



STORMWATER REPORT –

Medway Middle School

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0234166.09

Town of Medway

January 24, 2025

TABLE OF CONTENTS

SECTION	PAGE NO.
1. INTRODUCTION	1-1
2. PROJECT DESCRIPTION	2-2
2.1 Existing Conditions	2-2
2.2 Proposed Stormwater Management System	2-3
3. STORMWATER MANAGEMENT SYSTEM ANALYSIS	3-4
3.1 Methodology	3-4
3.2 Hydrologic Analysis.....	3-5
3.3 Phosphorus Load Reduction Calculations.....	3-5
3.4 Drawdown Calculations	3-6
4. SOIL EROSION AND SEDIMENTATION CONTROL	4-7
5. STORMWATER MANAGEMENT STANDARDS COMPLIANCE.....	5-8

TABLES

Table 3-1:	Rainfall Depths
Table 3-2:	Peak Rate of Runoff (CFS)
Table 3-3:	Estimated Phosphorus Load Reduction

FIGURES

Figure 1:	Existing and Proposed Conditions Watershed Figure
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APPENDICES

Appendix A:	Drawings (Under Separate Cover)
Appendix B:	Soils Data
Appendix C:	Pre- and Post-Development HydroCAD Analysis
Appendix D:	Stormwater Design Calculations
Appendix E:	Groundwater Vistas Analysis
Appendix F:	Operation and Maintenance Plan

1. INTRODUCTION

This Stormwater Management Report is for the stormwater retrofits proposed at the Medway Middle School (the Site) located at 45 Holliston Street in Medway, Massachusetts (the Town). This project supports the first phase (Phase 1) of the Town's Phosphorus Control Plan (PCP). Implementation of the Phase 1 PCP is required under the Town's existing Massachusetts Municipal Separate Storm Sewer System (MS4) General Permit (Permit) with a partial completion schedule by the end of Permit Year 8 (June 30, 2026).

This Report documents the design for the Medway Middle School improvements. The Town is proposing to construct two bioretention basins, one enhanced biofiltration system, and two subsurface infiltration chamber systems to provide approximately 17.7 pounds per year (lbs/year) of phosphorus reduction in support of PCP requirements. The design goal of this project is to maximize phosphorus reduction while improving existing conditions by providing pretreatment, maintaining or reducing peak discharge flow rates, improving site conditions, and increasing groundwater recharge without adversely impacting abutting or downstream properties and infrastructure.

2. PROJECT DESCRIPTION

2.1 Existing Conditions

The Project is located within the Medway Middle School parcel (parcel ID 49-056). The existing conditions and proposed improvements are shown on the drawings included in Appendix A. The proposed design and existing conditions documentation is based on 25% conceptual plans provided by Horsley Witten Group, Inc. (Horsley Witten) dated March 2023 along with data collected through field investigations and available geographic information system (GIS) mapping of existing infrastructure. Additional design plans, as-builts, and utility plans were utilized for supplemental existing drainage information.

Soil evaluations were completed by Horsley Witten on September 20 and October 4, 2024. The test pits were performed in the locations as shown on the drawings included in Appendix A. Completed soil logs provided by Horsley Witten are included in Appendix B. Test pits were performed at three of the five retrofit locations. Test pit 1 (TP-HW-MS-1) was performed in the northwest parking lot where it revealed fine loamy sand to a depth of 90 inches. Redoximorphic features indicative of seasonal high groundwater were encountered at a depth of 21 inches below the surface. Test pit 2 (TP-HW-MS-2) was performed in an area no longer considered as a retrofit opportunity location. Test pit 3 (TP-HW-MS-3) was performed in the eastern corner of the southern gravel parking lot where it revealed fill and gravel underlain by coarse sand, gravely coarse sand, and fine sandy loam to a depth of 120 inches. Redoximorphic features indicative of seasonal high groundwater were not encountered. Test pit 4 (TP-HW-MS-4) was performed northeast of the existing school building where it revealed fine sandy loam underlain by gravely loamy sand and loamy sand to a depth of 120 inches. Redoximorphic features indicative of seasonal high groundwater were not encountered. According to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey, the site and contributing drainage area soils are comprised primarily of Woodbridge fine sandy loam, classified as hydrologic soil groups (HSG) C/D, and Urban land, unclassified hydrologic soil group. The unclassified Urban land was considered HSG C per the recommendations in Appendix F Attachment 3 of the Massachusetts Municipal Separate Storm Sewer (MS4) General Permit. The NRCS Soil Survey is provided in Appendix B.

An existing conditions and topographic survey was performed by Guierriere & Halnon Inc. on November 17, 2023, and last revised June 5, 2024. This survey was supplemented with available record information for property boundaries and GIS data provided by the Town for drainage infrastructure and topographic contours. A signed survey plan is included in Appendix A. Source dates for the GIS data provided by the Town are noted in Figure 1.

The MassGIS MassMapper tool was used to review environmental resources at or near the Site. No wetlands are located at the Site per the MassDEP wetlands data. The retrofit locations are not located in areas under the jurisdiction of the Town Conservation Commission. Therefore, no wetland investigations were performed. The Site is partially within a MassDEP Approved Wellhead Protection Area (Zone II). The current Massachusetts Stormwater Handbook requires 44% TSS removal prior to infiltration in Zone II. While this project is not subject to Massachusetts Stormwater Handbook requirements, TSS removal calculations are included in Appendix D.

2.2 Proposed Stormwater Management System

The purpose of this project is to maximize phosphorus reduction while improving existing conditions by providing pretreatment, maintaining or reducing peak discharge flow rates, improving site conditions, and increasing groundwater recharge without adversely impacting abutting or downstream properties and infrastructure.

The proposed development consists of the installation of two bioretention basins, one enhanced biofiltration system, and two subsurface infiltration chamber systems. Sediment forebays are proposed as pretreatment for the bioretention and biofiltration basins, as required by the Massachusetts MS4 General Permit. The sediment forebays provide a storage volume greater than 10% of the proposed treatment as recommended by the Massachusetts Stormwater Handbook (refer to Appendix D for sediment forebay sizing calculations). Hydrodynamic separators are proposed to provide pretreatment for the subsurface infiltration chamber systems. The proposed stormwater system captures and treats existing impervious area throughout the site that currently has no/minimal treatment. Riprap aprons are proposed at the sediment forebays, bioretention basins and biofiltration basins as applicable. The stormwater management systems will achieve a Total Suspended Solids (TSS) removal rate of 90% or greater, while also removing phosphorus, nitrogen, metals, organics, and bacteria to varying degrees. The Water Quality Volume (WQV) Calculations, Total Phosphorus removal Calculations, TSS removal calculations, and rip-rap diaphragm sizing calculations are provided in Appendix D.

The disturbed areas surrounding the proposed improvement areas will be stabilized with loam and seed unless otherwise specified. The proposed improvements will not result in an increase in impervious area. The site is not located within wetland or wetland buffer.

An Operation and Maintenance Plan has been developed for the proposed Stormwater Management System. The Plan describes the long-term operation and maintenance of the proposed stormwater management system and is included in Appendix F.

3. STORMWATER MANAGEMENT SYSTEM ANALYSIS

3.1 Methodology

The analyses described below were performed using HydroCAD® modeling software, developed by HydroCAD® Software Solutions LLC. The HydroCAD® software is based upon the Soil Conservation Service's (SCS), *Technical Release 20 – Urban Hydrology for Small Watersheds* (TR-20), which is an industry accepted standard. The HydroCAD® model calculates peak rates of runoff by considering various hydrologic parameters and the stormwater structural measures that directly influence the rate at which runoff is conveyed from a watershed. The hydrology assessment was performed to size the outlet control devices to ensure the proposed basin improvements do not exceed storage capacity, increase peak flow rates, or cause erosive conditions during large storm events.

The hydrologic parameters that were applied to perform these calculations are as follows:

- Design Event: The project was evaluated under the 2-, 10-, 25-, and 100-year 24-hour SCS Type III Rainfall Events. Rainfall depths associated with each other event were obtained from the National Oceanic Atmospheric Administration (NOAA) Atlas 14 Point Precipitation Frequency Estimates. The Draft Massachusetts Stormwater Management Handbook, dated December 2023, proposes an update to the required storm event precipitation values; the NOAA Atlas 14 90th percent upper confidence interval multiplied by 0.9 shall be utilized. In anticipation of this updated requirement, these values were utilized and are presented in Table 3-1 below.

TABLE 3-1: RAINFALL DEPTHS

Rainfall Event	Rainfall Depth (inches)
2-year	3.83
10-year	6.04
25-year	7.79
100-year	10.71

- Curve Number: Curve numbers are specific to each watershed and are a function of the perviousness of the watershed cover, the underlying soil type, and antecedent moisture conditions. Cover types for existing and proposed conditions are shown in the Existing and Proposed Conditions Watershed Map (Figure 1). The cover types used as hydrologic parameters were based on the 2021 land use/land cover dataset prepared by the University of Vermont that was used for pollutant reduction calculations, discussed further below. Underlying soil types were identified using the soil data presented in Appendix B, and an antecedent moisture condition of "2" (Normal Conditions) was assumed. Curve number calculations for each watershed are presented in the Hydrologic Calculations provided in Appendix C.
- Time of Concentration: The time of concentration represents the time for runoff from the most hydrologically distant point of the watershed to reach the discharge location. They are specific to each watershed and are a function of the slope, length, and surface roughness of the flow path. Flow paths for existing and proposed conditions were delineated using the Existing and Proposed Conditions Watershed Map (Figure 1).

- **Watershed Area:** Watershed boundaries were delineated using the existing conditions survey, available GIS 1' contours received from the Town, discussed in Section 2, and the proposed Site Plan. Watershed boundaries for existing and proposed conditions are illustrated in Figure 1. Areas are included with the hydrologic calculations in Appendix C.

Pre- and post-development peak rates of runoff and total phosphorus load reduction calculations were calculated by considering the aforementioned hydrologic parameters and stormwater measures for each contributing watershed.

3.2 Hydrologic Analysis

The existing conditions model predicts that runoff from the design storm events will exceed the existing conveyance network capacity. This is expected given the increased rainfall depths utilized and the infrastructure age. To allow the existing and proposed models to function properly and provide comparable results, flow limits were established to restrict flows to the maximum flows the existing conveyance pipes can convey without surcharging at existing manholes or inlets. Flow limits calculations are included in Appendix C.

The subcatchments as depicted in Figure 1 drain to a single design point (DP-1). DP-1 represents two existing converging pipes: a 12-inch pipe and an 18-inch pipe. Under the proposed conditions, network reconfigurations hydraulically connect the two networks altering the runoff conveyed in each to DP-1. The altered flows for each pipe were considered during design, but, ultimately, the proposed conditions were designed to match or improve existing conditions at DP-1. A summary of peak rates of runoff calculated using the HydroCAD® modeling software is provided in Table 3-2 below. The hydrologic calculations are provided in Appendix C.

TABLE 3-2: PEAK RATE OF RUNOFF (CFS)

Design Point	Rainfall Event	Existing Conditions	Proposed Conditions	Difference
DP-1	2-year	29.72	23.85	-5.87
	10-year	51.98	51.28	-0.70
	25-year	69.64	68.51	-1.13
	100-year	99.02	97.87	-1.15

To be conservative, the smaller chamber system (ISM 102) was not modelled for peak runoff attenuation for storms exceeding the water quality volume event as the system storage volume and infiltration capacity is minimal. All other proposed stormwater control measures were modeled for peak runoff attenuation. The proposed conditions reduce the peak rates for DP-1 for all design storm events, ensuring the proposed conditions do not adversely impact the existing conveyance network, surrounding area, and downstream conditions.

3.3 Phosphorus Load Reduction Calculations

Phosphorus load reduction calculations were performed to estimate the project's water quality benefit using the United States Environmental Protection Agency's (US EPA's) Best Management Practice Accounting and Tracking Tool (BMP-BATT). This is a spreadsheet-based tool that provides accounting, tracking, and

reporting for nutrient load reduction. The 2021 land use/land cover data prepared by the University of Vermont in conjunction with the Charles River Watershed Association was used to estimate the contributing drainage area's generated phosphorus load. The estimated load reductions are presented in Table 3 below and in Appendix D. Since this project does not result in an increase in impervious area, there is no requirement to treat a specific water quality volume. Instead, the retrofit was sized to treat the maximum volume given existing site constraints. The proposed SCMs are estimated to reduce total phosphorus 17.7 lbs/year, as summarized in Table 3-3 below.

TABLE 3-3: ESTIMATED PHOSPHORUS LOAD REDUCTION

Stormwater Control Measure	Proposed TP Reduction (lbs/year)
RGM 101: Enhanced Biofiltration Basin (Bid Alternate A)	0.6
RGM 102: Bioretention Basin	0.8
RGM 103: Bioretention Basin	1.8
ISM 101: Infiltration Chamber System	14.1
ISM 102: Infiltration Chamber System	0.4
Total	17.7

3.4 Drawdown Calculations

The proposed bioretention basins and infiltration chambers are designed to draw down within 72 hours, to demonstrate compliance with the Massachusetts Stormwater Handbook. Given the large volume of water proposed to be infiltrated via the larger infiltration chamber system (ISM 101) and the proximity of municipal and neighboring buildings, a groundwater flow model was prepared to evaluate this system's capacity and potential impacts considering groundwater mounding. Groundwater Vistas, which is a graphical interface for building, running, and analyzing numeric flow models, was used for implementing industry standard USGS MODFLOW model code. Hydraulic conductivity was not tested in the field at this site, so available data from the National Resources Conservation Service (NRCS) Web Soil Survey was used. The model is not capable of simulating outfall pipes, so a drain was modelled at the same elevation as the system's high flow outlet pipe invert. The drain parameters were evaluated iteratively with the goal of matching the 100-year storm event hydrograph from HydroCAD. The drain parameters that resulted in the most similar infiltrated and overflowed runoff volumes were used. Finally, the model predicts that the proposed chamber system will adequately drain within 72 hours. The smaller infiltration system (ISM 102) is proposed to infiltrate a significantly less amount of runoff; therefore, the Hantush Groundwater Model provided by United States Geologic Survey (USGS) was utilized to model the groundwater mounding below the chamber system. Both ISM101 and ISM102 groundwater model results are included in Appendix E. Mounding is not anticipated to be a concern based on available subsurface condition data; however, additional test pits are proposed to be completed prior to construction to confirm subsurface conditions.

4. SOIL EROSION AND SEDIMENTATION CONTROL

This section describes the erosion and sedimentation control measures that will be installed before and during construction to control pollutants in stormwater discharges that will occur at the site. The measures implemented will be inspected and maintained during construction by the contractor and as directed by the owner or their authorized representative in accordance with standard industry practice, the Massachusetts Stormwater Handbook, and the Massachusetts Erosion and Sediment Control Handbook. The following temporary and permanent erosion control measures are proposed and depicted on the project plans:

- Perimeter Sediment Controls: Silt fence and/or silt socks will be installed in advance of construction along the perimeter of the site in locations shown on the plans. Such barriers will be inspected immediately after each runoff-producing rainfall and at least daily during prolonged rainfall until final stabilization is achieved. Sediment deposits will be removed when the level of deposition reaches approximately one-half the height of the barrier.
- Silt Sack: Silt sacks will be installed in advance of construction in catch basins within, immediately adjacent, or downstream of the project's limit of work. Silt sacks will be inspected immediately after each runoff-producing rainfall and at least daily during prolonged rainfall until final stabilization is achieved.
- Dust Control: During dry weather, water will be applied to control dust as needed.
- Temporary Seeding: Temporary seeding will be placed as needed to stabilize stockpiles.
- Stabilized Construction Entrance: A stone construction entrance will be installed in advance of construction to prevent debris tracking from construction equipment.

Permanent erosion control methods will also be put in place:

- Riprap Protection: Riprap will be installed immediately following basin installation or final grading at the locations shown on plans.
- Permanent and Dormant Seeding: On final grade areas, permanent seeding will be applied between April 1st through June 15th and within 7 days of grade preparation. Topsoil will be prepared, followed by seeding.

5. STORMWATER MANAGEMENT STANDARDS COMPLIANCE

This project does not discharge directly to or impact wetland resource areas, and no increase in impervious cover is proposed. Therefore, the project is not required to comply with the Massachusetts Stormwater Handbook. However, the 10 minimum standards were used as design guidance and met to the maximum extent practicable, given the project's proximity to a developed residential area. The 10 minimum standards were used as guidance to achieve the project's goal of not adversely impacting existing conditions. A summary of each Standard is provided below (in italics) for reference purposes, and a description regarding the project's compliance with the standard is also provided.

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

There are no new untreated discharges to, or that will cause erosion in, wetlands or waters of the Commonwealth. Stormwater runoff from the watershed's impervious surfaces will be directed to and treated by the proposed stormwater management systems, consisting of sediment forebays, an enhanced biofiltration basin, an infiltration chamber system, and bioretention basins. Therefore, Standard 1 has been met.

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

The post-development stormwater peak flow rates at the design point are less than pre-development rates for the 2-, 10-, 25-, and 100-year 24-hour storm events. Therefore, Standard 2 has been met. The proposed conditions do not adversely impact the existing conveyance network, surrounding area, and downstream conditions. The peak flows within the two converging pipes at the design point were minimized to the maximum extent practicable while ensuring the flows could be conveyed without adversely affecting the surrounding drainage infrastructure.

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

The project will result in a no net increase in impervious area from pre- to post-development conditions. The existing gravel lot is an existing impervious area and is proposed to be stabilized with pavement. Additionally, groundwater recharge is proposed by implementing infiltration chambers and bioretention basins in multiple locations around the school where existing recharge is minimal. Therefore, Standard 3 has been met.

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

The project's stormwater management systems have been designed to provide 80% TSS removal. Therefore, Standard 4 has been met. TSS removal calculations are included in Appendix D. TSS removal is achieved via the following treatment trains:

- Sediment forebay/pea gravel diaphragm/filter strip into an enhanced biofiltration basin
- Sediment forebay into bioretention basins
- Hydrodynamic separator into an isolator row within an infiltration chamber system

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

The site is not defined as a land use with higher potential pollutant loads (LUHPPL); therefore, Standard 5 does not apply.

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

A portion of the site is within a Zone II. A treatment train providing 80% TSS removal is provided prior to discharge. Additionally, at least 44% TSS removal is proposed prior to discharge to the infiltration systems. Therefore, Standard 6 is met.

Minimum Standard 7: *A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.*

This project is a redevelopment project. The Stormwater Management Standards have been met to the maximum extent practicable, and the project improves existing conditions.

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

A construction erosion and sedimentation plan is included in this memorandum, and erosion and sedimentation controls are shown on the project plans. Therefore, Standard 8 is met.

Minimum Standard 9: *A Long-Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.*

A long-term O&M plan is included in Appendix F. Standard 9 is met.

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

There are no known or proposed illicit discharges to the stormwater management system. Standard 10 is met.

FIGURE 1: EXISTING AND PROPOSED CONDITIONS WATERSHED FIGURE

I:\woodardcurran.net\shaned\Projects\0234166.09 Medway MA Middle School Stormwater Design\wp\Drawings\Figures\Watersheds\2024_10.08 Watershed Figure.dwg, Oct 17, 2024 - 12:58pm CJOHANSSON



- NOTE:
- 1-FOOT TOPOGRAPHIC CONTOURS DATED MAY 2023 FOR CENTRAL AND EASTERN MASSACHUSETTS OBTAINED FROM MASSGIS.
 - GIS MAPPED DRAINAGE INFRASTRUCTURE RECEIVED FROM THE TOWN OF MEDWAY.

