round 18" RCP X 2.00** L= 20.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 45.85' / 45.70' S= 0.0075 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf

Primary OutFlow Max=13.23 cfs @ 12.24 hrs HW=47.41' TW=46.31' (Dynamic Tailwater)
↑—**1=18" RCP** (Barrel Controls 13.23 cfs @ 4.47 fps)

Summary for Pond 21P: Dog DMH-30

Inflow Area = 313,504 sf, 66.00% Impervious, Inflow Depth = 0.77" for 25-Year event
Inflow = 7.87 cfs @ 12.24 hrs, Volume= 20,017 cf
Outflow = 7.87 cfs @ 12.24 hrs, Volume= 20,017 cf, Atten= 0%, Lag= 0.0 min
Primary = 7.87 cfs @ 12.24 hrs, Volume= 20,017 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 35.79' @ 12.24 hrs
Flood Elev= 41.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	34.45'	**30.0" Round Ex. 30" RCP** L= 96.8' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 34.45' / 34.10' S= 0.0036 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf

Primary OutFlow Max=7.86 cfs @ 12.24 hrs HW=35.79' TW=0.00' (Dynamic Tailwater)
└─**1=Ex. 30" RCP** (Barrel Controls 7.86 cfs @ 4.26 fps)

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

Subcatchment 1S: 1 Runoff Area=6,437 sf 0.00% Impervious Runoff Depth=1.40"
Tc=5.0 min CN=39 Runoff=0.23 cfs 751 cf

Subcatchment 2A: 2A Runoff Area=15,914 sf 0.00% Impervious Runoff Depth=1.61"
Flow Length=75' Slope=0.0100 '/' Tc=11.4 min CN=41 Runoff=0.51 cfs 2,133 cf

Subcatchment 2B: 2B Runoff Area=49,490 sf 30.94% Impervious Runoff Depth=3.41"
Flow Length=163' Tc=9.0 min CN=57 Runoff=4.54 cfs 14,049 cf

Subcatchment 2S: 2 Runoff Area=142,548 sf 75.11% Impervious Runoff Depth=6.88"
Flow Length=325' Tc=16.6 min CN=86 Runoff=19.77 cfs 81,671 cf

Subcatchment 3A: 3A Runoff Area=9,995 sf 0.00% Impervious Runoff Depth=1.40"
Tc=5.0 min CN=39 Runoff=0.36 cfs 1,166 cf

Subcatchment 3B: 3B Runoff Area=10,701 sf 0.00% Impervious Runoff Depth=1.40"
Tc=5.0 min CN=39 Runoff=0.39 cfs 1,249 cf

Subcatchment 3S: 3 Runoff Area=189,389 sf 83.50% Impervious Runoff Depth=7.12"
Flow Length=200' Tc=13.3 min CN=88 Runoff=29.28 cfs 112,313 cf

Subcatchment 4A: Showcase Watershed Runoff Area=217,523 sf 63.08% Impervious Runoff Depth=5.67"
Tc=5.0 min CN=76 Runoff=38.01 cfs 102,780 cf

Subcatchment 5S: Watershed 5 (Bypass) Runoff Area=16,943 sf 0.00% Impervious Runoff Depth=1.40"
Flow Length=388' Tc=14.4 min CN=39 Runoff=0.40 cfs 1,977 cf

Subcatchment 6S: Watershed 6 (bypass) Runoff Area=23,402 sf 4.38% Impervious Runoff Depth=1.71"
Flow Length=125' Slope=0.0200 '/' Tc=9.5 min CN=42 Runoff=0.90 cfs 3,344 cf

Subcatchment 7S: Watershed 7b Runoff Area=12,533 sf 98.60% Impervious Runoff Depth=8.20"
Tc=5.0 min CN=97 Runoff=2.73 cfs 8,564 cf

Subcatchment 8S: 8 Runoff Area=99,444 sf 45.06% Impervious Runoff Depth=4.47"
Flow Length=457' Tc=20.2 min CN=66 Runoff=8.57 cfs 37,050 cf

Subcatchment 22S: Watershed 7a Runoff Area=3,975 sf 100.00% Impervious Runoff Depth=8.32"
Tc=5.0 min CN=98 Runoff=0.87 cfs 2,756 cf

Reach 1R: Wetland 1 Inflow=0.23 cfs 751 cf
Outflow=0.23 cfs 751 cf

Reach 2R: Wetland D Inflow=0.51 cfs 2,133 cf
Outflow=0.51 cfs 2,133 cf

Reach 3R: Wetland M Inflow=0.00 cfs 0 cf
Outflow=0.00 cfs 0 cf

Reach 4R: Wetland N Inflow=0.90 cfs 3,344 cf
Outflow=0.90 cfs 3,344 cf

Reach 5R: Wetland C Inflow=0.40 cfs 1,977 cf
Outflow=0.40 cfs 1,977 cf

Reach 6R: Showcase Inflow=50.66 cfs 158,055 cf
Outflow=50.66 cfs 158,055 cf

Pond 1P: Basin 1 Peak Elev=47.86' Storage=14,411 cf Inflow=23.35 cfs 95,720 cf
Discarded=11.88 cfs 95,735 cf Primary=0.00 cfs 0 cf Outflow=11.88 cfs 95,735 cf

Pond 2: DDMH 2 Peak Elev=49.58' Inflow=19.77 cfs 81,671 cf
Primary=3.43 cfs 42,405 cf Secondary=17.21 cfs 39,266 cf Outflow=19.77 cfs 81,671 cf

Pond 2-A: Basin 2A Peak Elev=43.89' Storage=4,048 cf Inflow=16.69 cfs 73,088 cf
Discarded=1.52 cfs 40,117 cf Primary=14.87 cfs 32,973 cf Secondary=0.00 cfs 0 cf Outflow=16.39 cfs 73,090 cf

Pond 2-B: Basin 2B Peak Elev=41.23' Storage=6,225 cf Inflow=15.07 cfs 34,222 cf
ded=6.17 cfs 27,103 cf Primary=6.31 cfs 7,137 cf Secondary=0.00 cfs 0 cf Tertiary=0.00 cfs 0 cf Outflow=12.47 cfs 34,241 cf

Pond 3P: Basin 3 Peak Elev=43.39' Storage=6,963 cf Inflow=8.57 cfs 37,050 cf
Discarded=0.92 cfs 25,415 cf Primary=6.67 cfs 11,638 cf Secondary=0.00 cfs 0 cf Outflow=7.59 cfs 37,053 cf

Pond 4P: STORMCEPTOR Peak Elev=49.42' Inflow=3.43 cfs 42,405 cf
12.0" Round Culvert n=0.012 L=3.0' S=0.0167 '/' Outflow=3.43 cfs 42,405 cf

Pond 5P: Forebay P2 Peak Elev=44.45' Storage=5,148 cf Inflow=17.03 cfs 87,132 cf
Discarded=0.23 cfs 15,074 cf Primary=16.49 cfs 71,922 cf Outflow=16.71 cfs 86,995 cf

Pond 10: DMH 10 Peak Elev=44.79' Inflow=29.28 cfs 112,313 cf
Primary=17.03 cfs 87,132 cf Secondary=12.32 cfs 25,180 cf Tertiary=0.00 cfs 0 cf Outflow=29.28 cfs 112,313 cf

Pond 20A: DMH-20A Peak Elev=48.63' Inflow=19.77 cfs 81,671 cf
18.0" Round Culvert x 2.00 n=0.012 L=20.0' S=0.0075 '/' Outflow=19.77 cfs 81,671 cf

Pond 21P: Dog DMH-30 Peak Elev=36.82' Inflow=20.08 cfs 46,711 cf
30.0" Round Culvert n=0.012 L=96.8' S=0.0036 '/' Outflow=20.08 cfs 46,711 cf

Total Runoff Area = 798,294 sf Runoff Volume = 369,803 cf Average Runoff Depth = 5.56"
39.89% Pervious = 318,405 sf 60.11% Impervious = 479,889 sf

Summary for Subcatchment 1S: 1

Runoff = 0.23 cfs @ 12.13 hrs, Volume= 751 cf, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
6,437	39	>75% Grass cover, Good, HSG A
6,437		100.00% Pervious Area

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

Summary for Subcatchment 2A: 2A

Runoff = 0.51 cfs @ 12.21 hrs, Volume= 2,133 cf, Depth= 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

	Area (sf)	CN	Description
*	1,487	65	Playground
	14,427	39	>75% Grass cover, Good, HSG A
	15,914	41	Weighted Average
	15,914		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
0.6	25	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.4	75	Total			

Summary for Subcatchment 2B: 2B

Runoff = 4.54 cfs @ 12.17 hrs, Volume= 14,049 cf, Depth= 3.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
15,311	98	Paved roads w/curbs & sewers, HSG A
34,179	39	>75% Grass cover, Good, HSG A
49,490	57	Weighted Average
34,179		69.06% Pervious Area
15,311		30.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		**Sheet Flow,**
					Grass: Short n= 0.150 P2= 1.50"
2.8	113	0.0090	0.66		**Shallow Concentrated Flow,**
					Short Grass Pasture Kv= 7.0 fps
9.0	163	Total			

Summary for Subcatchment 2S: 2

Runoff = 19.77 cfs @ 12.24 hrs, Volume= 81,671 cf, Depth= 6.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

	Area (sf)	CN	Description
	107,069	98	Paved roads w/curbs & sewers, HSG A
*	12,550	65	Playground
	22,929	39	>75% Grass cover, Good, HSG A
	142,548	86	Weighted Average
	35,479		24.89% Pervious Area
	107,069		75.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
5.7	250	0.0110	0.73		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	25	0.3300	4.02		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
16.6	325	Total			

Summary for Subcatchment 3A: 3A

Runoff = 0.36 cfs @ 12.13 hrs, Volume= 1,166 cf, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
9,995	39	>75% Grass cover, Good, HSG A
9,995		100.00% Pervious Area

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

Summary for Subcatchment 3B: 3B

Runoff = 0.39 cfs @ 12.13 hrs, Volume= 1,249 cf, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
10,701	39	>75% Grass cover, Good, HSG A
10,701		100.00% Pervious Area

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

Summary for Subcatchment 3S: 3

Runoff = 29.28 cfs @ 12.21 hrs, Volume= 112,313 cf, Depth= 7.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
158,140	98	Paved roads w/curbs & sewers, HSG A
31,249	39	>75% Grass cover, Good, HSG A
189,389	88	Weighted Average
31,249		16.50% Pervious Area
158,140		83.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	50	0.0120	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
3.2	150	0.0125	0.78		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
13.3	200	Total			

Summary for Subcatchment 4A: Showcase Watershed

Runoff = 38.01 cfs @ 12.12 hrs, Volume= 102,780 cf, Depth= 5.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
80,318	39	>75% Grass cover, Good, HSG A
137,205	98	Paved roads w/curbs & sewers, HSG A
217,523	76	Weighted Average
80,318		36.92% Pervious Area
137,205		63.08% Impervious Area

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

Summary for Subcatchment 5S: Watershed 5 (Bypass)

Runoff = 0.40 cfs @ 12.27 hrs, Volume= 1,977 cf, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
0	98	Paved roads w/curbs & sewers, HSG A
16,943	39	>75% Grass cover, Good, HSG A
16,943	39	Weighted Average
16,943		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	50	0.0100	0.08		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.3	80	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.3	258	0.0150	1.84		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.4	388	Total			

Summary for Subcatchment 6S: Watershed 6 (bypass)

Runoff = 0.90 cfs @ 12.18 hrs, Volume= 3,344 cf, Depth= 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
22,376	39	>75% Grass cover, Good, HSG A
1,026	98	Paved roads w/curbs & sewers, HSG A
23,402	42	Weighted Average
22,376		95.62% Pervious Area
1,026		4.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0200	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 1.50"
1.3	75	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
9.5	125	Total			

Summary for Subcatchment 7S: Watershed 7b

Runoff = 2.73 cfs @ 12.12 hrs, Volume= 8,564 cf, Depth= 8.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
12,358	98	Unconnected pavement, HSG A
175	39	>75% Grass cover, Good, HSG A
12,533	97	Weighted Average
175		1.40% Pervious Area
12,358		98.60% Impervious Area
12,358		100.00% Unconnected

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

Summary for Subcatchment 8S: 8

Runoff = 8.57 cfs @ 12.30 hrs, Volume= 37,050 cf, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
44,805	98	Paved roads w/curbs & sewers, HSG A
54,639	39	>75% Grass cover, Good, HSG A
99,444	66	Weighted Average
54,639		54.94% Pervious Area
44,805		45.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	50	0.0050	0.06		**Sheet Flow,**
					Grass: Short n= 0.150 P2= 1.50"
4.8	182	0.0080	0.63		**Shallow Concentrated Flow,**
					Short Grass Pasture Kv= 7.0 fps
1.1	225	0.0050	3.47	2.73	**Pipe Channel, 12" HDPE**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.012 Corrugated PP, smooth interior
20.2	457	Total			