- LEGEND**
- SUBCATCHMENT AREAS
 - DESIGN POINT
 - TIME OF CONCENTRATION (Tc) FLOW LINE
 - DRAINAGE NETWORK
 - DRAINAGE STRUCTURE
 - DRAINAGE AREA
 - HYDROLOGIC SOIL GROUP BOUNDARY
 - HYDROLOGIC SOIL GROUP

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PE SEAL:

NOT FOR CONSTRUCTION

CLIENT INFO:
TOWN OF MEDWAY
MEDWAY, MASSACHUSETTS
MEDWAY MIDDLE SCHOOL
GREEN STORMWATER
INFRASTRUCTURE

REV.	MM/DD/YY	DESCRIPTION

JOB NO:	0234166.09
DATE:	NOVEMBER 2024
SCALE:	AS NOTED
DESIGNED BY:	CJ
DRAWN BY:	CJ
CHECKED BY:	RT
FILENAME:	2024.10.08 WATERSHED F1.dwg

DRAWING TITLE:
**EXISTING AND PROPOSED
CONDITIONS WATERSHED**

DRAWING NO:
FIGURE 1

APPENDIX A: DRAWINGS (UNDER SEPARATE COVER)

APPENDIX B: SOILS DATA

NRCS Web Soil Survey

Test Pits



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 Norfolk and Suffolk Counties, Massachusetts



August 20, 2024

Preface

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

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

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

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

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

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

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Contents

Preface	2
How Soil Surveys Are Made	5
Soil Map	8
Soil Map.....	9
Legend.....	10
Map Unit Legend.....	11
Map Unit Descriptions.....	11
Norfolk and Suffolk Counties, Massachusetts.....	13
245C—Hinckley loamy sand, 8 to 15 percent slopes.....	13
254B—Merrimac fine sandy loam, 3 to 8 percent slopes.....	14
310B—Woodbridge fine sandy loam, 3 to 8 percent slopes.....	16
312B—Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony.....	18
602—Urban land, 0 to 15 percent slopes.....	19
653—Udorthents, sandy.....	20
References	22

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

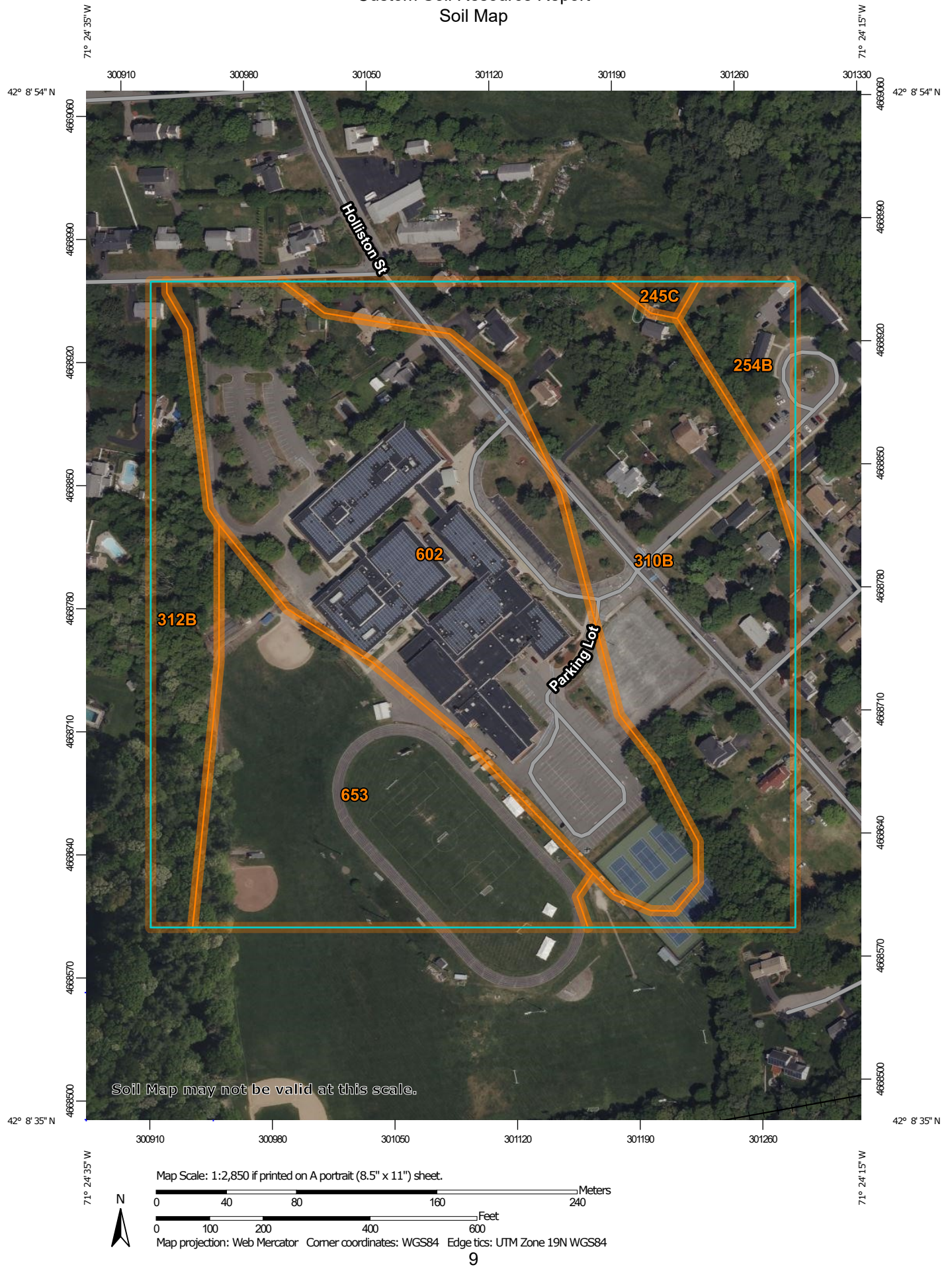
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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Custom Soil Resource Report Soil Map



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MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

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

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

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

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 19, Sep 10, 2023

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

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

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
245C	Hinckley loamy sand, 8 to 15 percent slopes	0.2	0.5%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	1.3	3.8%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	10.0	29.9%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	2.8	8.3%
602	Urban land, 0 to 15 percent slopes	12.1	36.2%
653	Udorthents, sandy	7.2	21.4%
Totals for Area of Interest		33.5	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.

Norfolk and Suffolk Counties, Massachusetts

245C—Hinckley loamy sand, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2svm9

Elevation: 0 to 1,480 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

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: Outwash deltas, outwash terraces, moraines, eskers, kames, outwash plains, kame terraces

Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope

Landform position (three-dimensional): Crest, head slope, nose slope, side slope, riser

Down-slope shape: Concave, convex, linear

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: 8 to 15 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 supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: A

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Ecological site: F144AY022MA - Dry Outwash

Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 5 percent

Landform: Moraines, eskers, kames, outwash deltas, outwash terraces, outwash plains, kame terraces

Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope

Landform position (three-dimensional): Crest, head slope, nose slope, side slope, riser

Down-slope shape: Concave, convex, linear

Across-slope shape: Convex, linear, concave

Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent

Landform: Outwash deltas, moraines, outwash plains, kame terraces, outwash terraces

Landform position (two-dimensional): Backslope, footslope

Landform position (three-dimensional): Base slope, tread

Down-slope shape: Concave, linear

Across-slope shape: Concave, linear

Hydric soil rating: No

Merrimac

Percent of map unit: 5 percent

Landform: Kames, outwash plains, outwash terraces, moraines, eskers

Landform position (two-dimensional): Shoulder, backslope, footslope, toeslope

Landform position (three-dimensional): Crest, head slope, nose slope, side slope, riser

Down-slope shape: Convex

Across-slope shape: 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: Kames, outwash plains, outwash terraces, moraines, eskers

Landform position (two-dimensional): Summit, shoulder, backslope, footslope

Landform position (three-dimensional): Crest, side slope, 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 supply, 0 to 60 inches: 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: Deltas, terraces, 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: Deltas, kames, eskers, outwash plains

Landform position (two-dimensional): Summit, shoulder, backslope

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Landform position (three-dimensional): Crest, side slope, head slope, nose slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Windsor

Percent of map unit: 3 percent
Landform: Outwash terraces, dunes, deltas, outwash plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Agawam

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

310B—Woodbridge fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t2ql
Elevation: 0 to 1,470 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

Woodbridge, fine sandy loam, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Fine Sandy Loam

Setting

Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

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Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 18 inches: fine sandy loam
Bw2 - 18 to 30 inches: fine sandy loam
Cd - 30 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Moderately 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 30 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Paxton

Percent of map unit: 10 percent
Landform: Drumlins, ground moraines, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury

Percent of map unit: 8 percent
Landform: Depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Toeslope, backslope, footslope
Landform position (three-dimensional): Base slope, head slope, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

312B—Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2t2qs

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

Woodbridge, extremely stony, and similar soils: 82 percent

Minor components: 18 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Extremely Stony

Setting

Landform: Ground moraines, hills, drumlins

Landform position (two-dimensional): Summit, backslope, footslope

Landform position (three-dimensional): Side slope

Down-slope shape: Concave

Across-slope shape: 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 9 inches: fine sandy loam

Bw1 - 9 to 20 inches: fine sandy loam

Bw2 - 20 to 32 inches: fine sandy loam

Cd - 32 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent

Surface area covered with cobbles, stones or boulders: 9.0 percent

Depth to restrictive feature: 20 to 43 inches to densic material

Drainage class: Moderately 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 19 to 27 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

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Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: C/D

Ecological site: F144AY037MA - Moist Dense Till Uplands

Hydric soil rating: No

Minor Components

Paxton, extremely stony

Percent of map unit: 10 percent

Landform: Ground moraines, hills, drumlins

Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Side slope, crest

Down-slope shape: Convex, linear

Across-slope shape: Linear, convex

Hydric soil rating: No

Ridgebury, extremely stony

Percent of map unit: 8 percent

Landform: Hills, drainageways, drumlins, depressions, ground moraines

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Base slope, head slope

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

602—Urban land, 0 to 15 percent slopes

Map Unit Setting

National map unit symbol: vkyj

Mean annual precipitation: 32 to 50 inches

Mean annual air temperature: 45 to 50 degrees F

Frost-free period: 120 to 200 days

Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 99 percent

Minor components: 1 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Excavated and filled land

Minor Components

Rock outcrops

Percent of map unit: 1 percent

Hydric soil rating: Unranked

653—Udorthents, sandy

Map Unit Setting

National map unit symbol: vky8
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: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Udorthents

Setting

Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Riser, tread
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Excavated and filled sandy glaciofluvial deposits

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
Runoff class: Low
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

Minor Components

Udorthents

Percent of map unit: 8 percent
Hydric soil rating: Unranked

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Urban land

Percent of map unit: 5 percent

Hydric soil rating: Unranked

Swansea

Percent of map unit: 2 percent

Landform: Bogs

Hydric soil rating: Yes

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Commonwealth of Massachusetts

City/Town of Medway

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review

Deep Observation Hole Number: 1 9/20/22 1000A 70F Cloudy 42°08'46.74"N 71°24'31.15"W
Hole # Date Time Weather Latitude Longitude

1. Land Use: Middle School Grass No 0-3
(e.g. woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g. cobbles, stones, boulders, etc.) Slope (%)

Description of Location: South side of school parking area

2. Soil Parent Material: _____

3. Distances From: Open Water Body > 200 feet Drainage Way > 200 feet Wetlands > 200 feet
 Property Line 150 feet Drinking Water Well > 200 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: _____ 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			
0-12	Ap	FLS	10YR 3/3						SG	Fr	
12-20	Bw	FLS	10YR 4/6						SG	Fi	
20-62	C1	FLS	10YR 5/1	21"	5YR 4/6	30	5	5	SG	Fi	
62-90	C2	FSL	10YR 6/1				5	5	M	Fi	

Additional Notes: _____



Commonwealth of Massachusetts

City/Town of Medway

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal**C. On-Site Review**

Deep Observation Hole Number: 2 10/4/2022 830A 65F Cloudy
Hole # Date Time Weather Latitude Longitude

1. Land Use: Middle School Grass No 0-3
(e.g. woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g. cobbles, stones, boulders, etc.) Slope (%)

Description of Location: Grassy open area just W of Holliston St and ~90' E of a single row of parking spaces at eastern edge of the middle school

2. Soil Parent Material: _____

3. Distances From: _____ Landform _____ Position on Landscape (SU, SH, BS, FS, TS) _____
Open Water Body > 50 feet Drainage Way > 50 feet Wetlands > 100 feet
Property Line > 10 feet Drinking Water Well > 100 feet Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If Yes: _____ 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			
0-24	Fill	FSL									
24-42	Fill	FSL	10YR 5/8								
42-60	C1	G-SL	10YR 4/4				25	15			
60-96	C2	G-LS	10YR 5/1				20	5			
96-120	C3	VFLS	10YR 6/2				10				

Additional Notes: No redox, bottom soil moist



Commonwealth of Massachusetts

City/Town of Medway

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review

Deep Observation Hole Number: 3 10/4/2022 945A 65F Cloudy _____
Hole # Date Time Weather Latitude Longitude

1. Land Use: Middle School No 0-3
(e.g. woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g. cobbles, stones, boulders, etc.) Slope (%)

Description of Location: Corner of gravel lot just W of Holliston St and ESE of school buildings

2. Soil Parent Material: _____
Landform Position on Landscape (SU, SH, BS, FS, TS)

3. Distances From: Open Water Body > 50 feet Drainage Way > 50 feet Wetlands > 100 feet
Property Line > 10 feet Drinking Water Well > 100 feet Other _____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☐ Disturbed Soil ☒ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If Yes: _____ 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			
0-5	Fill										
5-10	Fill										
10-30	Grav										
30-42	B						5	-			
42-66	C1	VCS					5	-			
66-87	C2	GCS	10YR 4/4				10	10			
87-120	C3	FSL	10YR 6/1				3	1			

Additional Notes: _____



Commonwealth of Massachusetts

City/Town of Medway

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review

Deep Observation Hole Number: 4 10/4/2022 1130A 65F Cloudy
Hole # Date Time Weather Latitude Longitude

1. Land Use: Middle School No 0-3
(e.g. woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g. cobbles, stones, boulders, etc.) Slope (%)

Description of Location: Open area just W of Holliston St and NE of school buildings

2. Soil Parent Material: _____ Landform _____ Position on Landscape (SU, SH, BS, FS, TS) _____

3. Distances From: Open Water Body > 50 feet Drainage Way > 50 feet Wetlands > 100 feet
Property Line > 10 feet Drinking Water Well > 100 feet Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If Yes: _____ 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			
0-12	A		10YR 2/2								
12-30	Bw	FLS	10YR 5/6				5	-			
30-57	C1	GLS	10YR 5/3				10	20			
57-120	C2	LS	2.5Y 5/2				5	-			

Additional Notes: _____

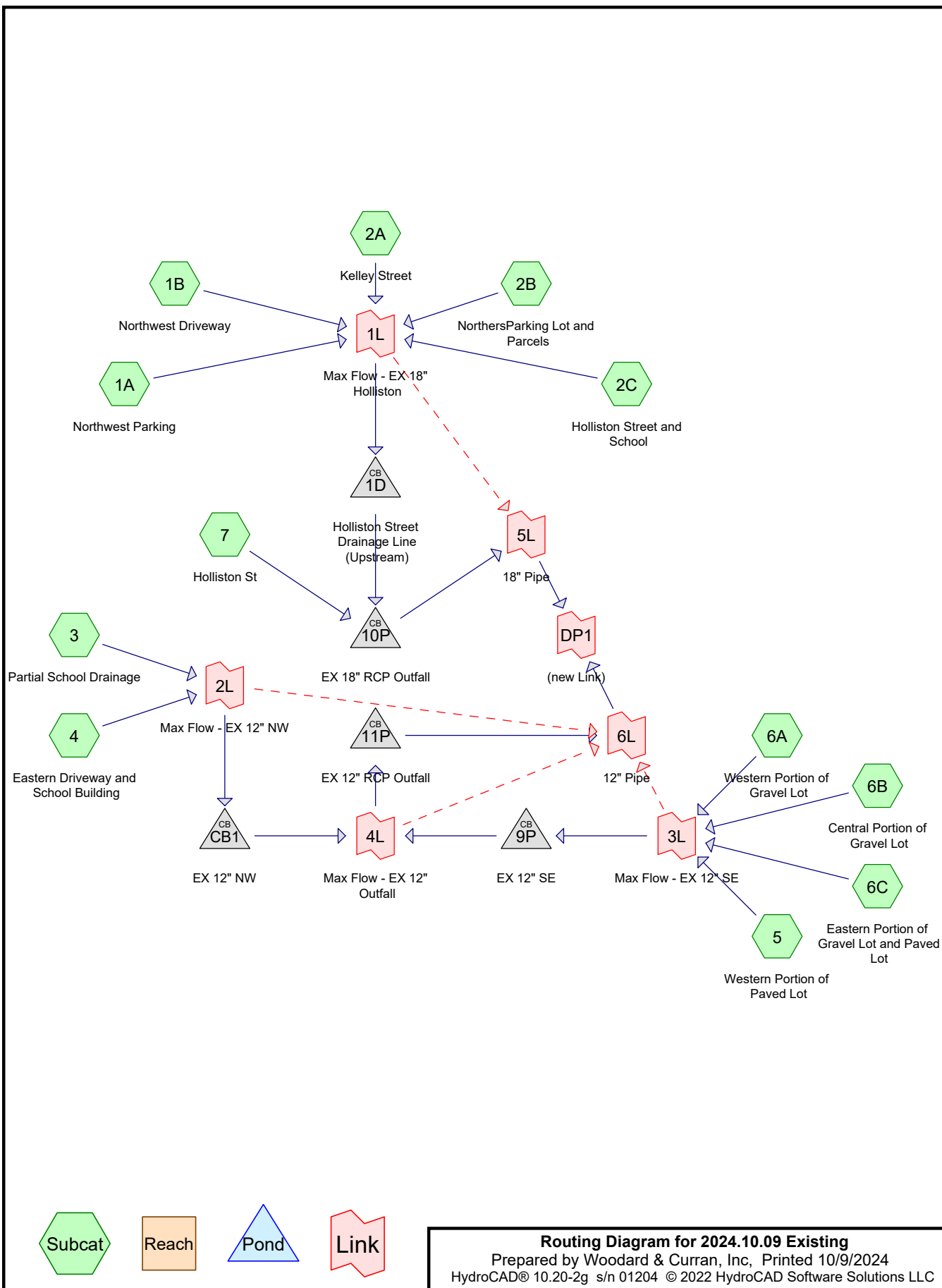
APPENDIX C: PRE- AND POST-DEVELOPMENT HYDROCAD ANALYSIS

Pre-Development HydroCAD Analysis

Post-Development HydroCAD Analysis

Flow Limit Discharge Rates

ISM 102 WQV Calculations



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NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 2

Summary for Subcatchment 1A: Northwest Parking

Runoff = 0.78 cfs @ 12.21 hrs, Volume= 0.075 af, Depth= 2.14"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
6,559	98	Paved parking, HSG D
11,871	74	>75% Grass cover, Good, HSG C
18,430	83	Weighted Average
11,871		64.41% Pervious Area
6,559		35.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.0200	0.17		Sheet Flow, Edge of pavement grass Grass: Short n= 0.150 P2= 3.24"
0.4	40	0.0125	1.68		Shallow Concentrated Flow, Edge of pavement grass Grassed Waterway Kv= 15.0 fps
0.3	40	0.0125	2.27		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
0.4	60	0.0330	2.72		Shallow Concentrated Flow, Swale Entrance Grassed Waterway Kv= 15.0 fps
1.3	140	0.0150	1.84		Shallow Concentrated Flow, Swale Grassed Waterway Kv= 15.0 fps
0.9	55	0.0050	1.06		Shallow Concentrated Flow, Swale to outlet Grassed Waterway Kv= 15.0 fps
13.0	435	Total			

Summary for Subcatchment 1B: Northwest Driveway

Runoff = 1.44 cfs @ 12.17 hrs, Volume= 0.124 af, Depth= 2.48"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
14,424	98	Paved parking, HSG D
11,762	74	>75% Grass cover, Good, HSG C
26,186	87	Weighted Average
11,762		44.92% Pervious Area
14,424		55.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	25	0.0200	1.05		Sheet Flow, Driveway Smooth surfaces n= 0.011 P2= 3.24"
6.9	75	0.0270	0.18		Sheet Flow, Yard Grass: Short n= 0.150 P2= 3.24"
0.3	25	0.0080	1.34		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
0.4	66	0.0200	2.87		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
1.4	211	0.0155	2.53		Shallow Concentrated Flow, Parking Paved Kv= 20.3 fps
9.4	402	Total			

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Page 4

Summary for Subcatchment 2A: Kelley Street

Runoff = 8.65 cfs @ 12.39 hrs, Volume= 1.235 af, Depth= 2.22"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
64,979	98	Paved parking, HSG D
9,897	74	>75% Grass cover, Good, HSG C
214,750	80	>75% Grass cover, Good, HSG D
842	82	Woods/grass comb., Fair, HSG D
290,468	84	Weighted Average
225,489		77.63% Pervious Area
64,979		22.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.3	100	0.0200	0.08		Sheet Flow, Woods Woods: Light underbrush n= 0.400 P2= 3.24"
0.7	35	0.0290	0.85		Shallow Concentrated Flow, Woods Woodland Kv= 5.0 fps
2.2	75	0.0130	0.57		Shallow Concentrated Flow, Woods Woodland Kv= 5.0 fps
0.2	30	0.0330	2.72		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
1.7	167	0.0120	1.64		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
1.0	130	0.0115	2.18		Shallow Concentrated Flow, Road Paved Kv= 20.3 fps
0.5	610	0.0100	22.31	2,198.79	Pipe Channel, Kelley Street Drain Pipe 159.000" x 113.000", R=82.000"/184.000" Pipe Arch Area= 98.6 sf n= 0.013 Concrete pipe, bends & connections
1.5	570	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM101 18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
29.1	1,717	Total			

Summary for Subcatchment 2B: NorthersParking Lot and Parcels

Runoff = 2.64 cfs @ 12.27 hrs, Volume= 0.295 af, Depth= 2.06"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
23,429	98	Paved parking, HSG D
51,501	74	>75% Grass cover, Good, HSG C
74,930	82	Weighted Average
51,501		68.73% Pervious Area
23,429		31.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	30	0.0500	0.19		Sheet Flow, Grass
					Grass: Short n= 0.150 P2= 3.24"
9.0	70	0.0120	0.13		Sheet Flow, Grass
					Grass: Short n= 0.150 P2= 3.24"
2.2	155	0.0060	1.16		Shallow Concentrated Flow, Grass
					Grassed Waterway Kv= 15.0 fps
0.2	40	0.0375	2.90		Shallow Concentrated Flow, End grass
					Grassed Waterway Kv= 15.0 fps
0.1	25	0.0200	2.87		Shallow Concentrated Flow, Parking
					Paved Kv= 20.3 fps
1.7	120	0.0032	1.15		Shallow Concentrated Flow, Parking
					Paved Kv= 20.3 fps
1.4	450	0.0100	5.26	6.46	Pipe Channel, Drainage from rear lot to Holliston
					15.000" Round Area= 1.2 sf Perim= 3.9' r= 0.31'
					n= 0.013 Concrete pipe, bends & connections
0.7	290	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM 101
					18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38'
					n= 0.013 Concrete pipe, bends & connections
17.9	1,180	Total			

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Page 6

Summary for Subcatchment 2C: Holliston Street and School

Runoff = 9.73 cfs @ 12.23 hrs, Volume= 1.049 af, Depth= 2.85"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
132,809	98	Paved parking, HSG D
37,272	74	>75% Grass cover, Good, HSG C
21,746	80	>75% Grass cover, Good, HSG D
179	82	Woods/grass comb., Fair, HSG D
192,006	91	Weighted Average
59,197		30.83% Pervious Area
132,809		69.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
2.3	30	0.0700	0.22		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
3.5	20	0.0100	0.09		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
1.6	160	0.0125	1.68		Shallow Concentrated Flow, Grass Grassed Waterway Kv= 15.0 fps
0.6	220	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM 101 18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
15.4	480	Total			

2024.10.09 Existing

NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 7

Summary for Subcatchment 3: Partial School Drainage

Runoff = 1.09 cfs @ 12.13 hrs, Volume= 0.084 af, Depth= 2.66"
Routed to Link 2L : Max Flow - EX 12" NW

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
10,444	98	Paved parking, HSG D
6,033	74	>75% Grass cover, Good, HSG C
16,477	89	Weighted Average
6,033		36.61% Pervious Area
10,444		63.39% Impervious Area

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

2024.10.09 Existing

NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 8

Summary for Subcatchment 4: Eastern Driveway and School Building

Runoff = 6.10 cfs @ 12.13 hrs, Volume= 0.507 af, Depth= 3.37"
Routed to Link 2L : Max Flow - EX 12" NW

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
72,642	98	Paved parking, HSG D
5,914	74	>75% Grass cover, Good, HSG C
63	80	>75% Grass cover, Good, HSG D
78,619	96	Weighted Average
5,977		7.60% Pervious Area
72,642		92.40% Impervious Area

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

2024.10.09 Existing

NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 9

Summary for Subcatchment 5: Western Portion of Paved Lot

Runoff = 1.66 cfs @ 12.13 hrs, Volume= 0.134 af, Depth= 3.16"
Routed to Link 3L : Max Flow - EX 12" SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
18,515	98	Paved parking, HSG D
3,668	74	>75% Grass cover, Good, HSG C
22,183	94	Weighted Average
3,668		16.54% Pervious Area
18,515		83.46% Impervious Area

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

2024.10.09 Existing

NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 10

Summary for Subcatchment 6A: Western Portion of Gravel Lot

Runoff = 0.88 cfs @ 12.13 hrs, Volume= 0.075 af, Depth= 3.48"
Routed to Link 3L : Max Flow - EX 12" SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
10,484	98	Paved parking, HSG D
162	74	>75% Grass cover, Good, HSG C
560	80	>75% Grass cover, Good, HSG D
11,206	97	Weighted Average
722		6.44% Pervious Area
10,484		93.56% Impervious Area

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

2024.10.09 Existing

NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 11

Summary for Subcatchment 6B: Central Portion of Gravel Lot

Runoff = 1.43 cfs @ 12.13 hrs, Volume= 0.124 af, Depth= 3.60"
Routed to Link 3L : Max Flow - EX 12" SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
17,687	98	Paved parking, HSG D
238	74	>75% Grass cover, Good, HSG C
34	80	>75% Grass cover, Good, HSG D
17,959	98	Weighted Average
272		1.51% Pervious Area
17,687		98.49% Impervious Area

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

2024.10.09 Existing

NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 12

Summary for Subcatchment 6C: Eastern Portion of Gravel Lot and Paved Lot

Runoff = 1.69 cfs @ 12.13 hrs, Volume= 0.143 af, Depth= 3.48"
Routed to Link 3L : Max Flow - EX 12" SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
20,797	98	Paved parking, HSG D
586	74	>75% Grass cover, Good, HSG C
16	80	>75% Grass cover, Good, HSG D
79	82	Woods/grass comb., Fair, HSG D
21,478	97	Weighted Average
681		3.17% Pervious Area
20,797		96.83% Impervious Area

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

2024.10.09 Existing

NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 13

Summary for Subcatchment 7: Holliston St

Runoff = 1.34 cfs @ 12.20 hrs, Volume= 0.128 af, Depth= 1.98"
 Routed to Pond 10P : EX 18" RCP Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 2-Year Rainfall=3.83"

	Area (sf)	CN	Description
*	8,042	98	Paved parking
	16,394	74	>75% Grass cover, Good, HSG C
	9,349	80	>75% Grass cover, Good, HSG D
	33,785	81	Weighted Average
	25,743		76.20% Pervious Area
	8,042		23.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		Sheet Flow, Sheet: Grass Grass: Short n= 0.150 P2= 3.24"
5.6	50	0.0200	0.15		Sheet Flow, Sheet: Grass Grass: Short n= 0.150 P2= 3.24"
2.4	210	0.0095	1.46		Shallow Concentrated Flow, Grass: Flat Grassed Waterway Kv= 15.0 fps
0.5	69	0.0150	2.49		Shallow Concentrated Flow, Paved Paved Kv= 20.3 fps
12.4	379	Total			

2024.10.09 Existing

NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 14

Summary for Pond 1D: Holliston Street Drainage Line (Upstream)

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 2.33" for 2-Year event
Inflow = 15.14 cfs @ 12.14 hrs, Volume= 2.686 af
Outflow = 15.14 cfs @ 12.16 hrs, Volume= 2.686 af, Atten= 0%, Lag= 1.2 min
Primary = 15.14 cfs @ 12.16 hrs, Volume= 2.686 af
Routed to Pond 10P : EX 18" RCP Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 223.01' @ 12.14 hrs

Flood Elev= 222.91'

Device	Routing	Invert	Outlet Devices
#1	Primary	218.20'	18.000" Round Culvert into DMH2 L= 180.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 218.20' / 216.05' S= 0.0119 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=15.14 cfs @ 12.16 hrs HW=223.01' TW=215.94' (Dynamic Tailwater)

↑**1=Culvert into DMH2** (Barrel Controls 15.14 cfs @ 8.57 fps)

2024.10.09 Existing

NRCC 24-hr D 2-Year Rainfall=3.83"

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Summary for Pond 9P: EX 12" SE

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 3.41" for 2-Year event
Inflow = 5.46 cfs @ 12.11 hrs, Volume= 0.475 af
Outflow = 5.46 cfs @ 12.11 hrs, Volume= 0.475 af, Atten= 0%, Lag= 0.0 min
Primary = 5.46 cfs @ 12.11 hrs, Volume= 0.475 af
Routed to Link 4L : Max Flow - EX 12" Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 216.18' @ 12.11 hrs

Flood Elev= 216.17'

Device	Routing	Invert	Outlet Devices
#1	Primary	211.70'	12.000" Round Culvert L= 155.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 211.70' / 210.40' S= 0.0084 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=5.46 cfs @ 12.11 hrs HW=216.18' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 5.46 cfs @ 6.95 fps)

2024.10.09 Existing

NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 16

Summary for Pond 10P: EX 18" RCP Outfall

Inflow Area = 14.596 ac, 39.36% Impervious, Inflow Depth = 2.31" for 2-Year event
Inflow = 16.48 cfs @ 12.20 hrs, Volume= 2.814 af
Outflow = 16.48 cfs @ 12.20 hrs, Volume= 2.814 af, Atten= 0%, Lag= 0.0 min
Primary = 16.48 cfs @ 12.20 hrs, Volume= 2.814 af
Routed to Link 5L : 18" Pipe

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 216.00' @ 12.20 hrs

Flood Elev= 218.12'

Device	Routing	Invert	Outlet Devices
#1	Primary	211.00'	18.000" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 211.00' / 210.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=16.48 cfs @ 12.20 hrs HW=216.00' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 16.48 cfs @ 9.33 fps)

2024.10.09 Existing

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Page 17

Summary for Pond 11P: EX 12" RCP Outfall

Inflow Area = 3.855 ac, 89.67% Impervious, Inflow Depth = 3.24" for 2-Year event
Inflow = 8.82 cfs @ 12.06 hrs, Volume= 1.039 af
Outflow = 8.82 cfs @ 12.06 hrs, Volume= 1.039 af, Atten= 0%, Lag= 0.3 min
Primary = 8.82 cfs @ 12.06 hrs, Volume= 1.039 af
Routed to Link 6L : 12" Pipe

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 219.29' @ 12.06 hrs

Flood Elev= 219.29'

Device	Routing	Invert	Outlet Devices
#1	Primary	210.20'	12.000" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 210.20' / 209.20' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=8.82 cfs @ 12.06 hrs HW=219.29' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 8.82 cfs @ 11.23 fps)

2024.10.09 Existing

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Page 18

Summary for Pond CB1: EX 12" NW

Inflow Area = 2.183 ac, 87.37% Impervious, Inflow Depth = 3.19" for 2-Year event
Inflow = 5.34 cfs @ 12.07 hrs, Volume= 0.580 af
Outflow = 5.34 cfs @ 12.07 hrs, Volume= 0.580 af, Atten= 0%, Lag= 0.0 min
Primary = 5.34 cfs @ 12.07 hrs, Volume= 0.580 af
Routed to Link 4L : Max Flow - EX 12" Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 218.42' @ 12.07 hrs

Flood Elev= 218.63'

Device	Routing	Invert	Outlet Devices
#1	Primary	214.60'	12.000" Round Culvert L= 82.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.60' / 214.50' S= 0.0012 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=5.34 cfs @ 12.07 hrs HW=218.42' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 5.34 cfs @ 6.80 fps)

2024.10.09 Existing

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Page 19

Summary for Link 1L: Max Flow - EX 18" Holliston

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 2.41" for 2-Year event
Inflow = 20.64 cfs @ 12.27 hrs, Volume= 2.778 af
Primary = 15.14 cfs @ 12.14 hrs, Volume= 2.686 af, Atten= 27%, Lag= 0.0 min
Routed to Pond 1D : Holliston Street Drainage Line (Upstream)
Secondary = 5.50 cfs @ 12.27 hrs, Volume= 0.092 af
Routed to Link 5L : 18" Pipe

Primary outflow = Inflow below 15.14 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

2024.10.09 Existing*NRCC 24-hr D 2-Year Rainfall=3.83"*

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Page 20

Summary for Link 2L: Max Flow - EX 12" NW

Inflow Area = 2.183 ac, 87.37% Impervious, Inflow Depth = 3.25" for 2-Year event
Inflow = 7.19 cfs @ 12.13 hrs, Volume= 0.591 af
Primary = 5.34 cfs @ 12.07 hrs, Volume= 0.580 af, Atten= 26%, Lag= 0.0 min
Routed to Pond CB1 : EX 12" NW
Secondary = 1.85 cfs @ 12.13 hrs, Volume= 0.011 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 5.34 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

2024.10.09 Existing

NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 21

Summary for Link 3L: Max Flow - EX 12" SE

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 3.41" for 2-Year event
Inflow = 5.66 cfs @ 12.13 hrs, Volume= 0.475 af
Primary = 5.46 cfs @ 12.11 hrs, Volume= 0.475 af, Atten= 3%, Lag= 0.0 min
Routed to Pond 9P : EX 12" SE
Secondary = 0.20 cfs @ 12.13 hrs, Volume= 0.000 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 5.46 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

2024.10.09 Existing*NRCC 24-hr D 2-Year Rainfall=3.83"*

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Page 22

Summary for Link 4L: Max Flow - EX 12" Outfall

Inflow Area = 3.855 ac, 89.67% Impervious, Inflow Depth = 3.28" for 2-Year event
Inflow = 10.80 cfs @ 12.11 hrs, Volume= 1.055 af
Primary = 8.82 cfs @ 12.06 hrs, Volume= 1.039 af, Atten= 18%, Lag= 0.0 min
Routed to Pond 11P : EX 12" RCP Outfall
Secondary = 1.98 cfs @ 12.11 hrs, Volume= 0.016 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 8.82 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

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NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 23

Summary for Link 5L: 18" Pipe

Inflow Area = 14.596 ac, 39.36% Impervious, Inflow Depth = 2.39" for 2-Year event

Inflow = 21.83 cfs @ 12.25 hrs, Volume= 2.906 af

Primary = 21.83 cfs @ 12.25 hrs, Volume= 2.906 af, Atten= 0%, Lag= 0.0 min

Routed to Link DP1 : (new Link)

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

2024.10.09 Existing

NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 24

Summary for Link 6L: 12" Pipe

Inflow Area = 3.855 ac, 89.67% Impervious, Inflow Depth = 3.32" for 2-Year event

Inflow = 12.85 cfs @ 12.13 hrs, Volume= 1.066 af

Primary = 12.85 cfs @ 12.13 hrs, Volume= 1.066 af, Atten= 0%, Lag= 0.0 min

Routed to Link DP1 : (new Link)

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link DP1: (new Link)

Inflow Area = 18.451 ac, 49.87% Impervious, Inflow Depth = 2.58" for 2-Year event

Inflow = 29.72 cfs @ 12.16 hrs, Volume= 3.972 af

Primary = 29.72 cfs @ 12.16 hrs, Volume= 3.972 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

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NRCC 24-hr D 10-Year Rainfall=6.04"

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Page 26

Summary for Subcatchment 1A: Northwest Parking

Runoff = 1.48 cfs @ 12.21 hrs, Volume= 0.146 af, Depth= 4.13"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
6,559	98	Paved parking, HSG D
11,871	74	>75% Grass cover, Good, HSG C
18,430	83	Weighted Average
11,871		64.41% Pervious Area
6,559		35.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.0200	0.17		Sheet Flow, Edge of pavement grass Grass: Short n= 0.150 P2= 3.24"
0.4	40	0.0125	1.68		Shallow Concentrated Flow, Edge of pavement grass Grassed Waterway Kv= 15.0 fps
0.3	40	0.0125	2.27		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
0.4	60	0.0330	2.72		Shallow Concentrated Flow, Swale Entrance Grassed Waterway Kv= 15.0 fps
1.3	140	0.0150	1.84		Shallow Concentrated Flow, Swale Grassed Waterway Kv= 15.0 fps
0.9	55	0.0050	1.06		Shallow Concentrated Flow, Swale to outlet Grassed Waterway Kv= 15.0 fps
13.0	435	Total			

Summary for Subcatchment 1B: Northwest Driveway

Runoff = 2.56 cfs @ 12.17 hrs, Volume= 0.228 af, Depth= 4.56"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
14,424	98	Paved parking, HSG D
11,762	74	>75% Grass cover, Good, HSG C
26,186	87	Weighted Average
11,762		44.92% Pervious Area
14,424		55.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	25	0.0200	1.05		Sheet Flow, Driveway Smooth surfaces n= 0.011 P2= 3.24"
6.9	75	0.0270	0.18		Sheet Flow, Yard Grass: Short n= 0.150 P2= 3.24"
0.3	25	0.0080	1.34		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
0.4	66	0.0200	2.87		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
1.4	211	0.0155	2.53		Shallow Concentrated Flow, Parking Paved Kv= 20.3 fps
9.4	402	Total			

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Page 28

Summary for Subcatchment 2A: Kelley Street

Runoff = 16.30 cfs @ 12.39 hrs, Volume= 2.353 af, Depth= 4.23"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
64,979	98	Paved parking, HSG D
9,897	74	>75% Grass cover, Good, HSG C
214,750	80	>75% Grass cover, Good, HSG D
842	82	Woods/grass comb., Fair, HSG D
290,468	84	Weighted Average
225,489		77.63% Pervious Area
64,979		22.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.3	100	0.0200	0.08		Sheet Flow, Woods
					Woods: Light underbrush n= 0.400 P2= 3.24"
0.7	35	0.0290	0.85		Shallow Concentrated Flow, Woods
					Woodland Kv= 5.0 fps
2.2	75	0.0130	0.57		Shallow Concentrated Flow, Woods
					Woodland Kv= 5.0 fps
0.2	30	0.0330	2.72		Shallow Concentrated Flow, Yard
					Grassed Waterway Kv= 15.0 fps
1.7	167	0.0120	1.64		Shallow Concentrated Flow, Yard
					Grassed Waterway Kv= 15.0 fps
1.0	130	0.0115	2.18		Shallow Concentrated Flow, Road
					Paved Kv= 20.3 fps
0.5	610	0.0100	22.31	2,198.79	Pipe Channel, Kelley Street Drain Pipe
					159.000" x 113.000", R=82.000"/184.000" Pipe Arch Area= 98.6 sf
					n= 0.013 Concrete pipe, bends & connections
1.5	570	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM101
					18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38'
					n= 0.013 Concrete pipe, bends & connections
29.1	1,717	Total			

Summary for Subcatchment 2B: NorthersParking Lot and Parcels

Runoff = 5.10 cfs @ 12.27 hrs, Volume= 0.577 af, Depth= 4.02"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
23,429	98	Paved parking, HSG D
51,501	74	>75% Grass cover, Good, HSG C
74,930	82	Weighted Average
51,501		68.73% Pervious Area
23,429		31.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	30	0.0500	0.19		Sheet Flow, Grass
					Grass: Short n= 0.150 P2= 3.24"
9.0	70	0.0120	0.13		Sheet Flow, Grass
					Grass: Short n= 0.150 P2= 3.24"
2.2	155	0.0060	1.16		Shallow Concentrated Flow, Grass
					Grassed Waterway Kv= 15.0 fps
0.2	40	0.0375	2.90		Shallow Concentrated Flow, End grass
					Grassed Waterway Kv= 15.0 fps
0.1	25	0.0200	2.87		Shallow Concentrated Flow, Parking
					Paved Kv= 20.3 fps
1.7	120	0.0032	1.15		Shallow Concentrated Flow, Parking
					Paved Kv= 20.3 fps
1.4	450	0.0100	5.26	6.46	Pipe Channel, Drainage from rear lot to Holliston
					15.000" Round Area= 1.2 sf Perim= 3.9' r= 0.31'
					n= 0.013 Concrete pipe, bends & connections
0.7	290	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM 101
					18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38'
					n= 0.013 Concrete pipe, bends & connections
17.9	1,180	Total			

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Page 30

Summary for Subcatchment 2C: Holliston Street and School

Runoff = 16.51 cfs @ 12.23 hrs, Volume= 1.835 af, Depth= 5.00"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
132,809	98	Paved parking, HSG D
37,272	74	>75% Grass cover, Good, HSG C
21,746	80	>75% Grass cover, Good, HSG D
179	82	Woods/grass comb., Fair, HSG D
192,006	91	Weighted Average
59,197		30.83% Pervious Area
132,809		69.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
2.3	30	0.0700	0.22		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
3.5	20	0.0100	0.09		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
1.6	160	0.0125	1.68		Shallow Concentrated Flow, Grass Grassed Waterway Kv= 15.0 fps
0.6	220	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM 101 18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
15.4	480	Total			

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Page 31

Summary for Subcatchment 3: Partial School Drainage

Runoff = 1.90 cfs @ 12.13 hrs, Volume= 0.150 af, Depth= 4.77"
Routed to Link 2L : Max Flow - EX 12" NW

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
10,444	98	Paved parking, HSG D
6,033	74	>75% Grass cover, Good, HSG C
16,477	89	Weighted Average
6,033		36.61% Pervious Area
10,444		63.39% Impervious Area

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

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Page 32

Summary for Subcatchment 4: Eastern Driveway and School Building

Runoff = 9.79 cfs @ 12.13 hrs, Volume= 0.837 af, Depth= 5.57"
Routed to Link 2L : Max Flow - EX 12" NW

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
72,642	98	Paved parking, HSG D
5,914	74	>75% Grass cover, Good, HSG C
63	80	>75% Grass cover, Good, HSG D
78,619	96	Weighted Average
5,977		7.60% Pervious Area
72,642		92.40% Impervious Area

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

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Page 33

Summary for Subcatchment 5: Western Portion of Paved Lot

Runoff = 2.72 cfs @ 12.13 hrs, Volume= 0.226 af, Depth= 5.34"
Routed to Link 3L : Max Flow - EX 12" SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
18,515	98	Paved parking, HSG D
3,668	74	>75% Grass cover, Good, HSG C
22,183	94	Weighted Average
3,668		16.54% Pervious Area
18,515		83.46% Impervious Area

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

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NRCC 24-hr D 10-Year Rainfall=6.04"

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Page 34

Summary for Subcatchment 6A: Western Portion of Gravel Lot

Runoff = 1.40 cfs @ 12.13 hrs, Volume= 0.122 af, Depth= 5.68"
 Routed to Link 3L : Max Flow - EX 12" SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
10,484	98	Paved parking, HSG D
162	74	>75% Grass cover, Good, HSG C
560	80	>75% Grass cover, Good, HSG D
11,206	97	Weighted Average
722		6.44% Pervious Area
10,484		93.56% Impervious Area

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

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NRCC 24-hr D 10-Year Rainfall=6.04"

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Page 35

Summary for Subcatchment 6B: Central Portion of Gravel Lot

Runoff = 2.26 cfs @ 12.13 hrs, Volume= 0.199 af, Depth= 5.80"
Routed to Link 3L : Max Flow - EX 12" SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
17,687	98	Paved parking, HSG D
238	74	>75% Grass cover, Good, HSG C
34	80	>75% Grass cover, Good, HSG D
17,959	98	Weighted Average
272		1.51% Pervious Area
17,687		98.49% Impervious Area

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

2024.10.09 Existing

NRCC 24-hr D 10-Year Rainfall=6.04"

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Page 36

Summary for Subcatchment 6C: Eastern Portion of Gravel Lot and Paved Lot

Runoff = 2.69 cfs @ 12.13 hrs, Volume= 0.234 af, Depth= 5.68"
Routed to Link 3L : Max Flow - EX 12" SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
20,797	98	Paved parking, HSG D
586	74	>75% Grass cover, Good, HSG C
16	80	>75% Grass cover, Good, HSG D
79	82	Woods/grass comb., Fair, HSG D
21,478	97	Weighted Average
681		3.17% Pervious Area
20,797		96.83% Impervious Area