Summary for Subcatchment 22S: Watershed 7a

Runoff = 0.87 cfs @ 12.12 hrs, Volume= 2,756 cf, Depth= 8.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.56"

Area (sf)	CN	Description
3,975	98	Unconnected pavement, HSG A
3,975		100.00% Impervious Area
3,975		100.00% Unconnected

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

Summary for Reach 1R: Wetland 1

Inflow Area =	6,437 sf,	0.00% Impervious,	Inflow Depth = 1.40"	for 100-Year event
Inflow =	0.23 cfs @	12.13 hrs, Volume=	751 cf	
Outflow =	0.23 cfs @	12.13 hrs, Volume=	751 cf, Atten= 0%,	Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Wetland D

Inflow Area =	207,952 sf,	58.85% Impervious,	Inflow Depth = 0.12"	for 100-Year event
Inflow =	0.51 cfs @	12.21 hrs, Volume=	2,133 cf	
Outflow =	0.51 cfs @	12.21 hrs, Volume=	2,133 cf,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 3R: Wetland M

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf	
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 4R: Wetland N

Inflow Area = 23,402 sf, 4.38% Impervious, Inflow Depth = 1.71" for 100-Year event
Inflow = 0.90 cfs @ 12.18 hrs, Volume= 3,344 cf
Outflow = 0.90 cfs @ 12.18 hrs, Volume= 3,344 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 5R: Wetland C

Inflow Area =	16,943 sf,	0.00% Impervious,	Inflow Depth = 1.40"	for 100-Year event
Inflow =	0.40 cfs @	12.27 hrs, Volume=	1,977 cf	
Outflow =	0.40 cfs @	12.27 hrs, Volume=	1,977 cf, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach 6R: Showcase

Inflow Area =	543,560 sf,	65.58% Impervious,	Inflow Depth = 3.49"	for 100-Year event	
Inflow =	50.66 cfs @	12.13 hrs,	Volume=	158,055 cf	
Outflow =	50.66 cfs @	12.13 hrs,	Volume=	158,055 cf,	Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Basin 1

Inflow Area = 192,038 sf, 63.73% Impervious, Inflow Depth = 5.98" for 100-Year event
Inflow = 23.35 cfs @ 12.23 hrs, Volume= 95,720 cf
Outflow = 11.88 cfs @ 12.47 hrs, Volume= 95,735 cf, Atten= 49%, Lag= 14.3 min
Discarded = 11.88 cfs @ 12.47 hrs, Volume= 95,735 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 47.86' @ 12.47 hrs Surf.Area= 12,440 sf Storage= 14,411 cf
Flood Elev= 49.00' Surf.Area= 15,007 sf Storage= 24,955 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 7.0 min (813.2 - 806.1)

Volume	Invert	Avail.Storage	Storage Description
#1	43.50'	0 cf	**ASTM C-33 Sand (Prismatic)** Listed below (Recalc) 6,689 cf Overall x 0.0% Voids
#2	45.50'	24,955 cf	**Basin (Prismatic)** Listed below (Recalc)
		24,955 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
43.50	4,459	0	0
44.50	4,459	4,459	4,459
45.00	4,459	2,230	6,689

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
45.50	4,459	0	0
46.00	5,124	2,396	2,396
47.00	6,495	5,810	8,205
48.00	8,228	7,362	15,567
49.00	10,548	9,388	24,955

Device	Routing	Invert	Outlet Devices
#1	Discarded	43.50'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 43.40'
#2	Device 1	43.50'	**8.270 in/hr Sand Exfiltration over Surface area** Conductivity to Groundwater Elevation = 43.40'
#3	Primary	48.00'	**13.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=11.88 cfs @ 12.47 hrs HW=47.86' (Free Discharge)
└─**1=Exfiltration** (Controls 11.88 cfs)
  └─**2=Sand Exfiltration** (Passes 11.88 cfs of 40.76 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=43.50' TW=0.00' (Dynamic Tailwater)
└─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2: DDMH 2

Inflow Area = 142,548 sf, 75.11% Impervious, Inflow Depth = 6.88" for 100-Year event
Inflow = 19.77 cfs @ 12.24 hrs, Volume= 81,671 cf
Outflow = 19.77 cfs @ 12.24 hrs, Volume= 81,671 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.43 cfs @ 12.26 hrs, Volume= 42,405 cf
Secondary = 17.21 cfs @ 12.25 hrs, Volume= 39,266 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 49.58' @ 12.29 hrs
Flood Elev= 49.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.72'	**12.0" Round 12" RCP** L= 3.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 45.72' / 45.70' S= 0.0067 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Device 3	46.50'	**3.0' long x 3.00' rise Sharp-Crested Rectangular Weir** 0 End Contraction(s)
#3	Secondary	46.00'	**18.0" Round 18" RCP X 2.00** L= 3.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 46.00' / 45.90' S= 0.0333 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf

Primary OutFlow Max=1.57 cfs @ 12.26 hrs HW=49.41' TW=49.30' (Dynamic Tailwater)
└─**1=12" RCP** (Inlet Controls 1.57 cfs @ 2.00 fps)

Secondary OutFlow Max=16.58 cfs @ 12.25 hrs HW=49.44' TW=48.49' (Dynamic Tailwater)
└─**3=18" RCP** (Inlet Controls 16.58 cfs @ 4.69 fps)
  └─**2=Sharp-Crested Rectangular Weir** (Passes 16.58 cfs of 37.62 cfs potential flow)

Summary for Pond 2-A: Basin 2A

Inflow Area = 199,384 sf, 79.31% Impervious, Inflow Depth = 4.40" for 100-Year event
Inflow = 16.69 cfs @ 12.22 hrs, Volume= 73,088 cf
Outflow = 16.39 cfs @ 12.25 hrs, Volume= 73,090 cf, Atten= 2%, Lag= 1.6 min
Discarded = 1.52 cfs @ 12.25 hrs, Volume= 40,117 cf
Primary = 14.87 cfs @ 12.25 hrs, Volume= 32,973 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 43.89' @ 12.25 hrs Surf.Area= 5,825 sf Storage= 4,048 cf
Flood Elev= 44.25' Surf.Area= 6,137 sf Storage= 5,356 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 8.5 min (815.9 - 807.4)

Volume	Invert	Avail.Storage	Storage Description
#1	40.50'	0 cf	**ASTM C-33 Sand (Prismatic)** Listed below (Recalc) 3,510 cf Overall x 0.0% Voids
#2	42.50'	5,356 cf	**Basin (Prismatic)** Listed below (Recalc)
		5,356 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.50	2,340	0	0
41.00	2,340	1,170	1,170
42.00	2,340	2,340	3,510

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
42.50	2,340	0	0
43.00	2,749	1,272	1,272
44.00	3,575	3,162	4,434
44.25	3,797	922	5,356

Device	Routing	Invert	Outlet Devices
#1	Primary	43.25'	**9.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	40.50'	**2.410 in/hr In-Situ Exfiltration over Surface area** Conductivity to Groundwater Elevation = 40.10'
#3	Device 2	40.50'	**8.270 in/hr Sand Exfiltration over Surface area** Conductivity to Groundwater Elevation = 40.10'
#4	Secondary	44.20'	**118.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 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

Discarded OutFlow Max=1.52 cfs @ 12.25 hrs HW=43.89' (Free Discharge)
↑—**2=In-Situ Exfiltration** (Controls 1.52 cfs)
↑—**3=Sand Exfiltration** (Passes 1.52 cfs of 5.22 cfs potential flow)

Primary OutFlow Max=14.86 cfs @ 12.25 hrs HW=43.89' TW=41.01' (Dynamic Tailwater)
↑—**1=Sharp-Crested Rectangular Weir** (Weir Controls 14.86 cfs @ 2.62 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=40.50' TW=0.00' (Dynamic Tailwater)
↑—**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2-B: Basin 2B

Inflow Area = 210,085 sf, 75.27% Impervious, Inflow Depth = 1.95" for 100-Year event
Inflow = 15.07 cfs @ 12.25 hrs, Volume= 34,222 cf
Outflow = 12.47 cfs @ 12.34 hrs, Volume= 34,241 cf, Atten= 17%, Lag= 5.8 min
Discarded = 6.17 cfs @ 12.34 hrs, Volume= 27,103 cf
Primary = 6.31 cfs @ 12.34 hrs, Volume= 7,137 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 41.23' @ 12.34 hrs Surf.Area= 9,394 sf Storage= 6,225 cf
Flood Elev= 42.00' Surf.Area= 10,364 sf Storage= 10,316 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 6.6 min (754.8 - 748.2)

Volume	Invert	Avail.Storage	Storage Description
#1	36.75'	0 cf	**ASTM C-33 sand (Prismatic)** Listed below (Recalc) 4,726 cf Overall x 0.0% Voids
#2	39.00'	11,808 cf	**Basin (Prismatic)** Listed below (Recalc)
		11,808 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
36.75	799	0	0
37.50	2,459	1,222	1,222
38.50	4,550	3,505	4,726

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.00	799	0	0
40.00	2,459	1,629	1,629
41.00	4,550	3,505	5,134
42.00	5,814	5,182	10,316
42.25	6,125	1,492	11,808

Device	Routing	Invert	Outlet Devices
#1	Primary	36.60'	**12.0" Round 15" RCP** L= 9.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 36.60' / 36.20' S= 0.0444 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	36.75'	**2.410 in/hr In-Situ Exfiltration over Surface area** Conductivity to Groundwater Elevation = 36.70'
#3	Device 2	36.75'	**8.270 in/hr Sand Exfiltration over Surface area** Conductivity to Groundwater Elevation = 36.70'
#4	Device 1	40.00'	**12.0" Vert. Vertical Orifice** C= 0.600
#5	Device 1	41.00'	**32.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#6	Secondary	41.25'	**6.0' long Conc. Curb Overflow** 2 End Contraction(s)
#7	Tertiary	42.10'	**193.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00

			2.50 3.00 3.50 4.00 4.50 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
#8	Tertiary	42.10'	**193.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 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

Discarded OutFlow Max=6.17 cfs @ 12.34 hrs HW=41.23' (Free Discharge)
2=In-Situ Exfiltration (Controls 6.17 cfs)
3=Sand Exfiltration (Passes 6.17 cfs of 21.16 cfs potential flow)

Primary OutFlow Max=6.30 cfs @ 12.34 hrs HW=41.23' TW=36.81' (Dynamic Tailwater)
1=15" RCP (Passes 6.30 cfs of 7.69 cfs potential flow)
4=Vertical Orifice (Orifice Controls 3.24 cfs @ 4.12 fps)
5=Grate (Weir Controls 3.06 cfs @ 1.58 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=36.75' TW=0.00' (Dynamic Tailwater)
6=Conc. Curb Overflow (Controls 0.00 cfs)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=36.75' TW=0.00' (Dynamic Tailwater)
7=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
8=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 3P: Basin 3

Inflow Area =	99,444 sf, 45.06% Impervious,	Inflow Depth = 4.47" for 100-Year event		
Inflow =	8.57 cfs @	12.30 hrs, Volume=	37,050 cf	
Outflow =	7.59 cfs @	12.39 hrs, Volume=	37,053 cf,	Atten= 11%, Lag= 5.7 min
Discarded =	0.92 cfs @	12.39 hrs, Volume=	25,415 cf	
Primary =	6.67 cfs @	12.39 hrs, Volume=	11,638 cf	
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 43.39' @ 12.39 hrs Surf.Area= 7,402 sf Storage= 6,963 cf
Flood Elev= 44.00' Surf.Area= 7,917 sf Storage= 9,832 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 42.6 min (889.1 - 846.5)

Volume	Invert	Avail.Storage	Storage Description
#1	39.50'	0 cf	**ASTM C-33 Sand (Prismatic)** Listed below (Recalc) 4,436 cf Overall x 0.0% Voids
#2	41.50'	9,832 cf	**Basin (Prismatic)** Listed below (Recalc)
		9,832 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.50	2,957	0	0
40.50	2,957	2,957	2,957
41.00	2,957	1,479	4,436

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	2,957	0	0
42.00	3,329	1,572	1,572
43.00	4,116	3,723	5,294
44.00	4,960	4,538	9,832

Device	Routing	Invert	Outlet Devices
#1	Primary	38.00'	**12.0" Round 12" RCP** L= 109.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 38.00' / 36.50' S= 0.0138 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf
#2	Discarded	39.50'	**1.020 in/hr In Situ Exfiltration over Surface area** Conductivity to Groundwater Elevation = 39.10'
#3	Device 2	39.50'	**8.270 in/hr Sand Layer Exfiltration over Surface area** Conductivity to Groundwater Elevation = 39.10'
#4	Device 1	43.00'	**32.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	43.50'	**6.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.92 cfs @ 12.39 hrs HW=43.39' (Free Discharge)
↑—**2=In Situ Exfiltration** (Controls 0.92 cfs)
  ↑—**3=Sand Layer Exfiltration** (Passes 0.92 cfs of 7.44 cfs potential flow)

Primary OutFlow Max=6.67 cfs @ 12.39 hrs HW=43.39' TW=36.66' (Dynamic Tailwater)
↑—**1=12" RCP** (Passes 6.67 cfs of 7.28 cfs potential flow)
  ↑—**4=Orifice/Grate** (Weir Controls 6.67 cfs @ 2.04 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=39.50' TW=34.45' (Dynamic Tailwater)
↑—**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 4P: STORMCEPTOR

Inflow Area = 142,548 sf, 75.11% Impervious, Inflow Depth = 3.57" for 100-Year event
Inflow = 3.43 cfs @ 12.26 hrs, Volume= 42,405 cf
Outflow = 3.43 cfs @ 12.26 hrs, Volume= 42,405 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.43 cfs @ 12.26 hrs, Volume= 42,405 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 49.42' @ 12.30 hrs
Flood Elev= 49.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.85'	**12.0" Round 12" RCP** L= 3.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 45.85' / 45.80' S= 0.0167 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=3.27 cfs @ 12.26 hrs HW=49.30' TW=48.55' (Dynamic Tailwater)
1=12" RCP (Inlet Controls 3.27 cfs @ 4.16 fps)

Summary for Pond 5P: Forebay P2

Inflow Area = 189,389 sf, 83.50% Impervious, Inflow Depth = 5.52" for 100-Year event
Inflow = 17.03 cfs @ 12.20 hrs, Volume= 87,132 cf
Outflow = 16.71 cfs @ 12.22 hrs, Volume= 86,995 cf, Atten= 2%, Lag= 1.5 min
Discarded = 0.23 cfs @ 12.23 hrs, Volume= 15,074 cf
Primary = 16.49 cfs @ 12.22 hrs, Volume= 71,922 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 44.45' @ 12.23 hrs Surf.Area= 2,661 sf Storage= 5,148 cf
Flood Elev= 45.00' Surf.Area= 3,023 sf Storage= 6,708 cf

Plug-Flow detention time= 53.2 min calculated for 86,971 cf (100% of inflow)
Center-of-Mass det. time= 52.3 min (854.2 - 801.9)

Volume	Invert	Avail.Storage	Storage Description
#1	41.50'	6,708 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	912	0	0
42.00	1,170	521	521
43.00	1,727	1,449	1,969
44.00	2,364	2,046	4,015
45.00	3,023	2,694	6,708

Device	Routing	Invert	Outlet Devices
#1	Primary	43.75'	**9.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#2	Discarded	41.50'	**0.520 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 41.30'

Discarded OutFlow Max=0.23 cfs @ 12.23 hrs HW=44.45' (Free Discharge)
└**2=Exfiltration** (Controls 0.23 cfs)

Primary OutFlow Max=16.44 cfs @ 12.22 hrs HW=44.45' TW=43.88' (Dynamic Tailwater)
└**1=Sharp-Crested Rectangular Weir** (Weir Controls 16.44 cfs @ 2.65 fps)

Summary for Pond 10: DMH 10

Inflow Area = 189,389 sf, 83.50% Impervious, Inflow Depth = 7.12" for 100-Year event
Inflow = 29.28 cfs @ 12.21 hrs, Volume= 112,313 cf
Outflow = 29.28 cfs @ 12.21 hrs, Volume= 112,313 cf, Atten= 0%, Lag= 0.0 min
Primary = 17.03 cfs @ 12.20 hrs, Volume= 87,132 cf
Secondary = 12.32 cfs @ 12.22 hrs, Volume= 25,180 cf
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 44.79' @ 12.22 hrs
Flood Elev= 44.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	41.60'	**20.0" Round Double 20" DI X 2.00** L= 18.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 41.60' / 41.50' S= 0.0056 '/' Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 2.18 sf
#2	Tertiary	44.80'	**32.0" Horiz. Orifice/Grate Overflow** C= 0.600 Limited to weir flow at low heads
#3	Device 4	43.80'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Secondary	40.65'	**18.0" Round 18" RCP** L= 202.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 40.65' / 38.45' S= 0.0109 '/' Cc= 0.900 n= 0.015 Concrete sewer w/manholes & inlets, Flow Area= 1.77 sf

Primary OutFlow Max=16.81 cfs @ 12.20 hrs HW=44.78' TW=44.44' (Dynamic Tailwater)
↑—**1=Double 20" DI** (Inlet Controls 16.81 cfs @ 3.85 fps)

Secondary OutFlow Max=12.31 cfs @ 12.22 hrs HW=44.79' TW=36.40' (Dynamic Tailwater)
↑—**4=18" RCP** (Passes 12.31 cfs of 12.32 cfs potential flow)
  ↑—**3=Sharp-Crested Rectangular Weir** (Weir Controls 12.31 cfs @ 3.26 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=40.65' TW=39.50' (Dynamic Tailwater)
↑—**2=Orifice/Grate Overflow** (Controls 0.00 cfs)

Summary for Pond 20A: DMH-20A

Inflow Area = 142,548 sf, 75.11% Impervious, Inflow Depth = 6.88" for 100-Year event
Inflow = 19.77 cfs @ 12.24 hrs, Volume= 81,671 cf
Outflow = 19.77 cfs @ 12.24 hrs, Volume= 81,671 cf, Atten= 0%, Lag= 0.0 min
Primary = 19.77 cfs @ 12.24 hrs, Volume= 81,671 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 48.63' @ 12.30 hrs
Flood Elev= 49.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	45.85'	**18.0" Round 18" RCP X 2.00** L= 20.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 45.85' / 45.70' S= 0.0075 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 1.77 sf

Primary OutFlow Max=19.24 cfs @ 12.24 hrs HW=48.44' TW=47.16' (Dynamic Tailwater)
↑—**1=18" RCP** (Inlet Controls 19.24 cfs @ 5.44 fps)

Summary for Pond 21P: Dog DMH-30

Inflow Area =	313,504 sf,	66.00% Impervious,	Inflow Depth = 1.79"	for 100-Year event
Inflow =	20.08 cfs @	12.33 hrs, Volume=	46,711 cf	
Outflow =	20.08 cfs @	12.33 hrs, Volume=	46,711 cf, Atten= 0%, Lag= 0.0 min	
Primary =	20.08 cfs @	12.33 hrs, Volume=	46,711 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 36.82' @ 12.33 hrs
Flood Elev= 41.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	34.45'	**30.0" Round Ex. 30" RCP** L= 96.8' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 34.45' / 34.10' S= 0.0036 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 4.91 sf

Primary OutFlow Max=20.07 cfs @ 12.33 hrs HW=36.82' TW=0.00' (Dynamic Tailwater)
↑—**1=Ex. 30" RCP** (Barrel Controls 20.07 cfs @ 5.37 fps)

Section B-3
Drainage Calculations

Stormwater Recharge

The Required Recharge Volume equals a depth of runoff corresponding to the soil type times the net impervious areas covering that soil type at the post-development site.

Rv = F x impervious area

Rv = Required Recharge Volume, expressed in Ft3, cubic yards, or acre-feet
F = Target Depth Factor associated with each Hydrologic Soil Group
Impervious Area = net pavement and rooftop area on site

Rv = 0.6-inch x 330,331 SF
Rv = 16,517 CF

All BMPs were sized using the "Static" method. The "Static" method assumes that there is no exfiltration until the entire recharge device is filled to the elevation associated with the Required Recharge Volume.

Three BMPs were designed to meet the required Recharge Volume of *16,517* cubic feet. Collectively, the BMPs provide *30,429* cubic feet of storage, meeting this requirement.

- BMP 1
  - Impervious Area – 111,053 SF
  - Rv Provided – 15,567 CF
- BMP 2
  - Impervious Area – 158,140 SF
  - Rv Provided – 9,568 CF
- BMP 3
  - Impervious Area – 44,805 SF
  - Rv Provided – 5,294 CF

Drawdown

The drawdown of the stormwater BMP must be within 72 hours. To determine whether an infiltration BMP will drain within 72 hours, the following formula must be used:

$$Time_{drawdown} = \frac{Rv}{(K)(Bottom\ Area)}$$

Where:
Rv = Storage Volume
K = Saturated Hydraulic Conductivity For "Static" and "Simple Dynamic" Methods, use Rawls Rate (see Table 2.3.3).
Bottom Area = Bottom Area of Recharge Structure

Using a K value of *2.41* inches/hour (from Table 2.3.3) it is determined that our drawdown times are as follows, which comply with the 72-hour threshold.

- BMP 1 – 17.4 hours
- BMP 2 – 15.2 hours
- BMP 3 – 8.9 hours

Water Quality Volume

The required water quality volume can be calculated using the following formula:

$V_{WQ} = (D_{WQ}/12 \text{ inches/foot}) * (A_{IMP} * 43{,}560 \text{ square feet/acre})$ *Equation (1)*

V_{WQ} = *Required Water Quality Volume* (in cubic feet)

D_{WQ} = Water Quality Depth: one-inch for discharges within a Zone II or Interim Wellhead Protection Area, to or near another critical area, runoff from a LUHPPL, or exfiltration to soils with infiltration rate greater than 2.4 inches/hour or greater; ½-inch for discharges near or to other areas.

Using a water quality depth of 1-inch and an area of ***330,331*** square-feet for the total impervious area within the project area, the required water quality volume is ***27,527*** cubic feet.

Stormceptor Sizing

The required water quality volume is then converted into a discharge rate for sizing manufactured proprietary stormwater treatment practices using the following formula:

$Q_{1.0} = (qu)(A)(WQV)$

Where:

$Q_{1.0}$ = flow rate associated with first 1 -inch of runoff
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1 -inch in this case)

The unit peak discharge was selected using a time of concentration of five minutes, resulting in a peak discharge of 225csm/in. The required calculated flow rate for the first 1 inch of runoff is 0.77 cfs (cubic feet per second). As the Stormceptor Pretreatment Chamber has been sized to accommodate the 25-year storm, the provided flow rate is 3.09 cfs, which is in compliance.

Forebay Sizing

- BMP 2
  - At a minimum, the sediment forebay shall hold 0.1-inch/impervious acre to pretreat the water quality volume.
  - Impervious Area Draining to BMP = 158,140 SF

- Required Forebay Volume = 1,318 CF
- Volume Provided = 3,504 CF

Section B-4

Groundwater Mounding Analysis

Basin 1

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days or inches & hours)

Input Values

4.8200	***R***	Recharge (infiltration) rate (feet/day)
0.260	Sy	Specific yield, Sy (dimensionless, between 0 and 1)
44.20	K	Horizontal hydraulic conductivity, Kh (feet/day)*
15.000	x	1/2 length of basin (x direction, in feet)
74.000	y	1/2 width of basin (y direction, in feet)
0.710	t	duration of infiltration period (days)
56.400	hi(0)	initial thickness of saturated zone (feet)
58.285	h(max)	maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
1.885	**Δ**h(max)	maximum groundwater mounding (beneath center of basin at end of infiltration period)

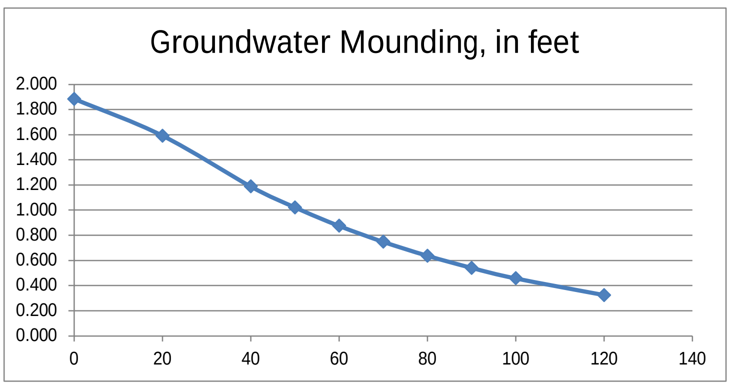
Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00
hours	**days**
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
1.885	0
1.592	20
1.188	40
1.021	50
0.875	60
0.748	70
0.637	80
0.541	90
0.457	100
0.324	120