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

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NRCC 24-hr D 10-Year Rainfall=6.04"

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Page 37

Summary for Subcatchment 7: Holliston St

Runoff = 2.64 cfs @ 12.20 hrs, Volume= 0.253 af, Depth= 3.92"
 Routed to Pond 10P : EX 18" RCP Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 10-Year Rainfall=6.04"

	Area (sf)	CN	Description
*	8,042	98	Paved parking
	16,394	74	>75% Grass cover, Good, HSG C
	9,349	80	>75% Grass cover, Good, HSG D
	33,785	81	Weighted Average
	25,743		76.20% Pervious Area
	8,042		23.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		Sheet Flow, Sheet: Grass Grass: Short n= 0.150 P2= 3.24"
5.6	50	0.0200	0.15		Sheet Flow, Sheet: Grass Grass: Short n= 0.150 P2= 3.24"
2.4	210	0.0095	1.46		Shallow Concentrated Flow, Grass: Flat Grassed Waterway Kv= 15.0 fps
0.5	69	0.0150	2.49		Shallow Concentrated Flow, Paved Paved Kv= 20.3 fps
12.4	379	Total			

2024.10.09 Existing

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Page 38

Summary for Pond 1D: Holliston Street Drainage Line (Upstream)

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 3.87" for 10-Year event
Inflow = 15.14 cfs @ 12.01 hrs, Volume= 4.461 af
Outflow = 15.14 cfs @ 12.01 hrs, Volume= 4.461 af, Atten= 0%, Lag= 0.3 min
Primary = 15.14 cfs @ 12.01 hrs, Volume= 4.461 af
Routed to Pond 10P : EX 18" RCP Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 223.01' @ 12.01 hrs

Flood Elev= 222.91'

Device	Routing	Invert	Outlet Devices
#1	Primary	218.20'	18.000" Round Culvert into DMH2 L= 180.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 218.20' / 216.05' S= 0.0119 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=15.14 cfs @ 12.01 hrs HW=223.01' TW=215.86' (Dynamic Tailwater)

↑**1=Culvert into DMH2** (Barrel Controls 15.14 cfs @ 8.57 fps)

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Page 39

Summary for Pond 9P: EX 12" SE

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 5.40" for 10-Year event
Inflow = 5.46 cfs @ 12.04 hrs, Volume= 0.752 af
Outflow = 5.46 cfs @ 12.04 hrs, Volume= 0.752 af, Atten= 0%, Lag= 0.3 min
Primary = 5.46 cfs @ 12.04 hrs, Volume= 0.752 af
Routed to Link 4L : Max Flow - EX 12" Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 216.18' @ 12.04 hrs

Flood Elev= 216.17'

Device	Routing	Invert	Outlet Devices
#1	Primary	211.70'	12.000" Round Culvert L= 155.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 211.70' / 210.40' S= 0.0084 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=5.46 cfs @ 12.04 hrs HW=216.18' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 5.46 cfs @ 6.95 fps)

Summary for Pond 10P: EX 18" RCP Outfall

Inflow Area = 14.596 ac, 39.36% Impervious, Inflow Depth = 3.88" for 10-Year event
 Inflow = 17.78 cfs @ 12.20 hrs, Volume= 4.714 af
 Outflow = 17.78 cfs @ 12.20 hrs, Volume= 4.714 af, Atten= 0%, Lag= 0.0 min
 Primary = 17.78 cfs @ 12.20 hrs, Volume= 4.714 af
 Routed to Link 5L : 18" Pipe

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 216.73' @ 12.20 hrs

Flood Elev= 218.12'

Device	Routing	Invert	Outlet Devices
#1	Primary	211.00'	18.000" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 211.00' / 210.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=17.78 cfs @ 12.20 hrs HW=216.73' TW=0.00' (Dynamic Tailwater)

↑**1=Culvert** (Barrel Controls 17.78 cfs @ 10.06 fps)

Summary for Pond 11P: EX 12" RCP Outfall

Inflow Area = 3.855 ac, 89.67% Impervious, Inflow Depth = 5.09" for 10-Year event
 Inflow = 8.82 cfs @ 11.97 hrs, Volume= 1.635 af
 Outflow = 8.82 cfs @ 11.98 hrs, Volume= 1.635 af, Atten= 0%, Lag= 0.6 min
 Primary = 8.82 cfs @ 11.98 hrs, Volume= 1.635 af
 Routed to Link 6L : 12" Pipe

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 219.29' @ 11.97 hrs

Flood Elev= 219.29'

Device	Routing	Invert	Outlet Devices
#1	Primary	210.20'	12.000" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 210.20' / 209.20' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=8.82 cfs @ 11.98 hrs HW=219.29' TW=0.00' (Dynamic Tailwater)

↑**1=Culvert** (Barrel Controls 8.82 cfs @ 11.23 fps)

2024.10.09 Existing

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Page 42

Summary for Pond CB1: EX 12" NW

Inflow Area = 2.183 ac, 87.37% Impervious, Inflow Depth = 5.06" for 10-Year event
Inflow = 5.34 cfs @ 11.98 hrs, Volume= 0.921 af
Outflow = 5.34 cfs @ 11.99 hrs, Volume= 0.921 af, Atten= 0%, Lag= 0.3 min
Primary = 5.34 cfs @ 11.99 hrs, Volume= 0.921 af
Routed to Link 4L : Max Flow - EX 12" Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 218.42' @ 11.99 hrs

Flood Elev= 218.63'

Device	Routing	Invert	Outlet Devices
#1	Primary	214.60'	12.000" Round Culvert L= 82.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.60' / 214.50' S= 0.0012 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=5.34 cfs @ 11.99 hrs HW=218.42' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 5.34 cfs @ 6.80 fps)

Summary for Link 1L: Max Flow - EX 18" Holliston

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 4.46" for 10-Year event
Inflow = 37.36 cfs @ 12.27 hrs, Volume= 5.139 af
Primary = 15.14 cfs @ 12.01 hrs, Volume= 4.461 af, Atten= 59%, Lag= 0.0 min
Routed to Pond 1D : Holliston Street Drainage Line (Upstream)
Secondary = 22.22 cfs @ 12.27 hrs, Volume= 0.678 af
Routed to Link 5L : 18" Pipe

Primary outflow = Inflow below 15.14 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link 2L: Max Flow - EX 12" NW

Inflow Area = 2.183 ac, 87.37% Impervious, Inflow Depth = 5.43" for 10-Year event
Inflow = 11.69 cfs @ 12.13 hrs, Volume= 0.988 af
Primary = 5.34 cfs @ 11.98 hrs, Volume= 0.921 af, Atten= 54%, Lag= 0.0 min
Routed to Pond CB1 : EX 12" NW
Secondary = 6.35 cfs @ 12.13 hrs, Volume= 0.067 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 5.34 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link 3L: Max Flow - EX 12" SE

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 5.61" for 10-Year event
Inflow = 9.07 cfs @ 12.13 hrs, Volume= 0.781 af
Primary = 5.46 cfs @ 12.04 hrs, Volume= 0.752 af, Atten= 40%, Lag= 0.0 min
Routed to Pond 9P : EX 12" SE
Secondary = 3.61 cfs @ 12.13 hrs, Volume= 0.029 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 5.46 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

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Page 46

Summary for Link 4L: Max Flow - EX 12" Outfall

Inflow Area = 3.855 ac, 89.67% Impervious, Inflow Depth = 5.21" for 10-Year event
Inflow = 10.80 cfs @ 12.04 hrs, Volume= 1.673 af
Primary = 8.82 cfs @ 11.97 hrs, Volume= 1.635 af, Atten= 18%, Lag= 0.0 min
Routed to Pond 11P : EX 12" RCP Outfall
Secondary = 1.98 cfs @ 12.04 hrs, Volume= 0.038 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 8.82 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

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Page 47

Summary for Link 5L: 18" Pipe

Inflow Area = 14.596 ac, 39.36% Impervious, Inflow Depth = 4.43" for 10-Year event

Inflow = 39.68 cfs @ 12.25 hrs, Volume= 5.392 af

Primary = 39.68 cfs @ 12.25 hrs, Volume= 5.392 af, Atten= 0%, Lag= 0.0 min

Routed to Link DP1 : (new Link)

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

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Page 48

Summary for Link 6L: 12" Pipe

Inflow Area = 3.855 ac, 89.67% Impervious, Inflow Depth = 5.51" for 10-Year event
Inflow = 20.76 cfs @ 12.13 hrs, Volume= 1.769 af
Primary = 20.76 cfs @ 12.13 hrs, Volume= 1.769 af, Atten= 0%, Lag= 0.0 min
Routed to Link DP1 : (new Link)

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link DP1: (new Link)

Inflow Area = 18.451 ac, 49.87% Impervious, Inflow Depth = 4.66" for 10-Year event
Inflow = 51.98 cfs @ 12.16 hrs, Volume= 7.161 af
Primary = 51.98 cfs @ 12.16 hrs, Volume= 7.161 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Subcatchment 1A: Northwest Parking

Runoff = 2.04 cfs @ 12.20 hrs, Volume= 0.204 af, Depth= 5.78"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
6,559	98	Paved parking, HSG D
11,871	74	>75% Grass cover, Good, HSG C
18,430	83	Weighted Average
11,871		64.41% Pervious Area
6,559		35.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.0200	0.17		Sheet Flow, Edge of pavement grass Grass: Short n= 0.150 P2= 3.24"
0.4	40	0.0125	1.68		Shallow Concentrated Flow, Edge of pavement grass Grassed Waterway Kv= 15.0 fps
0.3	40	0.0125	2.27		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
0.4	60	0.0330	2.72		Shallow Concentrated Flow, Swale Entrance Grassed Waterway Kv= 15.0 fps
1.3	140	0.0150	1.84		Shallow Concentrated Flow, Swale Grassed Waterway Kv= 15.0 fps
0.9	55	0.0050	1.06		Shallow Concentrated Flow, Swale to outlet Grassed Waterway Kv= 15.0 fps
13.0	435	Total			

Summary for Subcatchment 1B: Northwest Driveway

Runoff = 3.45 cfs @ 12.17 hrs, Volume= 0.313 af, Depth= 6.25"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
14,424	98	Paved parking, HSG D
11,762	74	>75% Grass cover, Good, HSG C
26,186	87	Weighted Average
11,762		44.92% Pervious Area
14,424		55.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	25	0.0200	1.05		Sheet Flow, Driveway Smooth surfaces n= 0.011 P2= 3.24"
6.9	75	0.0270	0.18		Sheet Flow, Yard Grass: Short n= 0.150 P2= 3.24"
0.3	25	0.0080	1.34		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
0.4	66	0.0200	2.87		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
1.4	211	0.0155	2.53		Shallow Concentrated Flow, Parking Paved Kv= 20.3 fps
9.4	402	Total			

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Page 52

Summary for Subcatchment 2A: Kelley Street

Runoff = 22.40 cfs @ 12.39 hrs, Volume= 3.275 af, Depth= 5.89"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
64,979	98	Paved parking, HSG D
9,897	74	>75% Grass cover, Good, HSG C
214,750	80	>75% Grass cover, Good, HSG D
842	82	Woods/grass comb., Fair, HSG D
290,468	84	Weighted Average
225,489		77.63% Pervious Area
64,979		22.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.3	100	0.0200	0.08		Sheet Flow, Woods Woods: Light underbrush n= 0.400 P2= 3.24"
0.7	35	0.0290	0.85		Shallow Concentrated Flow, Woods Woodland Kv= 5.0 fps
2.2	75	0.0130	0.57		Shallow Concentrated Flow, Woods Woodland Kv= 5.0 fps
0.2	30	0.0330	2.72		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
1.7	167	0.0120	1.64		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
1.0	130	0.0115	2.18		Shallow Concentrated Flow, Road Paved Kv= 20.3 fps
0.5	610	0.0100	22.31	2,198.79	Pipe Channel, Kelley Street Drain Pipe 159.000" x 113.000", R=82.000"/184.000" Pipe Arch Area= 98.6 sf n= 0.013 Concrete pipe, bends & connections
1.5	570	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM101 18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
29.1	1,717	Total			

Summary for Subcatchment 2B: NorthersParking Lot and Parcels

Runoff = 7.08 cfs @ 12.27 hrs, Volume= 0.811 af, Depth= 5.66"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
23,429	98	Paved parking, HSG D
51,501	74	>75% Grass cover, Good, HSG C
74,930	82	Weighted Average
51,501		68.73% Pervious Area
23,429		31.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	30	0.0500	0.19		Sheet Flow, Grass
					Grass: Short n= 0.150 P2= 3.24"
9.0	70	0.0120	0.13		Sheet Flow, Grass
					Grass: Short n= 0.150 P2= 3.24"
2.2	155	0.0060	1.16		Shallow Concentrated Flow, Grass
					Grassed Waterway Kv= 15.0 fps
0.2	40	0.0375	2.90		Shallow Concentrated Flow, End grass
					Grassed Waterway Kv= 15.0 fps
0.1	25	0.0200	2.87		Shallow Concentrated Flow, Parking
					Paved Kv= 20.3 fps
1.7	120	0.0032	1.15		Shallow Concentrated Flow, Parking
					Paved Kv= 20.3 fps
1.4	450	0.0100	5.26	6.46	Pipe Channel, Drainage from rear lot to Holliston
					15.000" Round Area= 1.2 sf Perim= 3.9' r= 0.31'
					n= 0.013 Concrete pipe, bends & connections
0.7	290	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM 101
					18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38'
					n= 0.013 Concrete pipe, bends & connections
17.9	1,180	Total			

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Page 54

Summary for Subcatchment 2C: Holliston Street and School

Runoff = 21.81 cfs @ 12.23 hrs, Volume= 2.467 af, Depth= 6.72"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
132,809	98	Paved parking, HSG D
37,272	74	>75% Grass cover, Good, HSG C
21,746	80	>75% Grass cover, Good, HSG D
179	82	Woods/grass comb., Fair, HSG D
192,006	91	Weighted Average
59,197		30.83% Pervious Area
132,809		69.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
2.3	30	0.0700	0.22		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
3.5	20	0.0100	0.09		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
1.6	160	0.0125	1.68		Shallow Concentrated Flow, Grass Grassed Waterway Kv= 15.0 fps
0.6	220	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM 101 18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
15.4	480	Total			

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Page 55

Summary for Subcatchment 3: Partial School Drainage

Runoff = 2.52 cfs @ 12.13 hrs, Volume= 0.204 af, Depth= 6.48"
Routed to Link 2L : Max Flow - EX 12" NW

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
10,444	98	Paved parking, HSG D
6,033	74	>75% Grass cover, Good, HSG C
16,477	89	Weighted Average
6,033		36.61% Pervious Area
10,444		63.39% Impervious Area

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

2024.10.09 Existing

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Page 56

Summary for Subcatchment 4: Eastern Driveway and School Building

Runoff = 12.70 cfs @ 12.13 hrs, Volume= 1.100 af, Depth= 7.31"
Routed to Link 2L : Max Flow - EX 12" NW

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
72,642	98	Paved parking, HSG D
5,914	74	>75% Grass cover, Good, HSG C
63	80	>75% Grass cover, Good, HSG D
78,619	96	Weighted Average
5,977		7.60% Pervious Area
72,642		92.40% Impervious Area

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

2024.10.09 Existing

NRCC 24-hr D 25-Year Rainfall=7.79"

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Page 57

Summary for Subcatchment 5: Western Portion of Paved Lot

Runoff = 3.54 cfs @ 12.13 hrs, Volume= 0.300 af, Depth= 7.07"
Routed to Link 3L : Max Flow - EX 12" SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
18,515	98	Paved parking, HSG D
3,668	74	>75% Grass cover, Good, HSG C
22,183	94	Weighted Average
3,668		16.54% Pervious Area
18,515		83.46% Impervious Area

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

2024.10.09 Existing

NRCC 24-hr D 25-Year Rainfall=7.79"

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Page 58

Summary for Subcatchment 6A: Western Portion of Gravel Lot

Runoff = 1.82 cfs @ 12.13 hrs, Volume= 0.159 af, Depth= 7.43"
Routed to Link 3L : Max Flow - EX 12" SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
10,484	98	Paved parking, HSG D
162	74	>75% Grass cover, Good, HSG C
560	80	>75% Grass cover, Good, HSG D
11,206	97	Weighted Average
722		6.44% Pervious Area
10,484		93.56% Impervious Area

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

2024.10.09 Existing

NRCC 24-hr D 25-Year Rainfall=7.79"

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Page 59

Summary for Subcatchment 6B: Central Portion of Gravel Lot

Runoff = 2.92 cfs @ 12.13 hrs, Volume= 0.259 af, Depth= 7.55"
Routed to Link 3L : Max Flow - EX 12" SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
17,687	98	Paved parking, HSG D
238	74	>75% Grass cover, Good, HSG C
34	80	>75% Grass cover, Good, HSG D
17,959	98	Weighted Average
272		1.51% Pervious Area
17,687		98.49% Impervious Area

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

2024.10.09 Existing

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Page 60

Summary for Subcatchment 6C: Eastern Portion of Gravel Lot and Paved Lot

Runoff = 3.48 cfs @ 12.13 hrs, Volume= 0.305 af, Depth= 7.43"
Routed to Link 3L : Max Flow - EX 12" SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
20,797	98	Paved parking, HSG D
586	74	>75% Grass cover, Good, HSG C
16	80	>75% Grass cover, Good, HSG D
79	82	Woods/grass comb., Fair, HSG D
21,478	97	Weighted Average
681		3.17% Pervious Area
20,797		96.83% Impervious Area

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

2024.10.09 Existing

NRCC 24-hr D 25-Year Rainfall=7.79"

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Page 61

Summary for Subcatchment 7: Holliston St

Runoff = 3.68 cfs @ 12.20 hrs, Volume= 0.358 af, Depth= 5.54"
 Routed to Pond 10P : EX 18" RCP Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 25-Year Rainfall=7.79"

	Area (sf)	CN	Description
*	8,042	98	Paved parking
	16,394	74	>75% Grass cover, Good, HSG C
	9,349	80	>75% Grass cover, Good, HSG D
	33,785	81	Weighted Average
	25,743		76.20% Pervious Area
	8,042		23.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		Sheet Flow, Sheet: Grass Grass: Short n= 0.150 P2= 3.24"
5.6	50	0.0200	0.15		Sheet Flow, Sheet: Grass Grass: Short n= 0.150 P2= 3.24"
2.4	210	0.0095	1.46		Shallow Concentrated Flow, Grass: Flat Grassed Waterway Kv= 15.0 fps
0.5	69	0.0150	2.49		Shallow Concentrated Flow, Paved Paved Kv= 20.3 fps
12.4	379	Total			

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NRCC 24-hr D 25-Year Rainfall=7.79"

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Page 62

Summary for Pond 1D: Holliston Street Drainage Line (Upstream)

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 5.02" for 25-Year event
Inflow = 15.14 cfs @ 11.91 hrs, Volume= 5.779 af
Outflow = 15.14 cfs @ 11.91 hrs, Volume= 5.779 af, Atten= 0%, Lag= 0.3 min
Primary = 15.14 cfs @ 11.91 hrs, Volume= 5.779 af
Routed to Pond 10P : EX 18" RCP Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 223.01' @ 11.91 hrs

Flood Elev= 222.91'

Device	Routing	Invert	Outlet Devices
#1	Primary	218.20'	18.000" Round Culvert into DMH2 L= 180.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 218.20' / 216.05' S= 0.0119 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=15.14 cfs @ 11.91 hrs HW=223.01' TW=215.82' (Dynamic Tailwater)

↑**1=Culvert into DMH2** (Barrel Controls 15.14 cfs @ 8.57 fps)

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Page 63

Summary for Pond 9P: EX 12" SE

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 6.88" for 25-Year event
Inflow = 5.46 cfs @ 11.98 hrs, Volume= 0.958 af
Outflow = 5.46 cfs @ 11.99 hrs, Volume= 0.958 af, Atten= 0%, Lag= 0.3 min
Primary = 5.46 cfs @ 11.99 hrs, Volume= 0.958 af
Routed to Link 4L : Max Flow - EX 12" Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 216.18' @ 11.99 hrs

Flood Elev= 216.17'

Device	Routing	Invert	Outlet Devices
#1	Primary	211.70'	12.000" Round Culvert L= 155.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 211.70' / 210.40' S= 0.0084 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=5.46 cfs @ 11.99 hrs HW=216.18' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 5.46 cfs @ 6.95 fps)

2024.10.09 Existing

NRCC 24-hr D 25-Year Rainfall=7.79"

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Page 64

Summary for Pond 10P: EX 18" RCP Outfall

Inflow Area = 14.596 ac, 39.36% Impervious, Inflow Depth = 5.05" for 25-Year event
Inflow = 18.82 cfs @ 12.20 hrs, Volume= 6.138 af
Outflow = 18.82 cfs @ 12.20 hrs, Volume= 6.138 af, Atten= 0%, Lag= 0.0 min
Primary = 18.82 cfs @ 12.20 hrs, Volume= 6.138 af
Routed to Link 5L : 18" Pipe

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 217.36' @ 12.20 hrs

Flood Elev= 218.12'

Device	Routing	Invert	Outlet Devices
#1	Primary	211.00'	18.000" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 211.00' / 210.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=18.82 cfs @ 12.20 hrs HW=217.36' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 18.82 cfs @ 10.65 fps)

2024.10.09 Existing

NRCC 24-hr D 25-Year Rainfall=7.79"

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Page 65

Summary for Pond 11P: EX 12" RCP Outfall

Inflow Area = 3.855 ac, 89.67% Impervious, Inflow Depth = 6.49" for 25-Year event
Inflow = 8.82 cfs @ 11.92 hrs, Volume= 2.083 af
Outflow = 8.82 cfs @ 11.92 hrs, Volume= 2.083 af, Atten= 0%, Lag= 0.0 min
Primary = 8.82 cfs @ 11.92 hrs, Volume= 2.083 af
Routed to Link 6L : 12" Pipe

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 219.29' @ 11.92 hrs

Flood Elev= 219.29'

Device	Routing	Invert	Outlet Devices
#1	Primary	210.20'	12.000" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 210.20' / 209.20' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=8.82 cfs @ 11.92 hrs HW=219.29' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 8.82 cfs @ 11.23 fps)

2024.10.09 Existing

NRCC 24-hr D 25-Year Rainfall=7.79"

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Page 66

Summary for Pond CB1: EX 12" NW

Inflow Area = 2.183 ac, 87.37% Impervious, Inflow Depth = 6.47" for 25-Year event
Inflow = 5.34 cfs @ 11.94 hrs, Volume= 1.177 af
Outflow = 5.34 cfs @ 11.95 hrs, Volume= 1.177 af, Atten= 0%, Lag= 0.3 min
Primary = 5.34 cfs @ 11.95 hrs, Volume= 1.177 af
Routed to Link 4L : Max Flow - EX 12" Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 218.42' @ 11.95 hrs

Flood Elev= 218.63'

Device	Routing	Invert	Outlet Devices
#1	Primary	214.60'	12.000" Round Culvert L= 82.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.60' / 214.50' S= 0.0012 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=5.34 cfs @ 11.95 hrs HW=218.42' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 5.34 cfs @ 6.80 fps)

2024.10.09 Existing

NRCC 24-hr D 25-Year Rainfall=7.79"

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Page 67

Summary for Link 1L: Max Flow - EX 18" Holliston

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 6.14" for 25-Year event
Inflow = 50.62 cfs @ 12.26 hrs, Volume= 7.070 af
Primary = 15.14 cfs @ 11.91 hrs, Volume= 5.779 af, Atten= 70%, Lag= 0.0 min
Routed to Pond 1D : Holliston Street Drainage Line (Upstream)
Secondary = 35.48 cfs @ 12.26 hrs, Volume= 1.291 af
Routed to Link 5L : 18" Pipe

Primary outflow = Inflow below 15.14 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link 2L: Max Flow - EX 12" NW

Inflow Area = 2.183 ac, 87.37% Impervious, Inflow Depth = 7.17" for 25-Year event
Inflow = 15.22 cfs @ 12.13 hrs, Volume= 1.304 af
Primary = 5.34 cfs @ 11.94 hrs, Volume= 1.177 af, Atten= 65%, Lag= 0.0 min
Routed to Pond CB1 : EX 12" NW
Secondary = 9.88 cfs @ 12.13 hrs, Volume= 0.127 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 5.34 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link 3L: Max Flow - EX 12" SE

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 7.35" for 25-Year event
Inflow = 11.76 cfs @ 12.13 hrs, Volume= 1.024 af
Primary = 5.46 cfs @ 11.98 hrs, Volume= 0.958 af, Atten= 54%, Lag= 0.0 min
Routed to Pond 9P : EX 12" SE
Secondary = 6.30 cfs @ 12.13 hrs, Volume= 0.066 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 5.46 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

2024.10.09 Existing*NRCC 24-hr D 25-Year Rainfall=7.79"*

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Page 70

Summary for Link 4L: Max Flow - EX 12" Outfall

Inflow Area = 3.855 ac, 89.67% Impervious, Inflow Depth = 6.65" for 25-Year event
Inflow = 10.80 cfs @ 11.99 hrs, Volume= 2.135 af
Primary = 8.82 cfs @ 11.92 hrs, Volume= 2.083 af, Atten= 18%, Lag= 0.0 min
Routed to Pond 11P : EX 12" RCP Outfall
Secondary = 1.98 cfs @ 11.99 hrs, Volume= 0.052 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 8.82 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

2024.10.09 Existing

NRCC 24-hr D 25-Year Rainfall=7.79"

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Page 71

Summary for Link 5L: 18" Pipe

Inflow Area = 14.596 ac, 39.36% Impervious, Inflow Depth = 6.11" for 25-Year event

Inflow = 53.85 cfs @ 12.25 hrs, Volume= 7.429 af

Primary = 53.85 cfs @ 12.25 hrs, Volume= 7.429 af, Atten= 0%, Lag= 0.0 min

Routed to Link DP1 : (new Link)

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

2024.10.09 Existing

NRCC 24-hr D 25-Year Rainfall=7.79"

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Page 72

Summary for Link 6L: 12" Pipe

Inflow Area = 3.855 ac, 89.67% Impervious, Inflow Depth = 7.25" for 25-Year event

Inflow = 26.99 cfs @ 12.13 hrs, Volume= 2.328 af

Primary = 26.99 cfs @ 12.13 hrs, Volume= 2.328 af, Atten= 0%, Lag= 0.0 min

Routed to Link DP1 : (new Link)

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

2024.10.09 Existing

NRCC 24-hr D 25-Year Rainfall=7.79"

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Page 73

Summary for Link DP1: (new Link)

Inflow Area = 18.451 ac, 49.87% Impervious, Inflow Depth = 6.35" for 25-Year event

Inflow = 69.64 cfs @ 12.16 hrs, Volume= 9.757 af

Primary = 69.64 cfs @ 12.16 hrs, Volume= 9.757 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

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NRCC 24-hr D 100-Year Rainfall=10.71"

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Page 74

Summary for Subcatchment 1A: Northwest Parking

Runoff = 2.97 cfs @ 12.20 hrs, Volume= 0.303 af, Depth= 8.59"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
6,559	98	Paved parking, HSG D
11,871	74	>75% Grass cover, Good, HSG C
18,430	83	Weighted Average
11,871		64.41% Pervious Area
6,559		35.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.0200	0.17		Sheet Flow, Edge of pavement grass Grass: Short n= 0.150 P2= 3.24"
0.4	40	0.0125	1.68		Shallow Concentrated Flow, Edge of pavement grass Grassed Waterway Kv= 15.0 fps
0.3	40	0.0125	2.27		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
0.4	60	0.0330	2.72		Shallow Concentrated Flow, Swale Entrance Grassed Waterway Kv= 15.0 fps
1.3	140	0.0150	1.84		Shallow Concentrated Flow, Swale Grassed Waterway Kv= 15.0 fps
0.9	55	0.0050	1.06		Shallow Concentrated Flow, Swale to outlet Grassed Waterway Kv= 15.0 fps
13.0	435	Total			

Summary for Subcatchment 1B: Northwest Driveway

Runoff = 4.92 cfs @ 12.17 hrs, Volume= 0.456 af, Depth= 9.10"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
14,424	98	Paved parking, HSG D
11,762	74	>75% Grass cover, Good, HSG C
26,186	87	Weighted Average
11,762		44.92% Pervious Area
14,424		55.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	25	0.0200	1.05		Sheet Flow, Driveway Smooth surfaces n= 0.011 P2= 3.24"
6.9	75	0.0270	0.18		Sheet Flow, Yard Grass: Short n= 0.150 P2= 3.24"
0.3	25	0.0080	1.34		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
0.4	66	0.0200	2.87		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
1.4	211	0.0155	2.53		Shallow Concentrated Flow, Parking Paved Kv= 20.3 fps
9.4	402	Total			

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NRCC 24-hr D 100-Year Rainfall=10.71"

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Page 76

Summary for Subcatchment 2A: Kelley Street

Runoff = 32.52 cfs @ 12.39 hrs, Volume= 4.846 af, Depth= 8.72"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
64,979	98	Paved parking, HSG D
9,897	74	>75% Grass cover, Good, HSG C
214,750	80	>75% Grass cover, Good, HSG D
842	82	Woods/grass comb., Fair, HSG D
290,468	84	Weighted Average
225,489		77.63% Pervious Area
64,979		22.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.3	100	0.0200	0.08		Sheet Flow, Woods Woods: Light underbrush n= 0.400 P2= 3.24"
0.7	35	0.0290	0.85		Shallow Concentrated Flow, Woods Woodland Kv= 5.0 fps
2.2	75	0.0130	0.57		Shallow Concentrated Flow, Woods Woodland Kv= 5.0 fps
0.2	30	0.0330	2.72		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
1.7	167	0.0120	1.64		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
1.0	130	0.0115	2.18		Shallow Concentrated Flow, Road Paved Kv= 20.3 fps
0.5	610	0.0100	22.31	2,198.79	Pipe Channel, Kelley Street Drain Pipe 159.000" x 113.000", R=82.000"/184.000" Pipe Arch Area= 98.6 sf n= 0.013 Concrete pipe, bends & connections
1.5	570	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM101 18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
29.1	1,717	Total			

2024.10.09 Existing

NRCC 24-hr D 100-Year Rainfall=10.71"

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Page 77

Summary for Subcatchment 2B: NorthersParking Lot and Parcels

Runoff = 10.36 cfs @ 12.27 hrs, Volume= 1.213 af, Depth= 8.46"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
23,429	98	Paved parking, HSG D
51,501	74	>75% Grass cover, Good, HSG C
74,930	82	Weighted Average
51,501		68.73% Pervious Area
23,429		31.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	30	0.0500	0.19		Sheet Flow, Grass
					Grass: Short n= 0.150 P2= 3.24"
9.0	70	0.0120	0.13		Sheet Flow, Grass
					Grass: Short n= 0.150 P2= 3.24"
2.2	155	0.0060	1.16		Shallow Concentrated Flow, Grass
					Grassed Waterway Kv= 15.0 fps
0.2	40	0.0375	2.90		Shallow Concentrated Flow, End grass
					Grassed Waterway Kv= 15.0 fps
0.1	25	0.0200	2.87		Shallow Concentrated Flow, Parking
					Paved Kv= 20.3 fps
1.7	120	0.0032	1.15		Shallow Concentrated Flow, Parking
					Paved Kv= 20.3 fps
1.4	450	0.0100	5.26	6.46	Pipe Channel, Drainage from rear lot to Holliston
					15.000" Round Area= 1.2 sf Perim= 3.9' r= 0.31'
					n= 0.013 Concrete pipe, bends & connections
0.7	290	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM 101
					18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38'
					n= 0.013 Concrete pipe, bends & connections
17.9	1,180	Total			

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NRCC 24-hr D 100-Year Rainfall=10.71"

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Page 78

Summary for Subcatchment 2C: Holliston Street and School

Runoff = 30.58 cfs @ 12.23 hrs, Volume= 3.529 af, Depth= 9.61"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
132,809	98	Paved parking, HSG D
37,272	74	>75% Grass cover, Good, HSG C
21,746	80	>75% Grass cover, Good, HSG D
179	82	Woods/grass comb., Fair, HSG D
192,006	91	Weighted Average
59,197		30.83% Pervious Area
132,809		69.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
2.3	30	0.0700	0.22		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
3.5	20	0.0100	0.09		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
1.6	160	0.0125	1.68		Shallow Concentrated Flow, Grass Grassed Waterway Kv= 15.0 fps
0.6	220	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM 101 18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
15.4	480	Total			

2024.10.09 Existing

NRCC 24-hr D 100-Year Rainfall=10.71"

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Page 79

Summary for Subcatchment 3: Partial School Drainage

Runoff = 3.56 cfs @ 12.13 hrs, Volume= 0.295 af, Depth= 9.36"
Routed to Link 2L : Max Flow - EX 12" NW

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
10,444	98	Paved parking, HSG D
6,033	74	>75% Grass cover, Good, HSG C
16,477	89	Weighted Average
6,033		36.61% Pervious Area
10,444		63.39% Impervious Area

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

2024.10.09 Existing

NRCC 24-hr D 100-Year Rainfall=10.71"

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Page 80

Summary for Subcatchment 4: Eastern Driveway and School Building

Runoff = 17.53 cfs @ 12.13 hrs, Volume= 1.538 af, Depth=10.23"
Routed to Link 2L : Max Flow - EX 12" NW

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
72,642	98	Paved parking, HSG D
5,914	74	>75% Grass cover, Good, HSG C
63	80	>75% Grass cover, Good, HSG D
78,619	96	Weighted Average
5,977		7.60% Pervious Area
72,642		92.40% Impervious Area

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

2024.10.09 Existing

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Page 81

Summary for Subcatchment 5: Western Portion of Paved Lot

Runoff = 4.92 cfs @ 12.13 hrs, Volume= 0.424 af, Depth= 9.98"
Routed to Link 3L : Max Flow - EX 12" SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
18,515	98	Paved parking, HSG D
3,668	74	>75% Grass cover, Good, HSG C
22,183	94	Weighted Average
3,668		16.54% Pervious Area
18,515		83.46% Impervious Area

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

2024.10.09 Existing

NRCC 24-hr D 100-Year Rainfall=10.71"

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Page 82

Summary for Subcatchment 6A: Western Portion of Gravel Lot

Runoff = 2.50 cfs @ 12.13 hrs, Volume= 0.222 af, Depth=10.35"
Routed to Link 3L : Max Flow - EX 12" SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
10,484	98	Paved parking, HSG D
162	74	>75% Grass cover, Good, HSG C
560	80	>75% Grass cover, Good, HSG D
11,206	97	Weighted Average
722		6.44% Pervious Area
10,484		93.56% Impervious Area

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

2024.10.09 Existing

NRCC 24-hr D 100-Year Rainfall=10.71"

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Page 83

Summary for Subcatchment 6B: Central Portion of Gravel Lot

Runoff = 4.02 cfs @ 12.13 hrs, Volume= 0.360 af, Depth=10.47"
Routed to Link 3L : Max Flow - EX 12" SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
17,687	98	Paved parking, HSG D
238	74	>75% Grass cover, Good, HSG C
34	80	>75% Grass cover, Good, HSG D
17,959	98	Weighted Average
272		1.51% Pervious Area
17,687		98.49% Impervious Area

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

2024.10.09 Existing

NRCC 24-hr D 100-Year Rainfall=10.71"

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Page 84

Summary for Subcatchment 6C: Eastern Portion of Gravel Lot and Paved Lot

Runoff = 4.80 cfs @ 12.13 hrs, Volume= 0.425 af, Depth=10.35"
Routed to Link 3L : Max Flow - EX 12" SE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
20,797	98	Paved parking, HSG D
586	74	>75% Grass cover, Good, HSG C
16	80	>75% Grass cover, Good, HSG D
79	82	Woods/grass comb., Fair, HSG D
21,478	97	Weighted Average
681		3.17% Pervious Area
20,797		96.83% Impervious Area

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

2024.10.09 Existing

NRCC 24-hr D 100-Year Rainfall=10.71"

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Page 85

Summary for Subcatchment 7: Holliston St

Runoff = 5.42 cfs @ 12.20 hrs, Volume= 0.539 af, Depth= 8.33"
 Routed to Pond 10P : EX 18" RCP Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 100-Year Rainfall=10.71"

	Area (sf)	CN	Description
*	8,042	98	Paved parking
	16,394	74	>75% Grass cover, Good, HSG C
	9,349	80	>75% Grass cover, Good, HSG D
	33,785	81	Weighted Average
	25,743		76.20% Pervious Area
	8,042		23.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		Sheet Flow, Sheet: Grass Grass: Short n= 0.150 P2= 3.24"
5.6	50	0.0200	0.15		Sheet Flow, Sheet: Grass Grass: Short n= 0.150 P2= 3.24"
2.4	210	0.0095	1.46		Shallow Concentrated Flow, Grass: Flat Grassed Waterway Kv= 15.0 fps
0.5	69	0.0150	2.49		Shallow Concentrated Flow, Paved Paved Kv= 20.3 fps
12.4	379	Total			

Summary for Pond 1D: Holliston Street Drainage Line (Upstream)

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 6.81" for 100-Year event
 Inflow = 15.14 cfs @ 11.68 hrs, Volume= 7.845 af
 Outflow = 15.14 cfs @ 12.12 hrs, Volume= 7.845 af, Atten= 0%, Lag= 26.7 min
 Primary = 15.14 cfs @ 12.12 hrs, Volume= 7.845 af
 Routed to Pond 10P : EX 18" RCP Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 223.96' @ 12.20 hrs

Flood Elev= 222.91'

Device	Routing	Invert	Outlet Devices
#1	Primary	218.20'	18.000" Round Culvert into DMH2 L= 180.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 218.20' / 216.05' S= 0.0119 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=15.14 cfs @ 12.12 hrs HW=223.27' TW=217.81' (Dynamic Tailwater)

↑**1=Culvert into DMH2** (Outlet Controls 15.14 cfs @ 8.57 fps)

2024.10.09 Existing

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Page 87

Summary for Pond 9P: EX 12" SE

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 9.24" for 100-Year event
Inflow = 5.46 cfs @ 11.93 hrs, Volume= 1.287 af
Outflow = 5.46 cfs @ 11.93 hrs, Volume= 1.287 af, Atten= 0%, Lag= 0.0 min
Primary = 5.46 cfs @ 11.93 hrs, Volume= 1.287 af
Routed to Link 4L : Max Flow - EX 12" Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 216.18' @ 11.93 hrs

Flood Elev= 216.17'

Device	Routing	Invert	Outlet Devices
#1	Primary	211.70'	12.000" Round Culvert L= 155.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 211.70' / 210.40' S= 0.0084 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=5.46 cfs @ 11.93 hrs HW=216.18' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 5.46 cfs @ 6.95 fps)

2024.10.09 Existing

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Page 88

Summary for Pond 10P: EX 18" RCP Outfall

Inflow Area = 14.596 ac, 39.36% Impervious, Inflow Depth = 6.89" for 100-Year event
Inflow = 20.56 cfs @ 12.20 hrs, Volume= 8.384 af
Outflow = 20.56 cfs @ 12.20 hrs, Volume= 8.384 af, Atten= 0%, Lag= 0.0 min
Primary = 20.56 cfs @ 12.20 hrs, Volume= 8.384 af
Routed to Link 5L : 18" Pipe

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 218.50' @ 12.20 hrs

Flood Elev= 218.12'

Device	Routing	Invert	Outlet Devices
#1	Primary	211.00'	18.000" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 211.00' / 210.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=20.56 cfs @ 12.20 hrs HW=218.50' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 20.56 cfs @ 11.64 fps)

2024.10.09 Existing

NRCC 24-hr D 100-Year Rainfall=10.71"

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Page 89

Summary for Pond 11P: EX 12" RCP Outfall

Inflow Area = 3.855 ac, 89.67% Impervious, Inflow Depth = 8.71" for 100-Year event
Inflow = 8.82 cfs @ 11.83 hrs, Volume= 2.797 af
Outflow = 8.82 cfs @ 11.83 hrs, Volume= 2.797 af, Atten= 0%, Lag= 0.3 min
Primary = 8.82 cfs @ 11.83 hrs, Volume= 2.797 af
Routed to Link 6L : 12" Pipe

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 219.29' @ 11.83 hrs

Flood Elev= 219.29'

Device	Routing	Invert	Outlet Devices
#1	Primary	210.20'	12.000" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 210.20' / 209.20' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=8.82 cfs @ 11.83 hrs HW=219.29' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 8.82 cfs @ 11.23 fps)

2024.10.09 Existing

NRCC 24-hr D 100-Year Rainfall=10.71"

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Page 90

Summary for Pond CB1: EX 12" NW

Inflow Area = 2.183 ac, 87.37% Impervious, Inflow Depth = 8.71" for 100-Year event
Inflow = 5.34 cfs @ 11.85 hrs, Volume= 1.585 af
Outflow = 5.34 cfs @ 11.86 hrs, Volume= 1.585 af, Atten= 0%, Lag= 0.3 min
Primary = 5.34 cfs @ 11.86 hrs, Volume= 1.585 af
Routed to Link 4L : Max Flow - EX 12" Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 218.42' @ 11.86 hrs

Flood Elev= 218.63'

Device	Routing	Invert	Outlet Devices
#1	Primary	214.60'	12.000" Round Culvert L= 82.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.60' / 214.50' S= 0.0012 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=5.34 cfs @ 11.86 hrs HW=218.42' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 5.34 cfs @ 6.80 fps)

Summary for Link 1L: Max Flow - EX 18" Holliston

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 8.98" for 100-Year event
Inflow = 72.61 cfs @ 12.26 hrs, Volume= 10.347 af
Primary = 15.14 cfs @ 11.68 hrs, Volume= 7.845 af, Atten= 79%, Lag= 0.0 min
Routed to Pond 1D : Holliston Street Drainage Line (Upstream)
Secondary = 57.47 cfs @ 12.26 hrs, Volume= 2.502 af
Routed to Link 5L : 18" Pipe

Primary outflow = Inflow below 15.14 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link 2L: Max Flow - EX 12" NW

Inflow Area = 2.183 ac, 87.37% Impervious, Inflow Depth = 10.08" for 100-Year event
Inflow = 21.09 cfs @ 12.13 hrs, Volume= 1.833 af
Primary = 5.34 cfs @ 11.85 hrs, Volume= 1.585 af, Atten= 75%, Lag= 0.0 min
Routed to Pond CB1 : EX 12" NW
Secondary = 15.75 cfs @ 12.13 hrs, Volume= 0.248 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 5.34 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link 3L: Max Flow - EX 12" SE

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 10.27" for 100-Year event
Inflow = 16.24 cfs @ 12.13 hrs, Volume= 1.430 af
Primary = 5.46 cfs @ 11.93 hrs, Volume= 1.287 af, Atten= 66%, Lag= 0.0 min
Routed to Pond 9P : EX 12" SE
Secondary = 10.78 cfs @ 12.13 hrs, Volume= 0.143 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 5.46 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