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Basin 2

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
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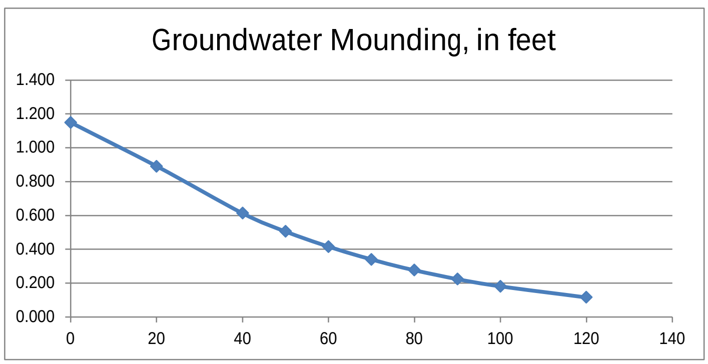
Input Values		use consistent units (e.g. feet & days or inches & hours)	Conversion Table	
			inch/hour	feet/day
4.8200	***R***	Recharge (infiltration) rate (feet/day)	0.67	1.33
0.260	Sy	Specific yield, Sy (dimensionless, between 0 and 1)		
44.20	K	Horizontal hydraulic conductivity, Kh (feet/day)*	2.00	4.00
10.750	x	1/2 length of basin (x direction, in feet)		
56.000	y	1/2 width of basin (y direction, in feet)	hours	days
0.500	t	duration of infiltration period (days)	36	1.50
53.100	hi(0)	initial thickness of saturated zone (feet)		

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

54.249	h(max)	maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
1.149	**Δ**h(max)	maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
1.149	0
0.891	20
0.613	40
0.505	50
0.415	60
0.339	70
0.276	80
0.224	90
0.180	100
0.115	120

Re-Calculate Now



Disclaimer

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This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
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use consistent units (e.g. feet & days or inches & hours)

Input Values

4.8200	***R***	Recharge (infiltration) rate (feet/day)
0.260	Sy	Specific yield, Sy (dimensionless, between 0 and 1)
44.20	K	Horizontal hydraulic conductivity, Kh (feet/day)*
9.250	x	1/2 length of basin (x direction, in feet)
90.500	y	1/2 width of basin (y direction, in feet)
0.500	t	duration of infiltration period (days)
49.700	hi(0)	initial thickness of saturated zone (feet)

Conversion Table

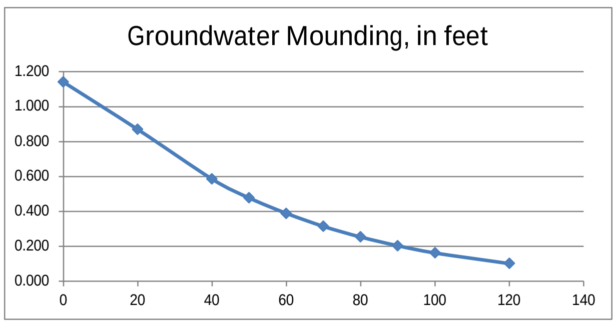
inch/hour	feet/day
0.67	1.33
2.00	4.00
hours	**days**
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

50.840	h(max)	maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
1.140	**Δ**h(max)	maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
1.140	0
0.869	20
0.585	40
0.478	50
0.389	60
0.315	70
0.254	80
0.204	90
0.163	100
0.102	120

Re-Calculate Now



Disclaimer

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Basin 3

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
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use consistent units (e.g. feet & days or inches & hours)

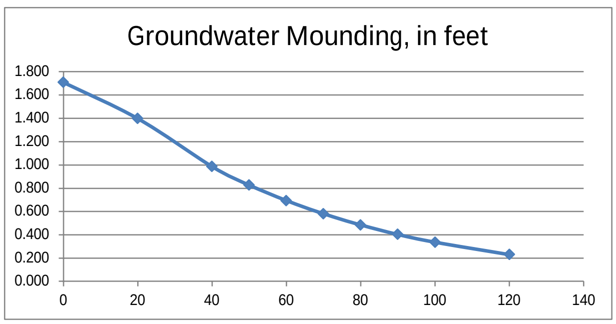
Input Values			Conversion Table	
			inch/hour	feet/day
4.8200	*R*	Recharge (infiltration) rate (feet/day)	0.67	1.33
0.260	Sy	Specific yield, Sy (dimensionless, between 0 and 1)		
44.20	K	Horizontal hydraulic conductivity, Kh (feet/day)*	2.00	4.00
15.500	x	1/2 length of basin (x direction, in feet)		
48.000	y	1/2 width of basin (y direction, in feet)	hours	days
0.710	t	duration of infiltration period (days)	36	1.50
49.700	hi(0)	initial thickness of saturated zone (feet)		

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

51.409	h(max)	maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
1.709	Δh(max)	maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
1.709	0
1.398	20
0.986	40
0.827	50
0.693	60
0.580	70
0.484	80
0.404	90
0.335	100
0.230	120

Re-Calculate Now



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Section B-5
Riprap Sizing Calculations

HW-1

Pipe Diameter (in)	Pipe Material	Manning's n Value	Storm Event
18	RCP	0.011	25
Cross-Sectional Area A (s.f.)	1.767	Peak Flow Rate Q (cfs)	13.24
Inside Width D_o (ft)	1.5	Tailwater Elev. (ft. from invert)	1.00

Apron Length
$La = (1.7Q/D_o^{3/2}) + 8D_o$
La = 24.25 feet
Apron Start Width
$Ws = 3 \times D_o$
Ws = 4.5 feet
Apron End Width - Tailwater @ CL
$We = (3 \times D_o) + 0.4La$
We = 14.2 feet
Apron End Width - Tailwater Below CL
$We = (3 \times D_o) + La$
We = n/a feet
Median Rip Rap Diameter
$d\text{-}50 = (0.02/TW) \times (Q/D_o)^{4/3}$
d-50 = 0.4 feet

HW-2

Pipe Diameter (in)	Pipe Material	Manning's n Value	Storm Event
20	DI	0.013	25
Cross-Sectional Area A (s.f.)	2.182	Peak Flow Rate Q (cfs)	15
Inside Width D_o (ft)	1.7	Tailwater Elev. (ft. from invert)	0.10

Apron Length		
$La = (1.7Q/D_o^{3/2}) + 8D_o$		
La =	25.18	feet
Apron Start Width		
$Ws = 3 \times D_o$		
Ws =	5.0	feet
Apron End Width - Tailwater @ CL		
$We = (3 \times D_o) + 0.4La$		
We =	n/a	feet
Apron End Width - Tailwater Below CL		
$We = (3 \times D_o) + La$		
We =	30.2	feet
Median Rip Rap Diameter		
$d\text{-}50 = (0.02/TW) \times (Q/D_o)^{4/3}$		
d-50 =	3.7	feet

<u>HW-2A</u>

Pipe Diameter (in)	Pipe Material	Manning's n Value	Storm Event
15	RCP	0.011	25
Cross-Sectional Area A (s.f.)	1.227	Peak Flow Rate Q (cfs)	3.6
Inside Width D_o (ft)	1.3	Tailwater Elev. (ft. from invert)	a

Apron Length		
$La = (1.7Q/D_o^{3/2}) + 8D_o$		
La =	14.38	feet
Apron Start Width		
$Ws = 3 \times D_o$		
Ws =	3.8	feet
Apron End Width - Tailwater @ CL		
$We = (3 \times D_o) + 0.4La$		
We =	9.5	feet
Apron End Width - Tailwater Below CL		
$We = (3 \times D_o) + La$		
We =	n/a	feet
Median Rip Rap Diameter		
$d\text{-}50 = (0.02/TW) \times (Q/D_o)^{4/3}$		
d-50 =	#VALUE!	feet

HW-3

Pipe Diameter (in)	Pipe Material	Manning's n Value	Storm Event
12	RCP	0.011	25

Cross-Sectional Area A (s.f.)	0.785	Peak Flow Rate Q (cfs)	0.79
Inside Width D_o (ft)	1.0	Tailwater Elev. (ft. from invert)	1.00

Apron Length

$$La = (1.7Q/D_o^{3/2}) + 8D_o$$

La = 9.34 feet

Apron Start Width

$$Ws = 3 \times D_o$$

Ws = 3.0 feet

Apron End Width - Tailwater @ CL

$$We = (3 \times D_o) + 0.4La$$

We = 6.7 feet

Apron End Width - Tailwater Below CL

$$We = (3 \times D_o) + La$$

We = n/a feet

Median Rip Rap Diameter

$$d\text{-}50 = (0.02/TW) \times (Q/D_o)^{4/3}$$

d-50 = 0.0 feet

HW-B5

Pipe Diameter (in)	Pipe Material	Manning's n Value	Storm Event
15	PVC	0.013	25
Cross-Sectional Area A (s.f.)	1.227	Peak Flow Rate Q (cfs)	6.1
Inside Width D_o (ft)	1.3	Tailwater Elev. (ft. from invert)	0.10

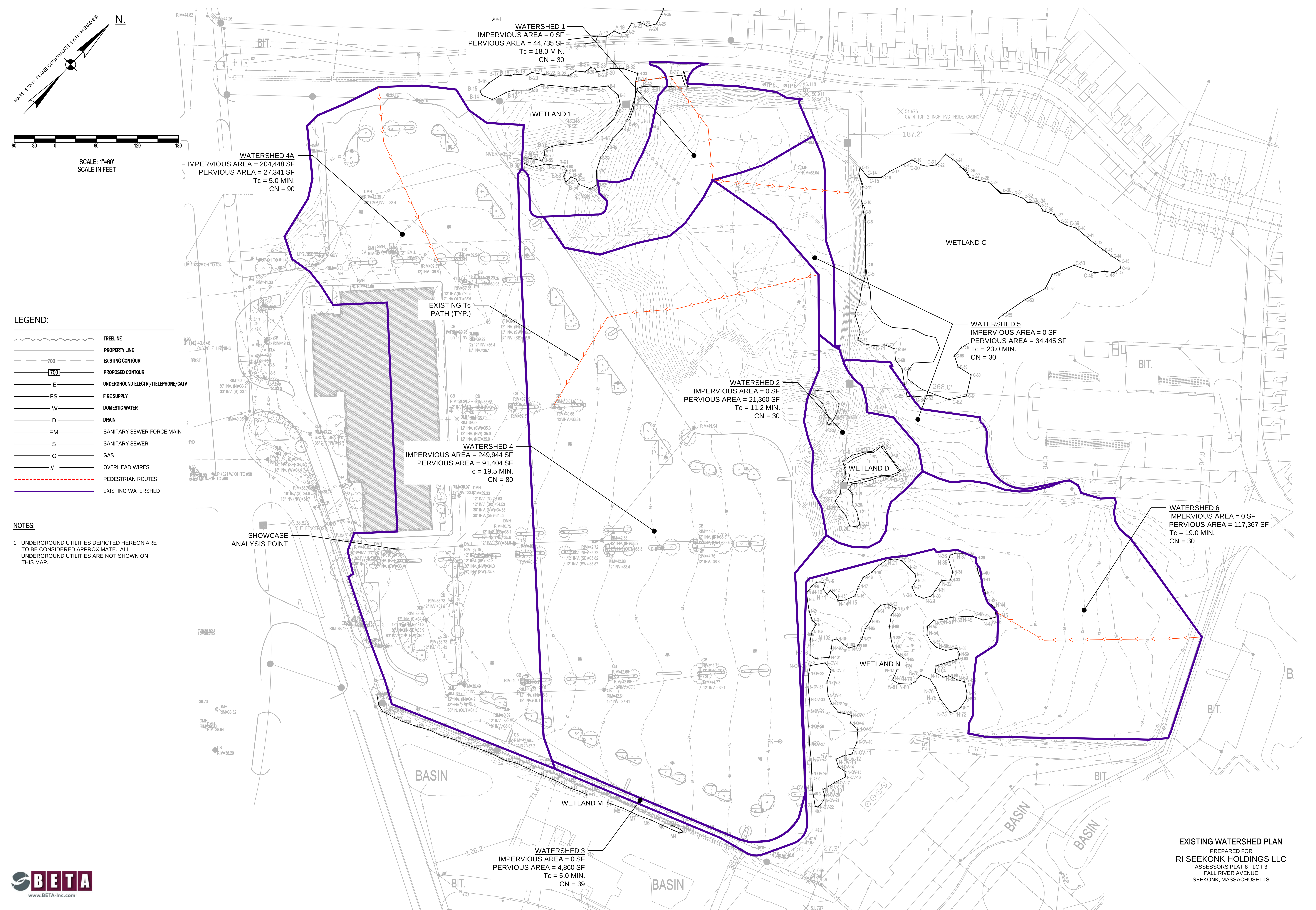
Apron Length
$La = (1.7Q/D_o^{3/2}) + 8D_o$
La = 17.42 feet
Apron Start Width
$Ws = 3 \times D_o$
Ws = 3.8 feet
Apron End Width - Tailwater @ CL
$We = (3 \times D_o) + 0.4La$
We = n/a feet
Apron End Width - Tailwater Below CL
$We = (3 \times D_o) + La$
We = 21.2 feet
Median Rip Rap Diameter
$d\text{-}50 = (0.02/TW) \times (Q/D_o)^{4/3}$
d-50 = 1.6 feet

<u>HW-CC</u>

Pipe Diameter (in)	Pipe Material	Manning's n Value	Storm Event
8	PVC	0.013	25
Cross-Sectional Area A (s.f.)	0.349	Peak Flow Rate Q (cfs)	1
Inside Width D_o (ft)	0.7	Tailwater Elev. (ft. from invert)	0.10

Apron Length		
$La = (1.7Q/D_o^{3/2}) + 8D_o$		
La =	8.46	feet
Apron Start Width		
$Ws = 3 \times D_o$		
Ws =	2.0	feet
Apron End Width - Tailwater @ CL		
$We = (3 \times D_o) + 0.4La$		
We =	n/a	feet
Apron End Width - Tailwater Below CL		
$We = (3 \times D_o) + La$		
We =	10.5	feet
Median Rip Rap Diameter		
$d\text{-}50 = (0.02/TW) \times (Q/D_o)^{4/3}$		
d-50 =	0.3	feet

Appendix C
Watershed Plans



LEGEND:

	TREELINE
	PROPERTY LINE
— — 700 — —	EXISTING CONTOUR
700	PROPOSED CONTOUR
E	UNDERGROUND ELECTRIC/TELEPHONE/CATV
FS	FIRE SUPPLY
W	DOMESTIC WATER
D	DRAIN
FM	SANITARY SEWER FORCE MAIN
S	SANITARY SEWER
G	GAS
//	OVERHEAD WIRES
	PEDESTRIAN ROUTES
	EXISTING WATERSHED

NOTES:

1. UNDERGROUND UTILITIES DEPICTED HEREON ARE TO BE CONSIDERED APPROXIMATE. ALL UNDERGROUND UTILITIES ARE NOT SHOWN ON THIS MAP.

BETA
www.BETA-Inc.com

EXISTING WATERSHED PLAN
PREPARED FOR
RI SEEKONK HOLDINGS LLC
ASSESSORS PLAT 8 - LOT 3
FALL RIVER AVENUE
SEEKONK, MASSACHUSETTS

Caputo & Wick LTD
CIVIL ENGINEERING • SURVEYING
TRANSPORTATION • ENVIRONMENTAL
1150 Pawtucket Avenue
Rumford, RI 02916-1897
(401) 434-8880 Office
(401) 434-1615 Fax
www.cwltd.net

DATE: 11/06/2020
SCALE:
DRAWN BY: LTD

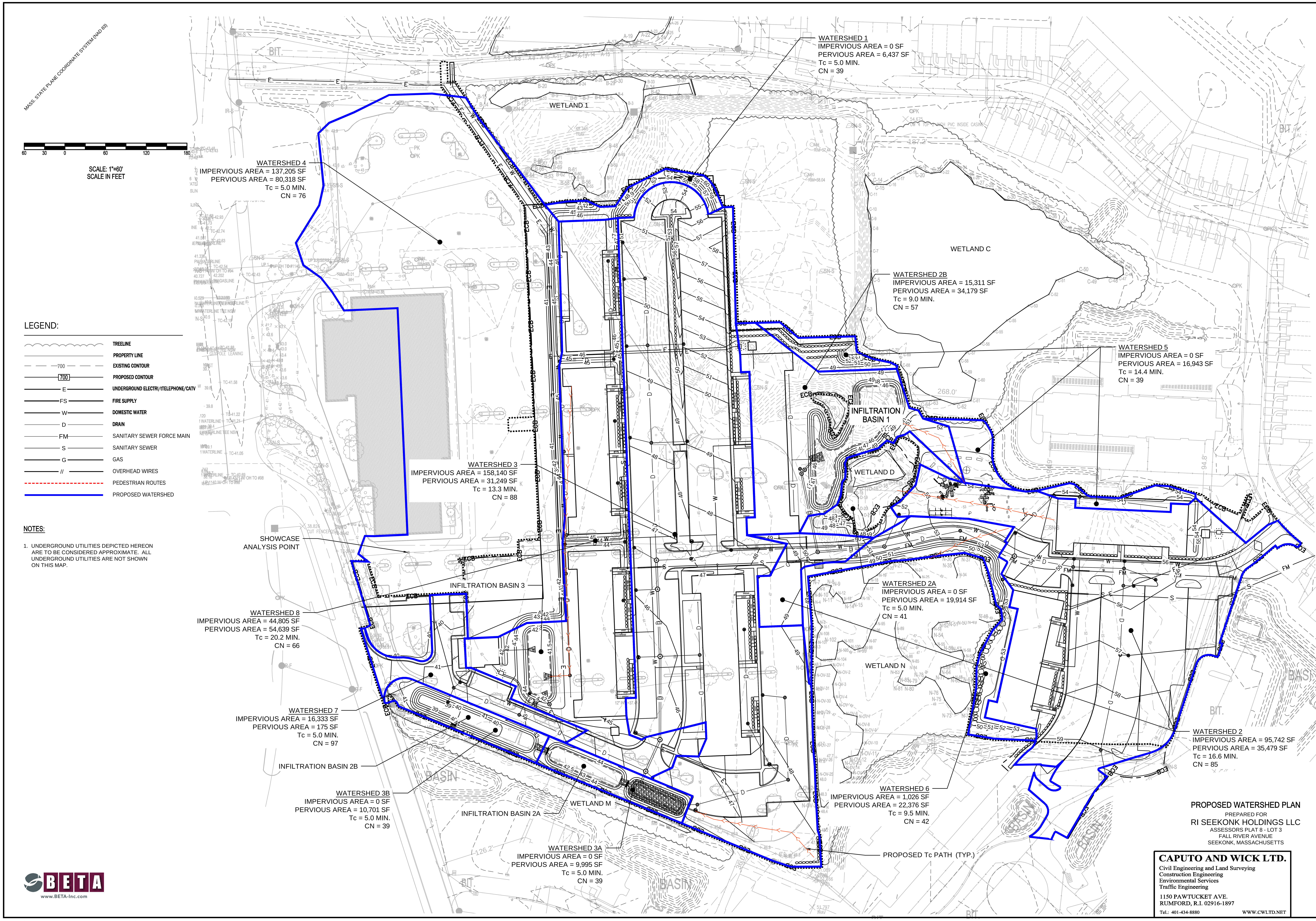
AJA architects
PROJECT # 2651

GREENBRIER II
RI SEEKONK HOLDINGS LLC

AJA GROUP, INC.
(781) 935-2500
AJA ARCHITECTS
16 MASON AVE SUITE 5 NORTH ATTLEBORO, MA 02760

DATE: NOVEMBER 1, 2021
SHEET 1 of 2
NOVEMBER 6, 2020

N:\2600s\2651 Greenbrier Condos II\DrawingFiles\Misc\2651 Watershed Plans.dwg



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DATE: NOVEMBER 1, 2021
SHEET 2 of 2
NOVEMBER 6, 2020

N:\2600s\2651 Greenbrier Condos II\DrawingFiles\Misc\2651 Watershed Plans.dwg

Appendix D
TSS Removal

Section D-1

TSS Removal Calculations

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: BMP 1 - Infiltration Basin

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Stormceptor Treatment Chamber	**0.77**	**0.75**	**0.58**	**0.17**
Infiltration Basin	**0.80**	**0.17**	**0.14**	**0.03**
	0.00	**0.03**	**0.00**	**0.03**
	0.00	**0.03**	**0.00**	**0.03**

Total TSS Removal = 97%

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

Project: **Greenbrier Condominiums II**

Prepared By: **TD**

Date: **1/20/2021**

*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

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

Version 1, Automated: Mar. 4, 2008

Location: BMP 2 - Infiltration Basin

TSS Removal Calculation Worksheet

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

Total TSS Removal = **89%**

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

Project: **Greenbrier Condominiums II**
Prepared By: **TD**
Date: **1/20/2021**

*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

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: BMP 3 - Infiltration Basin

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Stormceptor Treatment Chamber	**0.77**	**0.75**	**0.58**	**0.17**
Infiltration Basin	**0.80**	**0.17**	**0.14**	**0.03**
	0.00	**0.03**	**0.00**	**0.03**
	0.00	**0.03**	**0.00**	**0.03**

Total TSS Removal = 97%

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

Project: **Greenbrier Condominiums II**
Prepared By: **TD**
Date: **11/1/2021**

*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

Section D-2

Construction Period Pollution Prevention Plan

CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN

SITE DESCRIPTION			
Project Name and Location; (Latitude, Longitude, or Address	Greenbrier Residential Condominium Community 800 Fall River Ave, Seekonk	Owner Name and Address:	RI Seekonk Holdings LLC 44 Davis Street Seekonk, MA 02771
Description: (Purpose and Types of Soil Disturbing Activities)	The following information is based on information obtained from the project plans and supporting documents prepared by BETA Group, Inc.		

The project includes the construction of seven apartment buildings for Chapter 40 B affordable housing, containing approximately 240 units, as well as a community center and associated utility buildings. The proposed work will include the creation of an internal roadway network, ADA compliant pedestrian sidewalks, state roadway access, closed drainage systems, municipal water connection, and sanitary sewer connection to the Greenbrier Phase I wastewater treatment facility.

Runoff Coefficient	Approx. 65 (based on a mix of impervious area and landscaped areas and A hydrologic soil group)
Site Area:	The project includes approximately 13.40 acres of site disturbance.

Sequence of Major Activities

The order of activities will be as follows:

1. Install soil erosion controls including compost filter sock.
2. Grade site to accommodate roadway.
3. Install the proposed drainage system in the roadway.
4. Construct the roadway.
5. Grade remaining site and construct buildings
6. Install permanent seeding.
7. Protect disturbed area from erosion with mulch and/or erosion control matting.
8. Remove soil erosion controls after a satisfactory stand of grass has been established.

Type of Receiving Resource Area:	Bordering Vegetated Wetlands Isolated Vegetated Wetlands

CONTROLS

Erosion and Sediment Controls

Stabilization Practices

Temporary Stabilization - Topsoil stock piles and disturbed portions of the site where construction activity temporarily ceases for at least 21 days will be stabilized with temporary seed and mulch no later than 14 days from the last construction activity in that area. The temporary seed shall be Rye (grain) applied at the rate of 50 pounds per 1000 sq. ft. After seeding, each area shall be mulched with straw.

Permanent Stabilization - Disturbed portions of the site where construction activities permanently cease shall be stabilized with permanent seed mix no later than 14 days after the last construction activity. The permanent seed mix shall be as specified in the construction documents, and shall be properly maintained by the contractor until the grass has established an adequate level of growth.

CONTROLS (Continued)

Structural Practices

Compost filter sock – Erosion of or sedimentation from disturbed areas will be prevented by compost filter sock during construction. The compost filter sock will be removed and properly disposed of upon completion of the project.

Storm Water Management

Disturbed areas with slopes of 2h:1v or steeper will have erosion control matting and riprap while disturbed areas with slopes of 3h:1v or gentler will have permanent seeding and/or plantings.

OTHER CONTROLS

Waste Disposal:

Waste Materials

All waste materials will be collected and stored in a securely lidded metal dumpster. The dumpster will meet all local Town and any State solid waste management regulations. All trash and construction debris from the site will be deposited in the dumpster. The dumpster will be emptied as needed, and the trash will be hauled off site. No construction waste materials will be buried onsite. All personnel will be instructed regarding the correct procedure for waste disposal. Notices stating these practices will be posted in the office trailer and, the individual, who manages the day-to-day site operations, will be responsible for seeing that these procedures are followed.

Hazardous Waste

All hazardous waste materials will be disposed of in the manner specified by local or State regulation or by the manufacturer. Site personnel will be instructed in these practices and the individual, who manages day-to-day site operations, will be responsible for seeing that these practices are followed.

Sanitary Waste

All sanitary waste will be collected from the portable units a minimum of once a week by a licensed sanitary waste management contractor, as required by local regulation.

Offsite Vehicle Tracking:

The paved streets adjacent to the site will be swept as needed to remove any excess mud, dirt or rock tracked from the site. Dump trucks hauling material from the construction site will be covered with a tarpaulin.

Construction Equipment Emissions:

Emissions for construction equipment will be reduced through properly maintaining construction equipment. In addition, reducing engine idling time will reduce emissions from construction equipment.

TIMING OF CONTROLS/MEASURES

As indicated in the Plans, compost filter sock will be installed prior to clearing or grading of any other portions of the site. Areas where construction activity temporarily ceases for more than 21 days will be stabilized with temporary seed and mulch within 14 days of the last disturbance. Once construction activity ceases permanently the area will be stabilized with permanent seed and mulch.

CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS

The construction period pollution prevention and erosion and sedimentation control plan reflects the requirements established by the Massachusetts Stormwater Handbook for all construction activities.

MAINTENANCE/INSPECTION PROCEDURES

Erosion and Sediment Control Inspection and Maintenance Practices

These are the inspection and maintenance practices that will be used to maintain erosion and sediment controls.