2024.10.09 Existing*NRCC 24-hr D 100-Year Rainfall=10.71"*

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Page 94

Summary for Link 4L: Max Flow - EX 12" Outfall

Inflow Area = 3.855 ac, 89.67% Impervious, Inflow Depth = 8.94" for 100-Year event
Inflow = 10.80 cfs @ 11.93 hrs, Volume= 2.872 af
Primary = 8.82 cfs @ 11.83 hrs, Volume= 2.797 af, Atten= 18%, Lag= 0.0 min
Routed to Pond 11P : EX 12" RCP Outfall
Secondary = 1.98 cfs @ 11.93 hrs, Volume= 0.076 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 8.82 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

2024.10.09 Existing

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Page 95

Summary for Link 5L: 18" Pipe

Inflow Area = 14.596 ac, 39.36% Impervious, Inflow Depth = 8.95" for 100-Year event
Inflow = 77.36 cfs @ 12.25 hrs, Volume= 10.886 af
Primary = 77.36 cfs @ 12.25 hrs, Volume= 10.886 af, Atten= 0%, Lag= 0.0 min
Routed to Link DP1 : (new Link)

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

2024.10.09 Existing

NRCC 24-hr D 100-Year Rainfall=10.71"

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Page 96

Summary for Link 6L: 12" Pipe

Inflow Area = 3.855 ac, 89.67% Impervious, Inflow Depth = 10.16" for 100-Year event
Inflow = 37.33 cfs @ 12.13 hrs, Volume= 3.263 af
Primary = 37.33 cfs @ 12.13 hrs, Volume= 3.263 af, Atten= 0%, Lag= 0.0 min
Routed to Link DP1 : (new Link)

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

2024.10.09 Existing

NRCC 24-hr D 100-Year Rainfall=10.71"

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Page 97

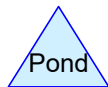
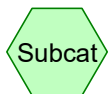
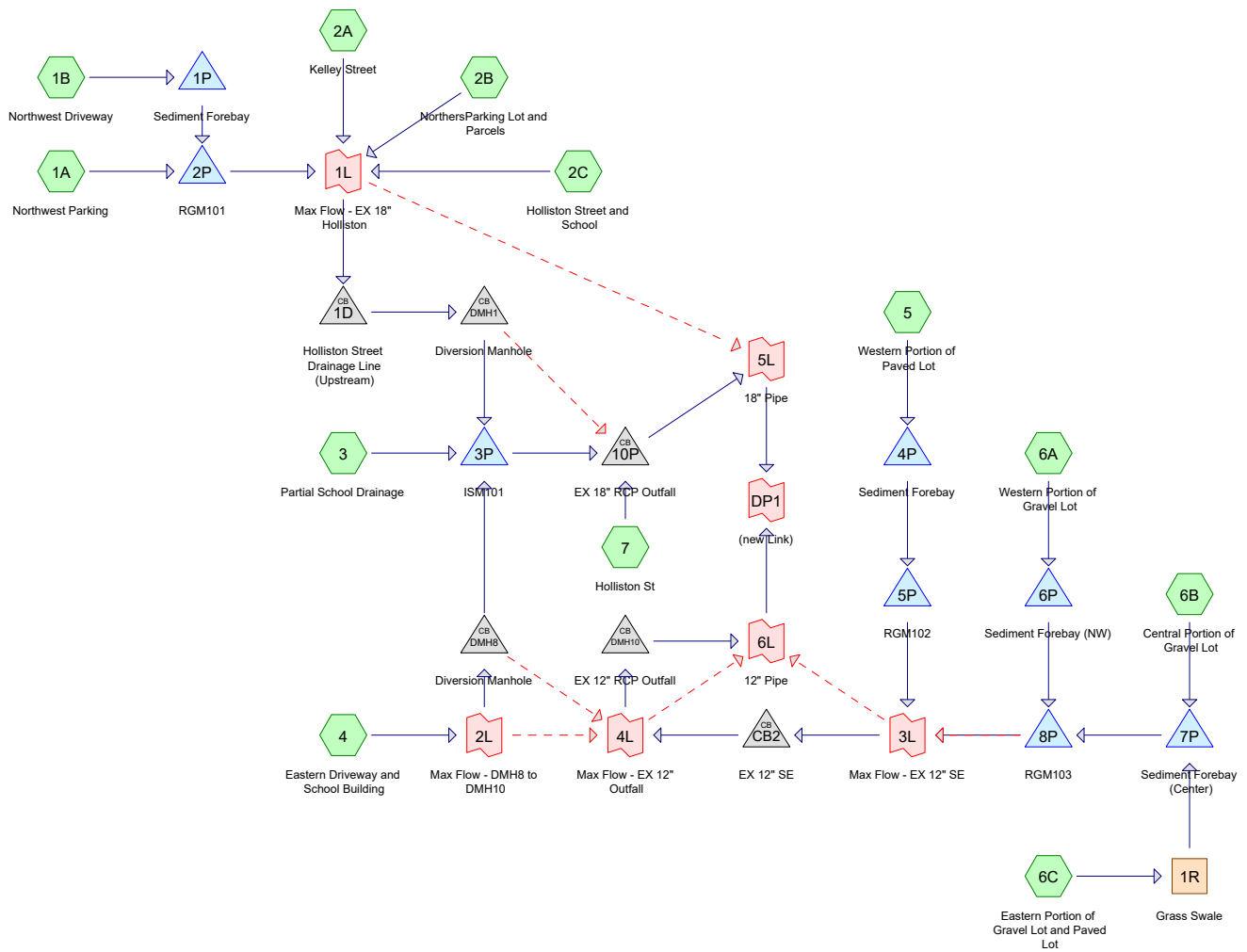
Summary for Link DP1: (new Link)

Inflow Area = 18.451 ac, 49.87% Impervious, Inflow Depth = 9.20" for 100-Year event

Inflow = 99.02 cfs @ 12.16 hrs, Volume= 14.149 af

Primary = 99.02 cfs @ 12.16 hrs, Volume= 14.149 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs



Routing Diagram for 2024.10.08 Proposed
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Summary for Subcatchment 1A: Northwest Parking

Runoff = 0.78 cfs @ 12.21 hrs, Volume= 0.075 af, Depth= 2.14"
 Routed to Pond 2P : RGM101

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
6,559	98	Paved parking, HSG D
11,871	74	>75% Grass cover, Good, HSG C
18,430	83	Weighted Average
11,871		64.41% Pervious Area
6,559		35.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.0200	0.17		Sheet Flow, Edge of pavement grass Grass: Short n= 0.150 P2= 3.24"
0.4	40	0.0125	1.68		Shallow Concentrated Flow, Edge of pavement grass Grassed Waterway Kv= 15.0 fps
0.3	40	0.0125	2.27		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
0.4	60	0.0330	2.72		Shallow Concentrated Flow, Swale Entrance Grassed Waterway Kv= 15.0 fps
1.3	140	0.0150	1.84		Shallow Concentrated Flow, Swale Grassed Waterway Kv= 15.0 fps
0.9	55	0.0050	1.06		Shallow Concentrated Flow, Swale to outlet Grassed Waterway Kv= 15.0 fps
13.0	435	Total			

Summary for Subcatchment 1B: Northwest Driveway

Runoff = 1.44 cfs @ 12.17 hrs, Volume= 0.124 af, Depth= 2.48"
 Routed to Pond 1P : Sediment Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
14,424	98	Paved parking, HSG D
11,762	74	>75% Grass cover, Good, HSG C
26,186	87	Weighted Average
11,762		44.92% Pervious Area
14,424		55.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	25	0.0200	1.05		Sheet Flow, Driveway Smooth surfaces n= 0.011 P2= 3.24"
6.9	75	0.0270	0.18		Sheet Flow, Yard Grass: Short n= 0.150 P2= 3.24"
0.3	25	0.0080	1.34		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
0.4	66	0.0200	2.87		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
1.4	211	0.0155	2.53		Shallow Concentrated Flow, Parking Paved Kv= 20.3 fps
9.4	402	Total			

2024.10.08 Proposed

NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 4

Summary for Subcatchment 2A: Kelley Street

Runoff = 8.65 cfs @ 12.39 hrs, Volume= 1.235 af, Depth= 2.22"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
64,979	98	Paved parking, HSG D
9,897	74	>75% Grass cover, Good, HSG C
214,750	80	>75% Grass cover, Good, HSG D
842	82	Woods/grass comb., Fair, HSG D
290,468	84	Weighted Average
225,489		77.63% Pervious Area
64,979		22.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.3	100	0.0200	0.08		Sheet Flow, Woods Woods: Light underbrush n= 0.400 P2= 3.24"
0.7	35	0.0290	0.85		Shallow Concentrated Flow, Woods Woodland Kv= 5.0 fps
2.2	75	0.0130	0.57		Shallow Concentrated Flow, Woods Woodland Kv= 5.0 fps
0.2	30	0.0330	2.72		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
1.7	167	0.0120	1.64		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
1.0	130	0.0115	2.18		Shallow Concentrated Flow, Road Paved Kv= 20.3 fps
0.5	610	0.0100	22.31	2,198.79	Pipe Channel, Kelley Street Drain Pipe 159.000" x 113.000", R=82.000"/184.000" Pipe Arch Area= 98.6 sf n= 0.013 Concrete pipe, bends & connections
1.5	570	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM101 18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
29.1	1,717	Total			

Summary for Subcatchment 2B: NorthersParking Lot and Parcels

Runoff = 2.64 cfs @ 12.27 hrs, Volume= 0.295 af, Depth= 2.06"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
23,429	98	Paved parking, HSG D
51,501	74	>75% Grass cover, Good, HSG C
74,930	82	Weighted Average
51,501		68.73% Pervious Area
23,429		31.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	30	0.0500	0.19		Sheet Flow, Grass
					Grass: Short n= 0.150 P2= 3.24"
9.0	70	0.0120	0.13		Sheet Flow, Grass
					Grass: Short n= 0.150 P2= 3.24"
2.2	155	0.0060	1.16		Shallow Concentrated Flow, Grass
					Grassed Waterway Kv= 15.0 fps
0.2	40	0.0375	2.90		Shallow Concentrated Flow, End grass
					Grassed Waterway Kv= 15.0 fps
0.1	25	0.0200	2.87		Shallow Concentrated Flow, Parking
					Paved Kv= 20.3 fps
1.7	120	0.0032	1.15		Shallow Concentrated Flow, Parking
					Paved Kv= 20.3 fps
1.4	450	0.0100	5.26	6.46	Pipe Channel, Drainage from rear lot to Holliston
					15.000" Round Area= 1.2 sf Perim= 3.9' r= 0.31'
					n= 0.013 Concrete pipe, bends & connections
0.7	290	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM 101
					18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38'
					n= 0.013 Concrete pipe, bends & connections
17.9	1,180	Total			

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NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 6

Summary for Subcatchment 2C: Holliston Street and School

Runoff = 9.73 cfs @ 12.23 hrs, Volume= 1.049 af, Depth= 2.85"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
132,809	98	Paved parking, HSG D
37,272	74	>75% Grass cover, Good, HSG C
21,746	80	>75% Grass cover, Good, HSG D
179	82	Woods/grass comb., Fair, HSG D
192,006	91	Weighted Average
59,197		30.83% Pervious Area
132,809		69.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
2.3	30	0.0700	0.22		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
3.5	20	0.0100	0.09		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
1.6	160	0.0125	1.68		Shallow Concentrated Flow, Grass Grassed Waterway Kv= 15.0 fps
0.6	220	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM 101 18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
15.4	480	Total			

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NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 7

Summary for Subcatchment 3: Partial School Drainage

Runoff = 1.09 cfs @ 12.13 hrs, Volume= 0.084 af, Depth= 2.66"
Routed to Pond 3P : ISM101

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
10,444	98	Paved parking, HSG D
6,033	74	>75% Grass cover, Good, HSG C
16,477	89	Weighted Average
6,033		36.61% Pervious Area
10,444		63.39% Impervious Area

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

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NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 8

Summary for Subcatchment 4: Eastern Driveway and School Building

Runoff = 6.10 cfs @ 12.13 hrs, Volume= 0.507 af, Depth= 3.37"
 Routed to Link 2L : Max Flow - DMH8 to DMH10

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
72,642	98	Paved parking, HSG D
5,914	74	>75% Grass cover, Good, HSG C
63	80	>75% Grass cover, Good, HSG D
78,619	96	Weighted Average
5,977		7.60% Pervious Area
72,642		92.40% Impervious Area

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

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Page 9

Summary for Subcatchment 5: Western Portion of Paved Lot

Runoff = 1.66 cfs @ 12.13 hrs, Volume= 0.134 af, Depth= 3.16"
Routed to Pond 4P : Sediment Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
18,515	98	Paved parking, HSG D
3,668	74	>75% Grass cover, Good, HSG C
22,183	94	Weighted Average
3,668		16.54% Pervious Area
18,515		83.46% Impervious Area

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

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NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 10

Summary for Subcatchment 6A: Western Portion of Gravel Lot

Runoff = 0.88 cfs @ 12.13 hrs, Volume= 0.075 af, Depth= 3.48"
Routed to Pond 6P : Sediment Forebay (NW)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
10,484	98	Paved parking, HSG D
162	74	>75% Grass cover, Good, HSG C
560	80	>75% Grass cover, Good, HSG D
11,206	97	Weighted Average
722		6.44% Pervious Area
10,484		93.56% Impervious Area

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

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NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 11

Summary for Subcatchment 6B: Central Portion of Gravel Lot

Runoff = 1.43 cfs @ 12.13 hrs, Volume= 0.124 af, Depth= 3.60"
Routed to Pond 7P : Sediment Forebay (Center)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
17,687	98	Paved parking, HSG D
238	74	>75% Grass cover, Good, HSG C
34	80	>75% Grass cover, Good, HSG D
17,959	98	Weighted Average
272		1.51% Pervious Area
17,687		98.49% Impervious Area

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

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Page 12

Summary for Subcatchment 6C: Eastern Portion of Gravel Lot and Paved Lot

Runoff = 1.69 cfs @ 12.13 hrs, Volume= 0.143 af, Depth= 3.48"
 Routed to Reach 1R : Grass Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 2-Year Rainfall=3.83"

Area (sf)	CN	Description
20,797	98	Paved parking, HSG D
586	74	>75% Grass cover, Good, HSG C
16	80	>75% Grass cover, Good, HSG D
79	82	Woods/grass comb., Fair, HSG D
21,478	97	Weighted Average
681		3.17% Pervious Area
20,797		96.83% Impervious Area

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

Summary for Subcatchment 7: Holliston St

Runoff = 1.34 cfs @ 12.20 hrs, Volume= 0.128 af, Depth= 1.98"
 Routed to Pond 10P : EX 18" RCP Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 2-Year Rainfall=3.83"

	Area (sf)	CN	Description
*	8,042	98	Paved parking
	16,394	74	>75% Grass cover, Good, HSG C
	9,349	80	>75% Grass cover, Good, HSG D
	33,785	81	Weighted Average
	25,743		76.20% Pervious Area
	8,042		23.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		Sheet Flow, Sheet: Grass Grass: Short n= 0.150 P2= 3.24"
5.6	50	0.0200	0.15		Sheet Flow, Sheet: Grass Grass: Short n= 0.150 P2= 3.24"
2.4	210	0.0095	1.46		Shallow Concentrated Flow, Grass: Flat Grassed Waterway Kv= 15.0 fps
0.5	69	0.0150	2.49		Shallow Concentrated Flow, Paved Paved Kv= 20.3 fps
12.4	379	Total			

Summary for Reach 1R: Grass Swale

Inflow Area = 0.493 ac, 96.83% Impervious, Inflow Depth = 3.48" for 2-Year event
Inflow = 1.69 cfs @ 12.13 hrs, Volume= 0.143 af
Outflow = 1.69 cfs @ 12.13 hrs, Volume= 0.143 af, Atten= 0%, Lag= 0.2 min
Routed to Pond 7P : Sediment Forebay (Center)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
Max. Velocity= 2.92 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 0.80 fps, Avg. Travel Time= 1.3 min

Peak Storage= 35 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.17' , Surface Width= 3.99'
Bank-Full Depth= 0.50' Flow Area= 2.3 sf, Capacity= 12.28 cfs

3.00' x 0.50' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 60.0' Slope= 0.0250 '/'
Inlet Invert= 219.50', Outlet Invert= 218.00'



Summary for Pond 1D: Holliston Street Drainage Line (Upstream)

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 2.32" for 2-Year event
 Inflow = 15.14 cfs @ 12.14 hrs, Volume= 2.675 af
 Outflow = 15.14 cfs @ 12.40 hrs, Volume= 2.675 af, Atten= 0%, Lag= 15.6 min
 Primary = 15.14 cfs @ 12.40 hrs, Volume= 2.675 af
 Routed to Pond DMH1 : Diversion Manhole

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 223.73' @ 12.47 hrs

Flood Elev= 222.91'

Device	Routing	Invert	Outlet Devices
#1	Primary	218.20'	18.000" Round Culvert into DMH2 L= 128.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 218.20' / 216.68' S= 0.0119'/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=15.14 cfs @ 12.40 hrs HW=223.68' TW=219.31' (Dynamic Tailwater)

↑1=Culvert into DMH2 (Outlet Controls 15.14 cfs @ 8.57 fps)

Summary for Pond 1P: Sediment Forebay

Inflow Area = 0.601 ac, 55.08% Impervious, Inflow Depth = 2.48" for 2-Year event
 Inflow = 1.44 cfs @ 12.17 hrs, Volume= 0.124 af
 Outflow = 1.41 cfs @ 12.17 hrs, Volume= 0.120 af, Atten= 2%, Lag= 0.2 min
 Primary = 1.41 cfs @ 12.17 hrs, Volume= 0.120 af
 Routed to Pond 2P : RGM101

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 224.49' @ 12.21 hrs Surf.Area= 242 sf Storage= 224 cf

Flood Elev= 224.75' Surf.Area= 277 sf Storage= 292 cf

Plug-Flow detention time= 33.3 min calculated for 0.120 af (97% of inflow)

Center-of-Mass det. time= 13.8 min (847.2 - 833.4)

Volume	Invert	Avail.Storage	Storage Description
#1	223.00'	292 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
223.00	66	0	0
224.00	177	122	122
224.75	277	170	292

Device	Routing	Invert	Outlet Devices
#1	Primary	224.25'	14.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=1.41 cfs @ 12.17 hrs HW=224.48' TW=224.48' (Dynamic Tailwater)

↑ **1=Sharp-Crested Rectangular Weir** (Weir Controls 1.41 cfs @ 0.43 fps)

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Page 17

Summary for Pond 2P: RGM101

Inflow Area = 1.024 ac, 47.03% Impervious, Inflow Depth = 2.29" for 2-Year event
 Inflow = 2.15 cfs @ 12.18 hrs, Volume= 0.196 af
 Outflow = 2.05 cfs @ 12.21 hrs, Volume= 0.191 af, Atten= 4%, Lag= 1.9 min
 Primary = 2.05 cfs @ 12.21 hrs, Volume= 0.191 af
 Routed to Link 1L : Max Flow - EX 18" Holliston

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
 Peak Elev= 224.49' @ 12.21 hrs Surf.Area= 1,900 sf Storage= 522 cf
 Flood Elev= 224.75' Surf.Area= 2,030 sf Storage= 1,042 cf

Plug-Flow detention time= 24.5 min calculated for 0.191 af (98% of inflow)
 Center-of-Mass det. time= 12.2 min (862.0 - 849.8)

Volume	Invert	Avail.Storage	Storage Description
#1	224.20'	1,042 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
224.20	1,759	0	0
224.75	2,030	1,042	1,042

Device	Routing	Invert	Outlet Devices
#1	Primary	222.20'	15.000" Round Culvert L= 35.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 222.20' / 222.00' S= 0.0057 ' / Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf
#2	Device 1	224.30'	30.000" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.05 cfs @ 12.21 hrs HW=224.49' TW=0.00' (Dynamic Tailwater)

↑ **1=Culvert** (Passes 2.05 cfs of 7.19 cfs potential flow)
 ↑ **2=Orifice/Grate** (Weir Controls 2.05 cfs @ 1.41 fps)

Summary for Pond 3P: ISM101

Inflow Area = 16.004 ac, 46.66% Impervious, Inflow Depth = 1.66" for 2-Year event
 Inflow = 6.40 cfs @ 12.14 hrs, Volume= 2.218 af
 Outflow = 2.35 cfs @ 13.30 hrs, Volume= 2.218 af, Atten= 63%, Lag= 69.7 min
 Discarded = 1.40 cfs @ 13.30 hrs, Volume= 2.023 af
 Primary = 0.95 cfs @ 13.30 hrs, Volume= 0.196 af
 Routed to Pond 10P : EX 18" RCP Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
 Peak Elev= 214.72' @ 13.30 hrs Surf.Area= 6,474 sf Storage= 27,501 cf
 Flood Elev= 215.00' Surf.Area= 6,474 sf Storage= 28,222 cf

Plug-Flow detention time= 249.4 min calculated for 2.218 af (100% of inflow)
 Center-of-Mass det. time= 249.4 min (1,123.9 - 874.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	208.25'	10,318 cf	37.58'W x 172.26'L x 6.75'H Field A 43,700 cf Overall - 17,904 cf Embedded = 25,796 cf x 40.0% Voids
#2A	209.00'	17,904 cf	ADS_StormTech MC-7200 +Cap x 100 Inside #1 Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap 100 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		28,222 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	208.25'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 206.00' Phase-In= 0.01'
#2	Primary	214.10'	12.000" Round Culvert L= 25.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.10' / 214.00' S= 0.0040 ' / ' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Discarded OutFlow Max=1.40 cfs @ 13.30 hrs HW=214.72' (Free Discharge)