- All control measures will be inspected at least once every seven calendar days and within 24 hours after any storm event of 0.25 inches or greater in a 24 hour period, or upon the request of the owner or engineer.
- All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of report.
- If ponding becomes excessive, and sediment reaches to the midpoint of the control measures, additional control measures should be added in the areas without disturbance of soil or collected sediment.
- Any sediment deposits remaining in place after the control measures have been removed should be dressed to conform to the existing grade, prepared, and seeded.
- Temporary and permanent seeding and planting will be inspected for bare spots, washouts, and healthy growth.
- A maintenance inspection report will be made after each inspection. A copy of the report form to be completed by the inspector is attached.
- The site superintendent will select one individual who will be responsible for inspections, maintenance and repair activities, and filling out the inspection and maintenance report.
- Personnel selected for inspection and maintenance responsibilities will receive training from site superintendent. They will be trained in all the inspection and maintenance practices necessary for keeping the erosion and sediment controls used onsite in good working order.

MAINTENANCE /INSPECTION PROCEDURES (Continued)

Non Storm-Water Discharges

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

- Pavement wash waters (where no spills or leaks of toxic or hazardous materials have occurred).

INVENTORY FOR POLLUTION PREVENTION PLAN

The materials or substances, but not limited to those listed below, will potentially be present onsite during construction:

- Paints (enamel and latex)
- Fertilizers
- Petroleum Based Products
- Cleaning Solvents
- Asphalt
- Detergents
- Wood
- Tar
- Concrete

SPILL PREVENTION

Material Management Practices

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

Good Housekeeping

The following good housekeeping practices will be followed onsite during the construction project

- An effort will be made to store on-site only enough products and materials required to do the job.
- All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.
- Products will be kept in their original containers with the original manufacturer's label.
- Substances will not be mixed with one another unless recommended by the manufacturer.
- Whenever possible, all of a product will be used up before disposing of the container.
- Manufacturers' recommendations for proper use and disposal will be followed.
- The site superintendent will inspect daily to ensure proper use and disposal of materials onsite.

Hazardous Products:

These practices are used to reduce the risks associated with hazardous materials.

- Products will be kept in original containers unless they are not re-sealable.
- Original labels and material safety data will be retained; they contain important product information.
- If surplus product must be disposed of, manufacturers' or local and State recommended methods for proper disposal will be followed.

SPILL PREVENTION (Continued)

Product Specific Practices

The following product specific practices will be followed onsite:

Petroleum Products

All onsite vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers which are clearly labeled. Any asphalt substances used onsite will be applied according to the manufacturer's recommendations.

Fertilizers:

Fertilizers used will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

Paints:

All containers will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewer system but will be properly disposed of according to manufacturers' instructions or State and local regulations.

Concrete Trucks:

Concrete trucks will be allowed to wash out or discharge surplus concrete or drum wash water to a dedicated area on site.

Spill Control Practices

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup:

- Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.

- Materials and equipment necessary for spill cleanup will be kept in a storage area onsite. Equipment and materials will include but not be limited to brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.

- All spills will be cleaned up immediately after discovery.

- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.

- Spills of toxic or hazardous material will be reported to the appropriate State or local government agency, regardless of the size.

- The spill prevention plan will be adjusted to include measures to prevent this type of spilt from reoccurring and how to clean up the spill if there is another one. A description of the spill, what caused it, and the cleanup measures will also be included.

- The site superintendent responsible for the day-to-day site operations will be the spill prevention and cleanup coordinator. He will designate at least three other site personnel who will receive spill prevention and cleanup training. The individual will each become responsible for a particular phase of prevention and cleanup. The names of responsible spill personnel will be posted in the office trailer onsite.

GREENBRIER RESIDENTIAL CONDOMINIUM COMMUNITY – PHASE 1
CONSTRUCTION PERIOD POLLUTION PREVENTION AND
EROSION AND SEDIMENTATION CONTROL PLAN
INSPECTION AND MAINTENANCE REPORT FORM

TO BE COMPLETED EVERY 7 DAYS AND WITHIN 24 HOURS OF
A RAINFALL EVENT OF 0.25 INCHES OR MORE

INSPECTOR:____ DATE:____

INSPECTOR'S QUALIFICATIONS:

____

____

____

____

DAYS SINCE LAST RAINFALL:__________________ AMOUNT OF LAST RAINFALL:____________ INCHES

STABILIZATION MEASURES

AREA	DATE SINCE LAST DISTURBANCE	DATE OF NEXT DISTURBANCE	STABILIZED? (YES/NO)	STABILIZED WITH	CONDITION

STABILIZATION REQUIRED:

____

____

____

____

TO BE PERFORMED BY:_________________________________ ON OR BEFORE _______________________________

GREENBRIER RESIDENTIAL CONDOMINIUM COMMUNITY – PHASE 1
CONSTRUCTION PERIOD POLLUTION PREVENTION AND
EROSION AND SEDIMENTATION CONTROL PLAN
INSPECTION AND MAINTENANCE REPORT FORM

STRUCTURAL CONTROLS
(Compost filter sock)

DATE:_____________________________

DRAINAGE AREA PERIMETER	**HAS SILT REACHED 1/2 OF FILTER SOCK HEIGHT?**	**IS THE FILTER SOCK PROPERLY SECURED?**	**IS THERE EVIDENCE OF WASHOUT OR OVERTOPPING?**

MAINTENANCE REQUIRED FOR COMPOST FILTER SOCK:

____

____

____

____

TO BE PERFORMED BY:_________________________________ ON OR BEFORE:______________________________

Appendix E
Test Pit Logs

LEGEND:

(treeline symbol)	TREELINE
(line)	PROPERTY LINE
— — 700 — —	EXISTING CONTOUR
—[700]—	PROPOSED CONTOUR
—— E ——	UNDERGROUND ELECTRI/tTELEPHONE/CATV
—— FS ——	FIRE SUPPLY
—— W ——	DOMESTIC WATER
—— D ——	DRAIN
—— FM ——	SANITARY SEWER FORCE MAIN
—— S ——	SANITARY SEWER
—— G ——	GAS
—— // ——	OVERHEAD WIRES
- - - - -	PEDESTRIAN ROUTES
•••••••••	EROSION CONTROL AND LIMIT OF WORK

PROPOSED APARTMENT PROJECT

7 BUILDINGS - 240 UNITS

12 - 4 BEDROOM UNITS
48 - 3 BEDROOM UNITS
132 - 2 BEDROOM UNITS
48 - 1 BEDROOM UNITS

PARKING
240 UNITS @ 2 SPACES/UNIT = 480 SPACES (MIN.)
520 SPACES PROVIDED

UNIT COUNT AND TYPE SCHEDULE

BUILDING NUMBER	ONE BEDROOM	TWO BEDROOM	THREE BEDROOM	FOUR BEDROOM
1	0	12	24	0
2	0	12	0	12
3	24	12	0	0
4	0	12	24	0
5	0	36	0	0
6	0	36	0	0
7	24	12	0	0
TOTAL	48	132	48	12

TEST PIT LOCATION PLAN

Caputo & Wick LTD
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DATE: 11/06/2020
SCALE: 1" = 60.0'
DRAWN BY: LTD
DB
PROJECT # 2651

AJA architects
AJA GROUP, INC.
(781) 935-2500

GREENBRIER II
RI SEEKONK HOLDINGS LLC

AJA ARCHITECTS
16 MASON AVE SUITE 5 NORTH ATTLEBORO, MA 02760

C-101

SHEET 3.1 OF 21

NOVEMBER 6, 2020

Test Hole ID:	TP-1 (See map for location)	Percolation Test:			Groundwater Data	Standing Water Depth, in.	Not Obs	Sc
Weather	35 degrees with snow flurries	Depth of Perc			Sh = Sc - [(Sr/Owr)*(Owc-Owmax)]	or, Depth Weeping from Pit Face	Not Obs	Sc
Date:	January 20, 2021	Start Pre-Soak			Frimpter Adjustment	USGS Index Well(s) Number/ID		per USGS
Soil Evaluator	Alan Gunnison- BETA Group, Inc.	End Pre-Soak				Reading Date		-
	Massachusetts License No. 13996	Time @ 12-in.				Index Well Max Level		Owmax
Project:	Greenbrier	Time @ 9-in.				Index Well Level		Owc
Project / Number	2651	Time @ 6-in.				Max Range for well		Owr
		Time 9 - 6in.				Rage in levels for Similar Topography (5% exceedence, Figure 11)		Sr
Top Hole El. = 42.5	(Based on assumed datum per Plan)	Rate (min./inch)				Predicted Adjusted Depth (Frimpter), ft	#VALUE!	Sh

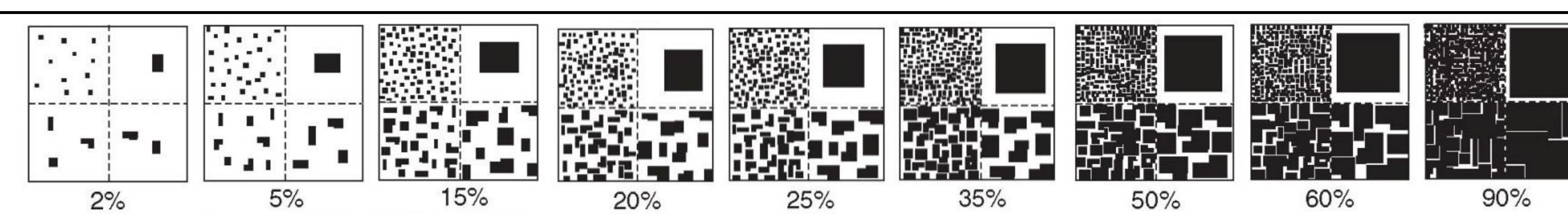
Test Hole Log

Depth (inches)	Soil Horizon (Layer)	Soil Matrix Color - Moist (Munsell)	Soil Texture (USDA) (USDA)	Coarse Fragments % by Volume: Gravel	Coarse Fragments % by Volume: Cobbles & Stones	Structure	Consistence	Redoximorphic Features (mottles): Depth	Redoximorphic Features (mottles): Color	Redoximorphic Features (mottles): Percent	Other
0-3	Pavement	--	--	--	--	--	--		--		--
3-40	Fill	--	--	--	--	--	--		--		--
40-90	C1	10YR 3/1	Sandy Loam	5%	2%	MA	FI		Not observed		trace organics
90-120	C2	10YR 5/1	Silty Clay Loam	--	--	MA	FI		Not observed		--

Geologic Setting and Topography | **Textural and Structure** | **Photo(s)**

Landform	Landscape Position	Parent Material	Texture (USDA)	Coarse Fragments		Structure	Consistence	Redox %	Photo(s)
Drumlin	Summit (SU)	Dense Compact Glacial Till	Coarse Sand	Gravel = 2mm to 3"	Cobble = 3" to 10"	Granular (GR)	Loose (L)	Few (F) <2%	
Till Ridge	Shoulder (SH)	Loose Ablation Till	Sand		Stone = 10" to 25"	Angular Blocky (ABK)	Very Friable (VFR)	Common 2 to <20%	
Ground Moraine	Backslope (BS)	Shallow to Bedrock Area	Fine Sand		Boulder = >25"	Subangular Blocky (SBK)	Friable (FR)	Many >20%	*No Photo*
Moraine (End / Recessional)	Footslope (FS)	Lacustrine	Loamy Sand			Platy (PL)	Firm (FI)		
Kettle	Toeslope (TS)	Ice-Contact Outwash	Sandy Loam			Structureless	Very Firm (VFI)		
Kame	Channel (CH)	Proglacial Outwash	Fine Sandy Loam			Single Grain (SG)	Extremely Firm (EF)		
Esker		Alluvium	Loam			Massive (MA)			
Outwash Plain		Organic Deposits	Silt Loam						
Lacustrine Plain		Eolian Deposits	Sandy Clay Loam						
Floodplain		Marine Silts & Clays	Silty Clay						
Swamp		Human-Made/Transported Materials (Fill)	Clay						
Other		Other							

Comments: Broke drain pipe which flooded the hole. Standing water could not be observed



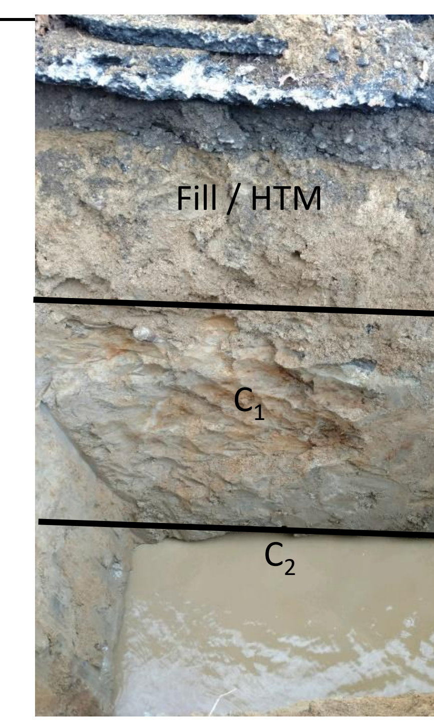
Test Hole ID:	TP-2 (See map for location)	Percolation Test:			Groundwater Data	Standing Water Depth, in.	64"	Sc
Weather	35 degrees with snow flurries	Depth of Perc			Sh = Sc - [(Sr/Owr)*(Owc-Owmax)]	or, Depth Weeping from Pit Face	76"	Sc
Date:	January 20, 2021	Start Pre-Soak			Frimpter Adjustment	USGS Index Well(s) Number/ID		per USGS
Soil Evaluator	Alan Gunnison- BETA Group, Inc.	End Pre-Soak				Reading Date		-
	Massachusetts License No. 13996	Time @ 12-in.				Index Well Max Level		Owmax
Project:	Greenbrier	Time @ 9-in.				Index Well Level		Owc
Project / Number	2651	Time @ 6-in.				Max Range for well		Owr
		Time 9 - 6in.				Rage in levels for Similar Topography (5% exceedence, Figure 11)		Sr
Top Hole El. = 45.4	(Based on datum per Plan)	Rate (min./inch)				Predicted Adjusted Depth (Frimpter), ft	#VALUE!	Sh

Test Hole Log

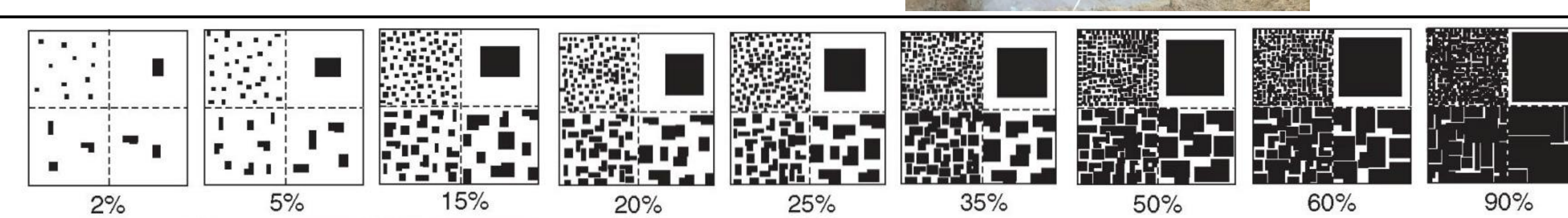
Depth (inches)	Soil Horizon (Layer)	Soil Matrix Color - Moist (Munsell)	Soil Texture (USDA) (USDA)	Coarse Fragments % by Volume: Gravel	Coarse Fragments % by Volume: Cobbles & Stones	Structure	Consistence	Redoximorphic Features (mottles): Depth	Redoximorphic Features (mottles): Color	Redoximorphic Features (mottles): Percent	Other
0-3	Pavement	--	--	--	--	--	--		--		--
3-30	Fill/HTM	--	--	--	--	--	--		--		--
30-90	C1	10YR 5/4	Loamy Sand	--	--	MA	Firm	45"	5YR 5/8	5%	--
90-120	C2	10YR 5/1	Silty Clay Loam	--	--	MA	Firm		--		--

Geologic Setting and Topography | **Textural and Structure** | **Photo(s)**

Landform	Landscape Position	Parent Material	Texture (USDA)	Coarse Fragments		Structure	Consistence	Redox %
Drumlin	Summit (SU)	Dense Compact Glacial Till	Coarse Sand	Gravel = 2mm to 3"	Cobble = 3" to 10"	Granular (GR)	Loose (L)	Few (F) <2%
Till Ridge	Shoulder (SH)	Loose Ablation Till	Sand		Stone = 10" to 25"	Angular Blocky (ABK)	Very Friable (VFR)	Common 2 to <20%
Ground Moraine	Backslope (BS)	Shallow to Bedrock Area	Fine Sand		Boulder = >25"	Subangular Blocky (SBK)	Friable (FR)	Many >20%
Moraine (End / Recessional)	Footslope (FS)	Lacustrine	Loamy Sand			Platy (PL)	Firm (FI)	
Kettle	Toeslope (TS)	Ice-Contact Outwash	Sandy Loam			Structureless	Very Firm (VFI)	
Kame	Channel (CH)	Proglacial Outwash	Fine Sandy Loam			Single Grain (SG)	Extremely Firm (EF)	
Esker		Alluvium	Loam			Massive (MA)		
Outwash Plain		Organic Deposits	Silt Loam					
Lacustrine Plain		Eolian Deposits	Sandy Clay Loam					
Floodplain		Marine Silts & Clays	Silty Clay					
Swamp		Human-Made/Transported Materials (Fill)	Clay					
Other		Other						



Comments: Standing water measured after hole open for one hour



Test Hole ID:	TP-3 (See map for location)
Weather	35 degrees with snow flurries
Date:	January 20, 2021
Soil Evaluator	Alan Gunnison- BETA Group, Inc.
	Massachusetts License No. 13996
Project:	Greenbrier
Project / Number	2651
Top Hole El. = 48.0	(Based on datum per Plan)

Percolation Test:		
Depth of Perc		
Start Pre-Soak		
End Pre-Soak		
Time @ 12-in.		
Time @ 9-in.		
Time @ 6-in.		
Time 9 - 6in.		
Rate (min./inch)		

Groundwater Data			
	Standing Water Depth, in.	84"	Sc
Sh = Sc - [(Sr/Owr)*(Owc-Owmax)]	or, Depth Weeping from Pit Face	Not Obs	Sc
Frimpter Adjustment	USGS Index Well(s) Number/ID		per USGS
	Reading Date		-
	Index Well Max Level		Owmax
	Index Well Level		Owc
	Max Range for well		Owr
	Rage in levels for Similar Topography (5% exceedence, Figure 11)		Sr
	Predicted Adjusted Depth (Frimpter), ft	#VALUE!	Sh

Test Hole Log

Depth (inches)	Soil Horizon (Layer)	Soil Matrix Color - Moist (Munsell)	Soil Texture (USDA) (USDA)	Coarse Fragments % by Volume: Gravel	Coarse Fragments % by Volume: Cobbles & Stones	Structure	Consistence	Redoximorphic Features (mottles): Depth / Color / Percent	Other
0-3	Pavement	--	--	--	--	--	--	--	--
3-20	Fill	--	--	--	--	--	--	--	--
20-36	C1	2.5Y 6/6	F-C Sand	--	--	SG	VFR	--	--
36-120	C2	2.5Y 5/3	F-C Sand	25%	2%	SG	L	--	--

Geologic Setting and Topography | **Textural and Structure** | **Photo(s)**

Landform	Landscape Position	Parent Material	Texture (USDA)	Coarse Fragments		Structure	Consistence	Redox %
Drumlin	Summit (SU)	Dense Compact Glacial Till	Coarse Sand	Gravel = 2mm to 3"	Cobble = 3" to 10"	Granular (GR)	Loose (L)	Few (F) <2%
Till Ridge	Shoulder (SH)	Loose Ablation Till	Sand		Stone = 10" to 25"	Angular Blocky (ABK)	Very Friable (VFR)	Common 2 to <20%
Ground Moraine	Backslope (BS)	Shallow to Bedrock Area	Fine Sand		Boulder = >25"	Subangular Blocky (SBK)	Friable (FR)	Many >20%
Moraine (End / Recessional)	**Footslope (FS)**	Lacustrine	Loamy Sand			Platy (PL)	Firm (FI)	
Kettle	Toeslope (TS)	Ice-Contact Outwash	Sandy Loam			Structureless	Very Firm (VFI)	
Kame	Channel (CH)	**Proglacial Outwash**	Fine Sandy Loam			Single Grain (SG)	Extremely Firm (EF)	
Esker		Alluvium	Loam			Massive (MA)		
Outwash Plain		Organic Deposits	Silt Loam					
Lacustrine Plain		Eolian Deposits	Sandy Clay Loam					
Floodplain		Marine Silts & Clays	Silty Clay					
Swamp		Human-Made/Transported Materials (Fill)	Clay					
Other		Other						

Comments: Standing water measured after hole open for one hour

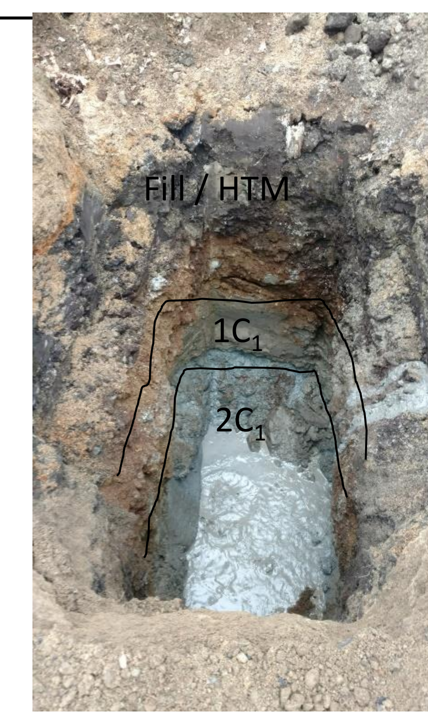
Test Hole ID:	TP-4 (See map for location)	Percolation Test:			Groundwater Data	Standing Water Depth, in.	88"	Sc
Weather	35 degrees with snow flurries	Depth of Perc			Sh = Sc - [(Sr/Owr)*(Owc-Owmax)]	or, Depth Weeping from Pit Face	55"	Sc
Date:	January 20, 2021	Start Pre-Soak			Frimpter Adjustment	USGS Index Well(s) Number/ID		per USGS
Soil Evaluator	Alan Gunnison- BETA Group, Inc.	End Pre-Soak				Reading Date		-
	Massachusetts License No. 13996	Time @ 12-in.				Index Well Max Level		Owmax
Project:	Greenbrier	Time @ 9-in.				Index Well Level		Owc
Project / Number	2651	Time @ 6-in.				Max Range for well		Owr
		Time 9 - 6in.				Rage in levels for Similar Topography (5% exceedence, Figure 11)		Sr
Top Hole El. = 48.0	(Based on datum per Plan)	Rate (min./inch)				Predicted Adjusted Depth (Frimpter), ft	#VALUE!	Sh

Test Hole Log

Depth (inches)	Soil Horizon (Layer)	Soil Matrix Color - Moist (Munsell)	Soil Texture (USDA) (USDA)	Coarse Fragments % by Volume: Gravel	Coarse Fragments % by Volume: Cobbles & Stones	Structure	Consistence	Redoximorphic Features (mottles): Depth	Color	Percent	Other
0-3	Pavement	--	--	--	--	--	--		--		--
3-60	Fill	--	--	--	--	--	--		--		--
60-94	1C1	10YR 5/2	Loamy Sand	2%	--	MA	FI		--		--
94-120	2C1	Gley 2 4/5PB	Silty Clay Loam	15%	2%	MA	FI		--		--

Geologic Setting and Topography / Textural and Structure / Photo(s)

Landform	Landscape Position	Parent Material	Texture (USDA)	Coarse Fragments		Structure	Consistence	Redox %
Drumlin	Summit (SU)	Dense Compact Glacial Till	Coarse Sand	Gravel = 2mm to 3"	Cobble = 3" to 10"	Granular (GR)	Loose (L)	Few (F) <2%
Till Ridge	Shoulder (SH)	Loose Ablation Till	Sand		Stone = 10" to 25"	Angular Blocky (ABK)	Very Friable (VFR)	Common 2 to <20%
Ground Moraine	Backslope (BS)	Shallow to Bedrock Area	Fine Sand		Boulder = >25"	Subangular Blocky (SBK)	Friable (FR)	Many >20%
Moraine (End / Recessional)	Footslope (FS)	Lacustrine	Loamy Sand			Platy (PL)	Firm (FI)	
Kettle	Toeslope (TS)	Ice-Contact Outwash	Sandy Loam			Structureless	Very Firm (VFI)	
Kame	Channel (CH)	Proglacial Outwash	Fine Sandy Loam			Single Grain (SG)	Extremely Firm (EF)	
Esker		Alluvium	Loam			Massive (MA)		
Outwash Plain		Organic Deposits	Silt Loam					
Lacustrine Plain		Eolian Deposits	Sandy Clay Loam					
Floodplain		Marine Silts & Clays	Silty Clay					
Swamp		Human-Made/Transported Materials (Fill)	Clay					
Other		Other						



Comments: Standing water measured after hole open for one hour

Test Hole ID:	TP-5 (See map for location)	Percolation Test:			Groundwater Data	Standing Water Depth, in.	16"	Sc
Weather	**30 degrees cloudy**	Depth of Perc			**Sh = Sc - [(Sr/Owr)*(Owc-Owmax)]**	or, Depth Weeping from Pit Face	16"	Sc
Date:	**February 10, 2021**	Start Pre-Soak			Frimpter Adjustment	USGS Index Well(s) Number/ID		per USGS
Soil Evaluator	**Alan Gunnison- BETA Group, Inc.**	End Pre-Soak				Reading Date		-
	Massachusetts License No. 13996	Time @ 12-in.				Index Well Max Level		Owmax
Project:	**Greenbrier**	Time @ 9-in.				Index Well Level		Owc
Project / Number	**2651**	Time @ 6-in.				Max Range for well		Owr
		Time 9 - 6in.				Range in levels for Similar Topography (5% exceedance, Figure 11)		Sr
Top Hole El. = 46.1	**(Based on datum per Plan)**	Rate (min./inch)				Predicted Adjusted Depth (Frimpter), ft		Sh