↑ **1=Exfiltration** (Controls 1.40 cfs)

Primary OutFlow Max=0.95 cfs @ 13.30 hrs HW=214.72' TW=211.79' (Dynamic Tailwater)

↑ **2=Culvert** (Barrel Controls 0.95 cfs @ 2.65 fps)

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Page 19

Pond 3P: ISM101 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-7200 +Cap (ADS StormTech®MC-7200 with cap volume)

Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf

Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap

Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

25 Chambers/Row x 6.59' Long +2.73' Cap Length x 2 = 170.26' Row Length +12.0" End Stone x 2 =
172.26' Base Length

4 Rows x 100.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width

9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

100 Chambers x 175.9 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 17,903.6 cf Chamber Storage

43,699.8 cf Field - 17,903.6 cf Chambers = 25,796.2 cf Stone x 40.0% Voids = 10,318.5 cf Stone Storage

Chamber Storage + Stone Storage = 28,222.0 cf = 0.648 af

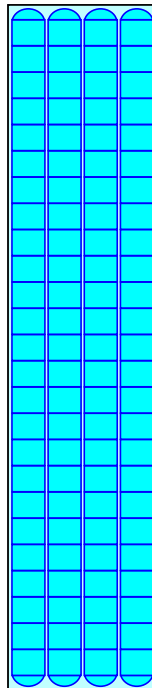
Overall Storage Efficiency = 64.6%

Overall System Size = 172.26' x 37.58' x 6.75'

100 Chambers

1,618.5 cy Field

955.4 cy Stone



Summary for Pond 4P: Sediment Forebay

Inflow Area = 0.509 ac, 83.46% Impervious, Inflow Depth = 3.16" for 2-Year event
 Inflow = 1.66 cfs @ 12.13 hrs, Volume= 0.134 af
 Outflow = 1.64 cfs @ 12.14 hrs, Volume= 0.130 af, Atten= 1%, Lag= 0.4 min
 Primary = 1.64 cfs @ 12.14 hrs, Volume= 0.130 af
 Routed to Pond 5P : RGM102

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 221.23' @ 12.14 hrs Surf.Area= 283 sf Storage= 216 cf

Flood Elev= 222.00' Surf.Area= 444 sf Storage= 497 cf

Plug-Flow detention time= 31.8 min calculated for 0.130 af (97% of inflow)

Center-of-Mass det. time= 15.0 min (806.4 - 791.4)

Volume	Invert	Avail.Storage	Storage Description
#1	220.00'	497 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
220.00	79	0	0
221.00	235	157	157
222.00	444	340	497

Device	Routing	Invert	Outlet Devices
#1	Primary	221.00'	8.0' long + 3.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.64 cfs @ 12.14 hrs HW=221.23' TW=221.15' (Dynamic Tailwater)

↑ **1=Broad-Crested Rectangular Weir** (Weir Controls 1.64 cfs @ 0.83 fps)

Summary for Pond 5P: RGM102

Inflow Area = 0.509 ac, 83.46% Impervious, Inflow Depth = 3.07" for 2-Year event
 Inflow = 1.64 cfs @ 12.14 hrs, Volume= 0.130 af
 Outflow = 1.58 cfs @ 12.15 hrs, Volume= 0.130 af, Atten= 4%, Lag= 1.2 min
 Discarded = 0.03 cfs @ 12.15 hrs, Volume= 0.060 af
 Primary = 1.55 cfs @ 12.15 hrs, Volume= 0.071 af
 Routed to Link 3L : Max Flow - EX 12" SE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
 Peak Elev= 221.15' @ 12.15 hrs Surf.Area= 1,284 sf Storage= 1,137 cf
 Flood Elev= 222.00' Surf.Area= 1,768 sf Storage= 2,429 cf

Plug-Flow detention time= 193.6 min calculated for 0.130 af (100% of inflow)
 Center-of-Mass det. time= 193.6 min (999.9 - 806.4)

Volume	Invert	Avail.Storage	Storage Description
#1	220.00'	2,429 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
220.00	697	0	0
221.00	1,196	947	947
222.00	1,768	1,482	2,429

Device	Routing	Invert	Outlet Devices
#1	Discarded	220.00'	1.020 in/hr Exfiltration over Horizontal area Phase-In= 0.01'
#2	Primary	215.20'	12.000" Round Culvert L= 168.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 215.20' / 213.50' S= 0.0101 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	221.00'	30.000" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.03 cfs @ 12.15 hrs HW=221.15' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.55 cfs @ 12.15 hrs HW=221.15' TW=0.00' (Dynamic Tailwater)

↑ **2=Culvert** (Passes 1.55 cfs of 6.25 cfs potential flow)

↑ **3=Orifice/Grate** (Weir Controls 1.55 cfs @ 1.28 fps)

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NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 22

Summary for Pond 6P: Sediment Forebay (NW)

Inflow Area = 0.257 ac, 93.56% Impervious, Inflow Depth = 3.48" for 2-Year event
 Inflow = 0.88 cfs @ 12.13 hrs, Volume= 0.075 af
 Outflow = 0.84 cfs @ 12.14 hrs, Volume= 0.072 af, Atten= 5%, Lag= 0.6 min
 Primary = 0.84 cfs @ 12.14 hrs, Volume= 0.072 af
 Routed to Pond 8P : RGM103

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 217.77' @ 12.16 hrs Surf.Area= 239 sf Storage= 184 cf

Flood Elev= 218.00' Surf.Area= 297 sf Storage= 245 cf

Plug-Flow detention time= 48.6 min calculated for 0.072 af (96% of inflow)

Center-of-Mass det. time= 23.6 min (790.4 - 766.8)

Volume	Invert	Avail.Storage	Storage Description
#1	216.00'	245 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
216.00	16	0	0
217.00	105	61	61
217.50	168	68	129
218.00	297	116	245

Device	Routing	Invert	Outlet Devices
#1	Primary	217.50'	8.5' long + 3.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.82 cfs @ 12.14 hrs HW=217.77' TW=217.76' (Dynamic Tailwater)↑**1=Broad-Crested Rectangular Weir**(Weir Controls 0.82 cfs @ 0.33 fps)

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Page 23

Summary for Pond 7P: Sediment Forebay (Center)

Inflow Area = 0.905 ac, 97.58% Impervious, Inflow Depth = 3.53" for 2-Year event
 Inflow = 3.11 cfs @ 12.13 hrs, Volume= 0.267 af
 Outflow = 3.00 cfs @ 12.14 hrs, Volume= 0.254 af, Atten= 4%, Lag= 0.5 min
 Primary = 3.00 cfs @ 12.14 hrs, Volume= 0.254 af
 Routed to Pond 8P : RGM103

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 217.78' @ 12.16 hrs Surf.Area= 734 sf Storage= 748 cf

Flood Elev= 218.00' Surf.Area= 838 sf Storage= 924 cf

Plug-Flow detention time= 58.8 min calculated for 0.254 af (95% of inflow)

Center-of-Mass det. time= 28.5 min (790.9 - 762.3)

Volume	Invert	Avail.Storage	Storage Description
#1	216.00'	924 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
216.00	180	0	0
217.00	429	305	305
217.50	605	259	563
218.00	838	361	924

Device	Routing	Invert	Outlet Devices
#1	Primary	217.50'	25.0' long + 12.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.96 cfs @ 12.14 hrs HW=217.77' TW=217.76' (Dynamic Tailwater)↑**1=Broad-Crested Rectangular Weir**(Weir Controls 2.96 cfs @ 0.38 fps)

Summary for Pond 8P: RGM103

Inflow Area = 1.163 ac, 96.69% Impervious, Inflow Depth = 3.36" for 2-Year event
 Inflow = 3.84 cfs @ 12.14 hrs, Volume= 0.325 af
 Outflow = 3.69 cfs @ 12.16 hrs, Volume= 0.325 af, Atten= 4%, Lag= 1.1 min
 Discarded = 0.04 cfs @ 12.16 hrs, Volume= 0.095 af
 Primary = 3.58 cfs @ 12.16 hrs, Volume= 0.230 af
 Routed to Link 3L : Max Flow - EX 12" SE
 Secondary = 0.06 cfs @ 12.16 hrs, Volume= 0.000 af
 Routed to Link 3L : Max Flow - EX 12" SE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
 Peak Elev= 217.77' @ 12.16 hrs Surf.Area= 1,860 sf Storage= 2,218 cf
 Flood Elev= 218.00' Surf.Area= 2,056 sf Storage= 2,670 cf

Plug-Flow detention time= 175.2 min calculated for 0.325 af (100% of inflow)
 Center-of-Mass det. time= 175.2 min (966.0 - 790.8)

Volume	Invert	Avail.Storage	Storage Description
#1	216.00'	2,670 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
216.00	714	0	0
217.00	1,311	1,013	1,013
217.50	1,631	736	1,748
218.00	2,056	922	2,670

Device	Routing	Invert	Outlet Devices
#1	Primary	213.40'	12.000" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.40' / 213.20' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	217.50'	30.000" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	216.00'	1.020 in/hr Exfiltration over Horizontal area Phase-In= 0.01'
#4	Secondary	217.75'	10.0' long + 3.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.04 cfs @ 12.16 hrs HW=217.77' (Free Discharge)
 ↑ **3=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=3.58 cfs @ 12.16 hrs HW=217.77' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Culvert** (Passes 3.58 cfs of 7.44 cfs potential flow)
 ↑ **2=Orifice/Grate** (Weir Controls 3.58 cfs @ 1.70 fps)

Secondary OutFlow Max=0.06 cfs @ 12.16 hrs HW=217.77' TW=0.00' (Dynamic Tailwater)
 ↑ **4=Broad-Crested Rectangular Weir** (Weir Controls 0.06 cfs @ 0.32 fps)

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Page 25

Summary for Pond 10P: EX 18" RCP Outfall

Inflow Area = 16.779 ac, 45.61% Impervious, Inflow Depth = 0.83" for 2-Year event
Inflow = 12.85 cfs @ 12.21 hrs, Volume= 1.166 af
Outflow = 12.85 cfs @ 12.21 hrs, Volume= 1.166 af, Atten= 0%, Lag= 0.0 min
Primary = 12.85 cfs @ 12.21 hrs, Volume= 1.166 af
Routed to Link 5L : 18" Pipe

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 214.23' @ 12.21 hrs

Flood Elev= 218.12'

Device	Routing	Invert	Outlet Devices
#1	Primary	211.00'	18.000" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 211.00' / 210.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=12.85 cfs @ 12.21 hrs HW=214.23' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 12.85 cfs @ 7.27 fps)

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Page 26

Summary for Pond CB2: EX 12" SE

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 2.16" for 2-Year event
Inflow = 5.19 cfs @ 12.16 hrs, Volume= 0.301 af
Outflow = 5.19 cfs @ 12.16 hrs, Volume= 0.301 af, Atten= 0%, Lag= 0.0 min
Primary = 5.19 cfs @ 12.16 hrs, Volume= 0.301 af
Routed to Link 4L : Max Flow - EX 12" Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 215.72' @ 12.16 hrs

Flood Elev= 216.17'

Device	Routing	Invert	Outlet Devices
#1	Primary	211.70'	12.000" Round Culvert L= 155.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 211.70' / 210.40' S= 0.0084 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=5.19 cfs @ 12.16 hrs HW=215.71' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 5.19 cfs @ 6.61 fps)

Summary for Pond DMH1: Diversion Manhole

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 2.32" for 2-Year event
 Inflow = 15.14 cfs @ 12.40 hrs, Volume= 2.675 af
 Outflow = 15.14 cfs @ 12.17 hrs, Volume= 2.675 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.70 cfs @ 12.14 hrs, Volume= 1.833 af
 Routed to Pond 3P : ISM101
 Secondary = 11.73 cfs @ 12.46 hrs, Volume= 0.843 af
 Routed to Pond 10P : EX 18" RCP Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 219.35' @ 12.46 hrs

Flood Elev= 220.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	212.13'	7.500" Round Culvert to DMH1 L= 25.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 212.13' / 209.19' S= 0.1176 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.31 sf
#2	Secondary	216.63'	18.000" Round Culvert to DMH4 L= 322.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 216.63' / 212.80' S= 0.0119 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=3.70 cfs @ 12.14 hrs HW=219.19' TW=212.48' (Dynamic Tailwater)

↑1=Culvert to DMH1 (Outlet Controls 3.70 cfs @ 12.07 fps)

Secondary OutFlow Max=11.73 cfs @ 12.46 hrs HW=219.35' TW=213.97' (Dynamic Tailwater)

↑2=Culvert to DMH4 (Barrel Controls 11.73 cfs @ 6.64 fps)

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Page 28

Summary for Pond DMH10: EX 12" RCP Outfall

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 3.62" for 2-Year event
Inflow = 8.82 cfs @ 12.12 hrs, Volume= 0.504 af
Outflow = 8.82 cfs @ 12.12 hrs, Volume= 0.504 af, Atten= 0%, Lag= 0.0 min
Primary = 8.82 cfs @ 12.12 hrs, Volume= 0.504 af
Routed to Link 6L : 12" Pipe

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 219.29' @ 12.12 hrs

Flood Elev= 219.29'

Device	Routing	Invert	Outlet Devices
#1	Primary	210.20'	12.000" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 210.20' / 209.20' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=8.82 cfs @ 12.12 hrs HW=219.29' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 8.82 cfs @ 11.23 fps)

Summary for Pond DMH8: Diversion Manhole

Inflow Area = 1.805 ac, 92.40% Impervious, Inflow Depth = 3.37" for 2-Year event
 Inflow = 6.10 cfs @ 12.13 hrs, Volume= 0.507 af
 Outflow = 6.10 cfs @ 12.13 hrs, Volume= 0.507 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.63 cfs @ 12.13 hrs, Volume= 0.302 af
 Routed to Pond 3P : ISM101
 Secondary = 4.47 cfs @ 12.13 hrs, Volume= 0.205 af
 Routed to Link 4L : Max Flow - EX 12" Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 216.14' @ 12.13 hrs

Flood Elev= 218.43'

Device	Routing	Invert	Outlet Devices
#1	Primary	209.55'	6.000" Round 6" HDPE to ISM101 L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 209.55' / 209.19' S= 0.0144 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Secondary	214.10'	12.000" Round 12" HDPE Bypass L= 88.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.10' / 213.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=1.63 cfs @ 12.13 hrs HW=216.13' TW=212.41' (Dynamic Tailwater)

↑ **1=6" HDPE to ISM101** (Outlet Controls 1.63 cfs @ 8.31 fps)

Secondary OutFlow Max=4.47 cfs @ 12.13 hrs HW=216.14' TW=0.00' (Dynamic Tailwater)

↑ **2=12" HDPE Bypass** (Barrel Controls 4.47 cfs @ 5.69 fps)

Summary for Link 1L: Max Flow - EX 18" Holliston

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 2.41" for 2-Year event
Inflow = 20.89 cfs @ 12.27 hrs, Volume= 2.770 af
Primary = 15.14 cfs @ 12.14 hrs, Volume= 2.675 af, Atten= 28%, Lag= 0.0 min
Routed to Pond 1D : Holliston Street Drainage Line (Upstream)
Secondary = 5.75 cfs @ 12.27 hrs, Volume= 0.095 af
Routed to Link 5L : 18" Pipe

Primary outflow = Inflow below 15.14 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

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Page 31

Summary for Link 2L: Max Flow - DMH8 to DMH10

Inflow Area = 1.805 ac, 92.40% Impervious, Inflow Depth = 3.37" for 2-Year event
Inflow = 6.10 cfs @ 12.13 hrs, Volume= 0.507 af
Primary = 6.10 cfs @ 12.13 hrs, Volume= 0.507 af, Atten= 0%, Lag= 0.0 min
Routed to Pond DMH8 : Diversion Manhole
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link 4L : Max Flow - EX 12" Outfall

Primary outflow = Inflow below 8.92 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link 3L: Max Flow - EX 12" SE

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 2.16" for 2-Year event
Inflow = 5.19 cfs @ 12.16 hrs, Volume= 0.301 af
Primary = 5.19 cfs @ 12.16 hrs, Volume= 0.301 af, Atten= 0%, Lag= 0.0 min
Routed to Pond CB2 : EX 12" SE
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 5.46 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link 4L: Max Flow - EX 12" Outfall

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 3.63" for 2-Year event
Inflow = 9.48 cfs @ 12.14 hrs, Volume= 0.506 af
Primary = 8.82 cfs @ 12.12 hrs, Volume= 0.504 af, Atten= 7%, Lag= 0.0 min
Routed to Pond DMH10 : EX 12" RCP Outfall
Secondary = 0.66 cfs @ 12.14 hrs, Volume= 0.002 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 8.82 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link 5L: 18" Pipe

Inflow Area = 16.779 ac, 45.61% Impervious, Inflow Depth = 0.90" for 2-Year event
Inflow = 18.46 cfs @ 12.26 hrs, Volume= 1.261 af
Primary = 18.46 cfs @ 12.26 hrs, Volume= 1.261 af, Atten= 0%, Lag= 0.0 min
Routed to Link DP1 : (new Link)

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link 6L: 12" Pipe

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 3.63" for 2-Year event
Inflow = 9.48 cfs @ 12.14 hrs, Volume= 0.506 af
Primary = 9.48 cfs @ 12.14 hrs, Volume= 0.506 af, Atten= 0%, Lag= 0.0 min
Routed to Link DP1 : (new Link)

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link DP1: (new Link)

Inflow Area = 18.451 ac, 49.87% Impervious, Inflow Depth = 1.15" for 2-Year event
Inflow = 23.85 cfs @ 12.19 hrs, Volume= 1.767 af
Primary = 23.85 cfs @ 12.19 hrs, Volume= 1.767 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Subcatchment 1A: Northwest Parking

Runoff = 1.48 cfs @ 12.21 hrs, Volume= 0.146 af, Depth= 4.13"
 Routed to Pond 2P : RGM101

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
6,559	98	Paved parking, HSG D
11,871	74	>75% Grass cover, Good, HSG C
18,430	83	Weighted Average
11,871		64.41% Pervious Area
6,559		35.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.0200	0.17		Sheet Flow, Edge of pavement grass Grass: Short n= 0.150 P2= 3.24"
0.4	40	0.0125	1.68		Shallow Concentrated Flow, Edge of pavement grass Grassed Waterway Kv= 15.0 fps
0.3	40	0.0125	2.27		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
0.4	60	0.0330	2.72		Shallow Concentrated Flow, Swale Entrance Grassed Waterway Kv= 15.0 fps
1.3	140	0.0150	1.84		Shallow Concentrated Flow, Swale Grassed Waterway Kv= 15.0 fps
0.9	55	0.0050	1.06		Shallow Concentrated Flow, Swale to outlet Grassed Waterway Kv= 15.0 fps
13.0	435	Total			

Summary for Subcatchment 1B: Northwest Driveway

Runoff = 2.56 cfs @ 12.17 hrs, Volume= 0.228 af, Depth= 4.56"
 Routed to Pond 1P : Sediment Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
14,424	98	Paved parking, HSG D
11,762	74	>75% Grass cover, Good, HSG C
26,186	87	Weighted Average
11,762		44.92% Pervious Area
14,424		55.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	25	0.0200	1.05		Sheet Flow, Driveway Smooth surfaces n= 0.011 P2= 3.24"
6.9	75	0.0270	0.18		Sheet Flow, Yard Grass: Short n= 0.150 P2= 3.24"
0.3	25	0.0080	1.34		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
0.4	66	0.0200	2.87		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
1.4	211	0.0155	2.53		Shallow Concentrated Flow, Parking Paved Kv= 20.3 fps
9.4	402	Total			

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Page 39

Summary for Subcatchment 2A: Kelley Street

Runoff = 16.30 cfs @ 12.39 hrs, Volume= 2.353 af, Depth= 4.23"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
64,979	98	Paved parking, HSG D
9,897	74	>75% Grass cover, Good, HSG C
214,750	80	>75% Grass cover, Good, HSG D
842	82	Woods/grass comb., Fair, HSG D
290,468	84	Weighted Average
225,489		77.63% Pervious Area
64,979		22.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.3	100	0.0200	0.08		Sheet Flow, Woods Woods: Light underbrush n= 0.400 P2= 3.24"
0.7	35	0.0290	0.85		Shallow Concentrated Flow, Woods Woodland Kv= 5.0 fps
2.2	75	0.0130	0.57		Shallow Concentrated Flow, Woods Woodland Kv= 5.0 fps
0.2	30	0.0330	2.72		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
1.7	167	0.0120	1.64		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
1.0	130	0.0115	2.18		Shallow Concentrated Flow, Road Paved Kv= 20.3 fps
0.5	610	0.0100	22.31	2,198.79	Pipe Channel, Kelley Street Drain Pipe 159.000" x 113.000", R=82.000"/184.000" Pipe Arch Area= 98.6 sf n= 0.013 Concrete pipe, bends & connections
1.5	570	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM101 18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
29.1	1,717	Total			

Summary for Subcatchment 2B: NorthersParking Lot and Parcels

Runoff = 5.10 cfs @ 12.27 hrs, Volume= 0.577 af, Depth= 4.02"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
23,429	98	Paved parking, HSG D
51,501	74	>75% Grass cover, Good, HSG C
74,930	82	Weighted Average
51,501		68.73% Pervious Area
23,429		31.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	30	0.0500	0.19		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
9.0	70	0.0120	0.13		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
2.2	155	0.0060	1.16		Shallow Concentrated Flow, Grass Grassed Waterway Kv= 15.0 fps
0.2	40	0.0375	2.90		Shallow Concentrated Flow, End grass Grassed Waterway Kv= 15.0 fps
0.1	25	0.0200	2.87		Shallow Concentrated Flow, Parking Paved Kv= 20.3 fps
1.7	120	0.0032	1.15		Shallow Concentrated Flow, Parking Paved Kv= 20.3 fps
1.4	450	0.0100	5.26	6.46	Pipe Channel, Drainage from rear lot to Holliston 15.000" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
0.7	290	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM 101 18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
17.9	1,180	Total			