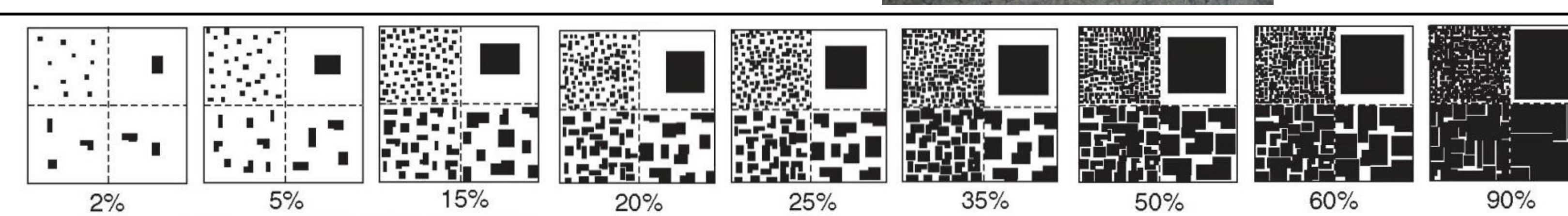
Test Hole Log

Depth (inches)	Soil Horizon (Layer)	Soil Matrix Color - Moist (Munsell)	Soil Texture (USDA) (USDA)	Coarse Fragments % by Volume: Gravel	Coarse Fragments % by Volume: Cobbles & Stones	Structure	Consistence	Redoximorphic Features (mottles): Depth	Color	Percent	Other
0-6	Loam/Grass	--	--	--	--	--	--		--		--
6-72	C1	10YR 5/2	F-C Sand	--	--	SG	Loose		--		--
											--
											--

Geologic Setting and Topography | **Textural and Structure** | **Photo(s)**

Landform	Landscape Position	Parent Material	Texture (USDA)	Coarse Fragments		Structure	Consistence	Redox %
Drumlin	Summit (SU)	Dense Compact Glacial Till	Coarse Sand	Gravel = 2mm to 3"	Cobble = 3" to 10"	Granular (GR)	Loose (L)	Few (F) <2%
Till Ridge	Shoulder (SH)	Loose Ablation Till	Sand		Stone = 10" to 25"	Angular Blocky (ABK)	Very Friable (VFR)	Common 2 to <20%
Ground Moraine	Backslope (BS)	Shallow to Bedrock Area	Fine Sand		Boulder = >25"	Subangular Blocky (SBK)	Friable (FR)	Many >20%
Moraine (End / Recessional)	Footslope (FS)	Lacustrine	Loamy Sand			Platy (PL)	Firm (FI)	
Kettle	Toeslope (TS)	Ice-Contact Outwash	Sandy Loam			Structureless	Very Firm (VFI)	
Kame	Channel (CH)	Proglacial Outwash	Fine Sandy Loam			Single Grain (SG)	Extremely Firm (EF)	
Esker		Alluvium	Loam			Massive (MA)		
Outwash Plain		Organic Deposits	Silt Loam					
Lacustrine Plain		Eolian Deposits	Sandy Clay Loam					
Floodplain		Marine Silts & Clays	Silty Clay					
Swamp		Human-Made/Transported Materials (Fill)	Clay					
Other		Other						

Comments:	
	Due to high groundwater and sandy soil excavation to 10-feet was not feasible.
	The test pit continued to cave in when attempting to reach a depth of 10-feet



Test Hole ID:	TP-6 (See map for location)	Percolation Test:			Groundwater Data	Standing Water Depth, in.	25	Sc
Weather	30 degrees cloudy	Depth of Perc			Sh = Sc - [(Sr/Owr)*(Owc-Owmax)]	or, Depth Weeping from Pit Face	25	Sc
Date:	February 10, 2021	Start Pre-Soak			Frimpter Adjustment	USGS Index Well(s) Number/ID		per USGS
Soil Evaluator	Alan Gunnison- BETA Group, Inc.	End Pre-Soak				Reading Date		-
	Massachusetts License No. 13996	Time @ 12-in.				Index Well Max Level		Owmax
Project:	Greenbrier	Time @ 9-in.				Index Well Level		Owc
Project / Number	2651	Time @ 6-in.				Max Range for well		Owr
		Time 9 - 6in.				Rage in levels for Similar Topography (5% exceedance, Figure 11)		Sr
Top Hole El. = 46.2	(Based on datum per Plan)	Rate (min./inch)				Predicted Adjusted Depth (Frimpter), ft	#DIV/0!	Sh

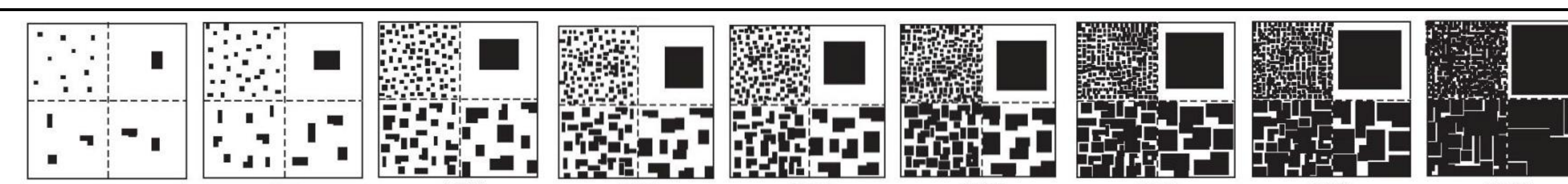
Test Hole Log

Depth (inches)	Soil Horizon (Layer)	Soil Matrix Color - Moist (Munsell)	Soil Texture (USDA) (USDA)	Coarse Fragments % by Volume: Gravel	Coarse Fragments % by Volume: Cobbles & Stones	Structure	Consistence	Redoximorphic Features (mottles): Depth	Color	Percent	Other
0-6	Loam/Grass	--	--	--	--	--	--		--		--
6-60	C1	10YR 5/2	F-C Sand	--	--	SG	Loose		--		--
											--
											--

Geologic Setting and Topography | **Textural and Structure** | **Photo(s)**

Landform	Landscape Position	Parent Material	Texture (USDA)	Coarse Fragments		Structure	Consistence	Redox %
Drumlin	Summit (SU)	Dense Compact Glacial Till	Coarse Sand	Gravel = 2mm to 3"	Cobble = 3" to 10"	Granular (GR)	Loose (L)	Few (F) <2%
Till Ridge	Shoulder (SH)	Loose Ablation Till	Sand		Stone = 10" to 25"	Angular Blocky (ABK)	Very Friable (VFR)	Common 2 to <20%
Ground Moraine	Backslope (BS)	Shallow to Bedrock Area	Fine Sand		Boulder = >25"	Subangular Blocky (SBK)	Friable (FR)	Many >20%
Moraine (End / Recessional)	**Footslope (FS)**	Lacustrine	Loamy Sand			Platy (PL)	Firm (FI)	
Kettle	Toeslope (TS)	Ice-Contact Outwash	Sandy Loam			Structureless	Very Firm (VFI)	
Kame	Channel (CH)	**Proglacial Outwash**	Fine Sandy Loam			Single Grain (SG)	Extremely Firm (EF)	
Esker		Alluvium	Loam			Massive (MA)		
Outwash Plain		Organic Deposits	Silt Loam					
Lacustrine Plain		Eolian Deposits	Sandy Clay Loam					
Floodplain		Marine Silts & Clays	Silty Clay					
Swamp		Human-Made/Transported Materials (Fill)	Clay					
Other		Other						

Comments:	
	Due to high groundwater and sandy soil excavation to 10-feet was not feasible.
	The test pit continued to cave in when attempting to reach a depth of 10-feet



2% 5% 15% 20% 25% 35% 50% 60% 90%

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Owner Name:

Street Address:

Map/Lot #:

City: Seekonk

State: MA

Zip Code:

B. Site Information

1. (Check one) ☐ New Construction ☐ Upgrade ☐ Repair ☒ Stormwater

2. Soil Survey Available? ☒ Yes ☐ No If yes: NRCS-WSS (Source) 32A (Soil Map Unit)

   Wareham loamy sand (Soil Name) poorly drained (Soil Limitations)

   sand (Soil Parent material) (Landform)

3. Surficial Geological Report Available? ☐ Yes ☐ No If yes: (Year Published/Source) (Map Unit)

   Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: (Wetland Type)

7. Current Water Resource Conditions (USGS): 10/25/2021 (Month/Day/ Year) Range: ☐ Above Normal ☒ Normal ☐ Below Normal

8. Other references reviewed: groundwater levels at the 50% mark based upon rise in groundwater levels from morning rain

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 1 TP-8 (Hole #) 10/25/2021 (Date) 8:30 (Time) rain (Weather) ______ (Latitude) ______ (Longitude:)

1. Land Use: commercial (e.g., woodland, agricultural field, vacant lot, etc.) none (Vegetation) n/a (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 1-3 (Slope (%))

   Description of Location: west edge of pavement near frontage

2. Soil Parent Material: sand ______ (Landform) ______ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet
   Property Line 15' feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 54 Depth Weeping from Pit 78 Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-40	paved/ fill	Sand	5 Y 5/4								
40-60	C1g	f-m sand	10 YR 7/2				0-5	25-30	crumb		friable
60-68	C2	loam-s. loam	10 YR 4/4				0-5	0-5	block		firm
68-80	C3	Loamy Sand	10 YR 7/2				0-5	10-15	crumb		friable

Additional Notes:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 2 TP-9 (Hole #) 10/25/2021 (Date) 9:30 (Time) rain (Weather) ______ (Latitude) ______ (Longitude:)

1. Land Use: commercial (e.g., woodland, agricultural field, vacant lot, etc.) none (Vegetation) n/a (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 1-3 (Slope (%))

Description of Location: right side of parking, 150'-200' from frontage

2. Soil Parent Material: sand ______ (Landform) ______ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet
Property Line 15 feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 60" Depth Weeping from Pit ______ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-13	pave/base	fill									
13-34	C1	Med. Sand	2.5 Y 5/4	29	7.5 YR 5/8	>3	5-10	20-25	grain		loose
34-56	C2g	loam-s. loam	10 YR 3/4				0-5	0-5	block	wet	firm
56-82	C3	sand-l. sand	10 YR 7/2				0-5	0-5	grain	wet	fine/loose

Additional Notes: pieces of asphalt found at 31"

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: ~~3~~ TP-7 (Hole #) 10/25/2021 (Date) 10:00 (Time) rain (Weather) ______ (Latitude) ______ (Longitude:)

1. Land Use: commercial (e.g., woodland, agricultural field, vacant lot, etc.) none (Vegetation) n/a (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 1-3 (Slope (%))

   Description of Location: middle of parking, between test pit Nos. 1 & 2

2. Soil Parent Material: sand ______ (Landform) ______ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet
   Property Line 75 feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: 44" Depth Weeping from Pit ____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-15	pave/base	fill									
15-50	C1	Med. Sand	2.5 Y 5/4	21	7.5 YR 5/8	>3	10-15	20-25	grain		loose
50-74	C2g	loam-s. loam	10 YR 7/2				0-5	0-5	block	wet	dense

Additional Notes:
pieces of asphalt found at 48"

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:	TP-8 Obs. Hole # 1	TP-9 Obs. Hole # 2	TP-7 Obs. Hole # 3
☐ Depth observed standing water in observation hole	_____ inches	_____ inches	_____ inches
☐ Depth weeping from side of observation hole	_____ inches	_____ inches	_____ inches
☒ Depth to soil redoximorphic features (mottles)	40 inches	29 inches	21 inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches	_____ inches

Index Well Number ______________ Reading Date ______________

$S_h = S_c – [S_r \times (OW_c – OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☐ Yes ☐ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: _____ inches Lower boundary: _____ inches

c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator	Date
Typed or Printed Name of Soil Evaluator / License #	Expiration Date of License
Name of Approving Authority Witness	Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

Appendix F

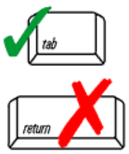
Stormwater Checklist

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.

[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

COMMONWEALTH OF MASSACHUSETTS
Nicole B.
Iannuzzi
Civil
No. 40686
REGISTERED
PROFESSIONAL ENGINEER

12/12/21
Signature and Date

Checklist

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

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

☒ No disturbance to any Wetland Resource Areas

☒ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☒ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☐ Other (describe): ____________________

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 (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 (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.