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Page 41

Summary for Subcatchment 2C: Holliston Street and School

Runoff = 16.51 cfs @ 12.23 hrs, Volume= 1.835 af, Depth= 5.00"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
132,809	98	Paved parking, HSG D
37,272	74	>75% Grass cover, Good, HSG C
21,746	80	>75% Grass cover, Good, HSG D
179	82	Woods/grass comb., Fair, HSG D
192,006	91	Weighted Average
59,197		30.83% Pervious Area
132,809		69.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
2.3	30	0.0700	0.22		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
3.5	20	0.0100	0.09		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
1.6	160	0.0125	1.68		Shallow Concentrated Flow, Grass Grassed Waterway Kv= 15.0 fps
0.6	220	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM 101 18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
15.4	480	Total			

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Page 42

Summary for Subcatchment 3: Partial School Drainage

Runoff = 1.90 cfs @ 12.13 hrs, Volume= 0.150 af, Depth= 4.77"
Routed to Pond 3P : ISM101

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
10,444	98	Paved parking, HSG D
6,033	74	>75% Grass cover, Good, HSG C
16,477	89	Weighted Average
6,033		36.61% Pervious Area
10,444		63.39% Impervious Area

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

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Page 43

Summary for Subcatchment 4: Eastern Driveway and School Building

Runoff = 9.79 cfs @ 12.13 hrs, Volume= 0.837 af, Depth= 5.57"
Routed to Link 2L : Max Flow - DMH8 to DMH10

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
72,642	98	Paved parking, HSG D
5,914	74	>75% Grass cover, Good, HSG C
63	80	>75% Grass cover, Good, HSG D
78,619	96	Weighted Average
5,977		7.60% Pervious Area
72,642		92.40% Impervious Area

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

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Page 44

Summary for Subcatchment 5: Western Portion of Paved Lot

Runoff = 2.72 cfs @ 12.13 hrs, Volume= 0.226 af, Depth= 5.34"
Routed to Pond 4P : Sediment Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
18,515	98	Paved parking, HSG D
3,668	74	>75% Grass cover, Good, HSG C
22,183	94	Weighted Average
3,668		16.54% Pervious Area
18,515		83.46% Impervious Area

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

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Page 45

Summary for Subcatchment 6A: Western Portion of Gravel Lot

Runoff = 1.40 cfs @ 12.13 hrs, Volume= 0.122 af, Depth= 5.68"
 Routed to Pond 6P : Sediment Forebay (NW)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
10,484	98	Paved parking, HSG D
162	74	>75% Grass cover, Good, HSG C
560	80	>75% Grass cover, Good, HSG D
11,206	97	Weighted Average
722		6.44% Pervious Area
10,484		93.56% Impervious Area

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

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Page 46

Summary for Subcatchment 6B: Central Portion of Gravel Lot

Runoff = 2.26 cfs @ 12.13 hrs, Volume= 0.199 af, Depth= 5.80"
Routed to Pond 7P : Sediment Forebay (Center)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
17,687	98	Paved parking, HSG D
238	74	>75% Grass cover, Good, HSG C
34	80	>75% Grass cover, Good, HSG D
17,959	98	Weighted Average
272		1.51% Pervious Area
17,687		98.49% Impervious Area

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

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Page 47

Summary for Subcatchment 6C: Eastern Portion of Gravel Lot and Paved Lot

Runoff = 2.69 cfs @ 12.13 hrs, Volume= 0.234 af, Depth= 5.68"
Routed to Reach 1R : Grass Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
20,797	98	Paved parking, HSG D
586	74	>75% Grass cover, Good, HSG C
16	80	>75% Grass cover, Good, HSG D
79	82	Woods/grass comb., Fair, HSG D
21,478	97	Weighted Average
681		3.17% Pervious Area
20,797		96.83% Impervious Area

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

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Page 48

Summary for Subcatchment 7: Holliston St

Runoff = 2.64 cfs @ 12.20 hrs, Volume= 0.253 af, Depth= 3.92"
 Routed to Pond 10P : EX 18" RCP Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 10-Year Rainfall=6.04"

	Area (sf)	CN	Description
*	8,042	98	Paved parking
	16,394	74	>75% Grass cover, Good, HSG C
	9,349	80	>75% Grass cover, Good, HSG D
	33,785	81	Weighted Average
	25,743		76.20% Pervious Area
	8,042		23.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		Sheet Flow, Sheet: Grass Grass: Short n= 0.150 P2= 3.24"
5.6	50	0.0200	0.15		Sheet Flow, Sheet: Grass Grass: Short n= 0.150 P2= 3.24"
2.4	210	0.0095	1.46		Shallow Concentrated Flow, Grass: Flat Grassed Waterway Kv= 15.0 fps
0.5	69	0.0150	2.49		Shallow Concentrated Flow, Paved Paved Kv= 20.3 fps
12.4	379	Total			

Summary for Reach 1R: Grass Swale

Inflow Area = 0.493 ac, 96.83% Impervious, Inflow Depth = 5.68" for 10-Year event
Inflow = 2.69 cfs @ 12.13 hrs, Volume= 0.234 af
Outflow = 2.69 cfs @ 12.13 hrs, Volume= 0.234 af, Atten= 0%, Lag= 0.2 min
Routed to Pond 7P : Sediment Forebay (Center)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
Max. Velocity= 3.41 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 0.96 fps, Avg. Travel Time= 1.0 min

Peak Storage= 47 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.22' , Surface Width= 4.30'
Bank-Full Depth= 0.50' Flow Area= 2.3 sf, Capacity= 12.28 cfs

3.00' x 0.50' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 ' / ' Top Width= 6.00'
Length= 60.0' Slope= 0.0250 ' / '
Inlet Invert= 219.50', Outlet Invert= 218.00'



Summary for Pond 1D: Holliston Street Drainage Line (Upstream)

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 3.86" for 10-Year event
 Inflow = 15.14 cfs @ 12.01 hrs, Volume= 4.450 af
 Outflow = 15.14 cfs @ 12.01 hrs, Volume= 4.450 af, Atten= 0%, Lag= 0.0 min
 Primary = 15.14 cfs @ 12.01 hrs, Volume= 4.450 af
 Routed to Pond DMH1 : Diversion Manhole

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 227.63' @ 12.15 hrs

Flood Elev= 222.91'

Device	Routing	Invert	Outlet Devices
#1	Primary	218.20'	18.000" Round Culvert into DMH2 L= 128.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 218.20' / 216.68' S= 0.0119 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=15.19 cfs @ 12.01 hrs HW=226.05' TW=221.64' (Dynamic Tailwater)

↑1=Culvert into DMH2 (Outlet Controls 15.19 cfs @ 8.60 fps)

Summary for Pond 1P: Sediment Forebay

Inflow Area = 0.601 ac, 55.08% Impervious, Inflow Depth = 4.56" for 10-Year event
 Inflow = 2.56 cfs @ 12.17 hrs, Volume= 0.228 af
 Outflow = 2.52 cfs @ 12.17 hrs, Volume= 0.224 af, Atten= 2%, Lag= 0.2 min
 Primary = 2.52 cfs @ 12.17 hrs, Volume= 0.224 af
 Routed to Pond 2P : RGM101

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 224.59' @ 12.20 hrs Surf.Area= 255 sf Storage= 248 cf

Flood Elev= 224.75' Surf.Area= 277 sf Storage= 292 cf

Plug-Flow detention time= 21.1 min calculated for 0.224 af (98% of inflow)

Center-of-Mass det. time= 9.9 min (821.1 - 811.2)

Volume	Invert	Avail.Storage	Storage Description
#1	223.00'	292 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
223.00	66	0	0
224.00	177	122	122
224.75	277	170	292

Device	Routing	Invert	Outlet Devices
#1	Primary	224.25'	14.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=2.52 cfs @ 12.17 hrs HW=224.58' TW=224.57' (Dynamic Tailwater)

↑ **1=Sharp-Crested Rectangular Weir** (Weir Controls 2.52 cfs @ 0.55 fps)

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Page 52

Summary for Pond 2P: RGM101

Inflow Area = 1.024 ac, 47.03% Impervious, Inflow Depth = 4.33" for 10-Year event
 Inflow = 3.93 cfs @ 12.18 hrs, Volume= 0.370 af
 Outflow = 3.81 cfs @ 12.20 hrs, Volume= 0.366 af, Atten= 3%, Lag= 1.6 min
 Primary = 3.81 cfs @ 12.20 hrs, Volume= 0.366 af
 Routed to Link 1L : Max Flow - EX 18" Holliston

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
 Peak Elev= 224.58' @ 12.20 hrs Surf.Area= 1,946 sf Storage= 704 cf
 Flood Elev= 224.75' Surf.Area= 2,030 sf Storage= 1,042 cf

Plug-Flow detention time= 16.4 min calculated for 0.366 af (99% of inflow)
 Center-of-Mass det. time= 9.5 min (834.0 - 824.4)

Volume	Invert	Avail.Storage	Storage Description
#1	224.20'	1,042 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
224.20	1,759	0	0
224.75	2,030	1,042	1,042

Device	Routing	Invert	Outlet Devices
#1	Primary	222.20'	15.000" Round Culvert L= 35.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 222.20' / 222.00' S= 0.0057 ' / Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf
#2	Device 1	224.30'	30.000" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.81 cfs @ 12.20 hrs HW=224.58' TW=0.00' (Dynamic Tailwater)

↑ **1=Culvert** (Passes 3.81 cfs of 7.46 cfs potential flow)
 ↑ **2=Orifice/Grate** (Weir Controls 3.81 cfs @ 1.73 fps)

Summary for Pond 3P: ISM101

Inflow Area = 16.004 ac, 46.66% Impervious, Inflow Depth = 2.35" for 10-Year event
 Inflow = 6.45 cfs @ 12.13 hrs, Volume= 3.131 af
 Outflow = 6.62 cfs @ 12.13 hrs, Volume= 3.131 af, Atten= 0%, Lag= 0.3 min
 Discarded = 2.10 cfs @ 12.14 hrs, Volume= 2.460 af
 Primary = 4.53 cfs @ 12.12 hrs, Volume= 0.671 af
 Routed to Pond 10P : EX 18" RCP Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
 Peak Elev= 219.06' @ 12.14 hrs Surf.Area= 6,474 sf Storage= 28,222 cf
 Flood Elev= 215.00' Surf.Area= 6,474 sf Storage= 28,222 cf

Plug-Flow detention time= 219.5 min calculated for 3.130 af (100% of inflow)
 Center-of-Mass det. time= 219.6 min (1,076.3 - 856.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	208.25'	10,318 cf	37.58'W x 172.26'L x 6.75'H Field A 43,700 cf Overall - 17,904 cf Embedded = 25,796 cf x 40.0% Voids
#2A	209.00'	17,904 cf	ADS_StormTech MC-7200 +Cap x 100 Inside #1 Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap 100 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		28,222 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	208.25'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 206.00' Phase-In= 0.01'
#2	Primary	214.10'	12.000" Round Culvert L= 25.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.10' / 214.00' S= 0.0040 ' / ' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Discarded OutFlow Max=2.10 cfs @ 12.14 hrs HW=219.06' (Free Discharge)

↑ **1=Exfiltration** (Controls 2.10 cfs)

Primary OutFlow Max=4.64 cfs @ 12.12 hrs HW=218.96' TW=217.45' (Dynamic Tailwater)

↑ **2=Culvert** (Inlet Controls 4.64 cfs @ 5.91 fps)

Pond 3P: ISM101 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-7200 +Cap (ADS StormTech®MC-7200 with cap volume)

Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf

Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap

Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

25 Chambers/Row x 6.59' Long +2.73' Cap Length x 2 = 170.26' Row Length +12.0" End Stone x 2 = 172.26' Base Length

4 Rows x 100.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width

9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

100 Chambers x 175.9 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 17,903.6 cf Chamber Storage

43,699.8 cf Field - 17,903.6 cf Chambers = 25,796.2 cf Stone x 40.0% Voids = 10,318.5 cf Stone Storage

Chamber Storage + Stone Storage = 28,222.0 cf = 0.648 af

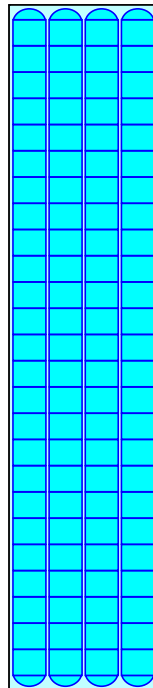
Overall Storage Efficiency = 64.6%

Overall System Size = 172.26' x 37.58' x 6.75'

100 Chambers

1,618.5 cy Field

955.4 cy Stone



Summary for Pond 4P: Sediment Forebay

Inflow Area = 0.509 ac, 83.46% Impervious, Inflow Depth = 5.34" for 10-Year event
 Inflow = 2.72 cfs @ 12.13 hrs, Volume= 0.226 af
 Outflow = 2.69 cfs @ 12.13 hrs, Volume= 0.223 af, Atten= 1%, Lag= 0.3 min
 Primary = 2.69 cfs @ 12.13 hrs, Volume= 0.223 af
 Routed to Pond 5P : RGM102

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 221.31' @ 12.14 hrs Surf.Area= 300 sf Storage= 240 cf

Flood Elev= 222.00' Surf.Area= 444 sf Storage= 497 cf

Plug-Flow detention time= 20.8 min calculated for 0.223 af (98% of inflow)

Center-of-Mass det. time= 10.4 min (785.4 - 775.0)

Volume	Invert	Avail.Storage	Storage Description
#1	220.00'	497 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
220.00	79	0	0
221.00	235	157	157
222.00	444	340	497

Device	Routing	Invert	Outlet Devices
#1	Primary	221.00'	8.0' long + 3.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.69 cfs @ 12.13 hrs HW=221.31' TW=221.21' (Dynamic Tailwater)

↑ **1=Broad-Crested Rectangular Weir** (Weir Controls 2.69 cfs @ 0.97 fps)

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Page 56

Summary for Pond 5P: RGM102

Inflow Area = 0.509 ac, 83.46% Impervious, Inflow Depth = 5.25" for 10-Year event
 Inflow = 2.69 cfs @ 12.13 hrs, Volume= 0.223 af
 Outflow = 2.61 cfs @ 12.15 hrs, Volume= 0.223 af, Atten= 3%, Lag= 1.0 min
 Discarded = 0.03 cfs @ 12.15 hrs, Volume= 0.065 af
 Primary = 2.58 cfs @ 12.15 hrs, Volume= 0.158 af
 Routed to Link 3L : Max Flow - EX 12" SE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
 Peak Elev= 221.22' @ 12.15 hrs Surf.Area= 1,319 sf Storage= 1,218 cf
 Flood Elev= 222.00' Surf.Area= 1,768 sf Storage= 2,429 cf

Plug-Flow detention time= 127.8 min calculated for 0.223 af (100% of inflow)
 Center-of-Mass det. time= 127.8 min (913.2 - 785.4)

Volume	Invert	Avail.Storage	Storage Description
#1	220.00'	2,429 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
220.00	697	0	0
221.00	1,196	947	947
222.00	1,768	1,482	2,429

Device	Routing	Invert	Outlet Devices
#1	Discarded	220.00'	1.020 in/hr Exfiltration over Horizontal area Phase-In= 0.01'
#2	Primary	215.20'	12.000" Round Culvert L= 168.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 215.20' / 213.50' S= 0.0101 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	221.00'	30.000" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.03 cfs @ 12.15 hrs HW=221.22' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=2.58 cfs @ 12.15 hrs HW=221.22' TW=0.00' (Dynamic Tailwater)

↑ **2=Culvert** (Passes 2.58 cfs of 6.28 cfs potential flow)
 ↑ **3=Orifice/Grate** (Weir Controls 2.58 cfs @ 1.52 fps)

Summary for Pond 6P: Sediment Forebay (NW)

Inflow Area = 0.257 ac, 93.56% Impervious, Inflow Depth = 5.68" for 10-Year event
 Inflow = 1.40 cfs @ 12.13 hrs, Volume= 0.122 af
 Outflow = 1.37 cfs @ 12.14 hrs, Volume= 0.119 af, Atten= 3%, Lag= 0.5 min
 Primary = 1.37 cfs @ 12.14 hrs, Volume= 0.119 af
 Routed to Pond 8P : RGM103

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
 Peak Elev= 217.86' @ 12.15 hrs Surf.Area= 260 sf Storage= 205 cf
 Flood Elev= 218.00' Surf.Area= 297 sf Storage= 245 cf

Plug-Flow detention time= 32.5 min calculated for 0.119 af (98% of inflow)
 Center-of-Mass det. time= 16.5 min (771.8 - 755.2)

Volume	Invert	Avail.Storage	Storage Description
#1	216.00'	245 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
216.00	16	0	0
217.00	105	61	61
217.50	168	68	129
218.00	297	116	245

Device	Routing	Invert	Outlet Devices
#1	Primary	217.50'	8.5' long + 3.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.35 cfs @ 12.14 hrs HW=217.85' TW=217.85' (Dynamic Tailwater)

↑1=**Broad-Crested Rectangular Weir**(Weir Controls 1.35 cfs @ 0.40 fps)

Summary for Pond 7P: Sediment Forebay (Center)

Inflow Area = 0.905 ac, 97.58% Impervious, Inflow Depth = 5.74" for 10-Year event
 Inflow = 4.95 cfs @ 12.13 hrs, Volume= 0.433 af
 Outflow = 4.84 cfs @ 12.14 hrs, Volume= 0.420 af, Atten= 2%, Lag= 0.4 min
 Primary = 4.84 cfs @ 12.14 hrs, Volume= 0.420 af
 Routed to Pond 8P : RGM103

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 217.86' @ 12.15 hrs Surf.Area= 773 sf Storage= 811 cf

Flood Elev= 218.00' Surf.Area= 838 sf Storage= 924 cf

Plug-Flow detention time= 39.5 min calculated for 0.420 af (97% of inflow)

Center-of-Mass det. time= 19.9 min (771.8 - 751.9)

Volume	Invert	Avail.Storage	Storage Description
#1	216.00'	924 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
216.00	180	0	0
217.00	429	305	305
217.50	605	259	563
218.00	838	361	924

Device	Routing	Invert	Outlet Devices
#1	Primary	217.50'	25.0' long + 12.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=4.80 cfs @ 12.14 hrs HW=217.86' TW=217.85' (Dynamic Tailwater)

↑1=**Broad-Crested Rectangular Weir**(Weir Controls 4.80 cfs @ 0.46 fps)

Summary for Pond 8P: RGM103

Inflow Area = 1.163 ac, 96.69% Impervious, Inflow Depth = 5.56" for 10-Year event
 Inflow = 6.21 cfs @ 12.14 hrs, Volume= 0.539 af
 Outflow = 6.08 cfs @ 12.15 hrs, Volume= 0.539 af, Atten= 2%, Lag= 0.8 min
 Discarded = 0.05 cfs @ 12.15 hrs, Volume= 0.103 af
 Primary = 5.29 cfs @ 12.15 hrs, Volume= 0.430 af
 Routed to Link 3L : Max Flow - EX 12" SE
 Secondary = 0.74 cfs @ 12.15 hrs, Volume= 0.006 af
 Routed to Link 3L : Max Flow - EX 12" SE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
 Peak Elev= 217.85' @ 12.15 hrs Surf.Area= 1,927 sf Storage= 2,368 cf
 Flood Elev= 218.00' Surf.Area= 2,056 sf Storage= 2,670 cf

Plug-Flow detention time= 117.9 min calculated for 0.539 af (100% of inflow)
 Center-of-Mass det. time= 117.9 min (889.8 - 771.8)

Volume	Invert	Avail.Storage	Storage Description
#1	216.00'	2,670 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
216.00	714	0	0
217.00	1,311	1,013	1,013
217.50	1,631	736	1,748
218.00	2,056	922	2,670

Device	Routing	Invert	Outlet Devices
#1	Primary	213.40'	12.000" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.40' / 213.20' S= 0.0100 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	217.50'	30.000" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	216.00'	1.020 in/hr Exfiltration over Horizontal area Phase-In= 0.01'
#4	Secondary	217.75'	10.0' long + 3.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.05 cfs @ 12.15 hrs HW=217.85' (Free Discharge)
 ↑ **3=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=5.29 cfs @ 12.15 hrs HW=217.85' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Culvert** (Passes 5.29 cfs of 7.51 cfs potential flow)
 ↑ **2=Orifice/Grate** (Weir Controls 5.29 cfs @ 1.93 fps)

Secondary OutFlow Max=0.74 cfs @ 12.15 hrs HW=217.85' TW=0.00' (Dynamic Tailwater)
 ↑ **4=Broad-Crested Rectangular Weir** (Weir Controls 0.74 cfs @ 0.73 fps)

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NRCC 24-hr D 10-Year Rainfall=6.04"

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Page 60

Summary for Pond 10P: EX 18" RCP Outfall

Inflow Area = 16.779 ac, 45.61% Impervious, Inflow Depth = 1.90" for 10-Year event
Inflow = 19.19 cfs @ 12.15 hrs, Volume= 2.661 af
Outflow = 19.19 cfs @ 12.15 hrs, Volume= 2.661 af, Atten= 0%, Lag= 0.0 min
Primary = 19.19 cfs @ 12.15 hrs, Volume= 2.661 af
Routed to Link 5L : 18" Pipe

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 217.60' @ 12.15 hrs

Flood Elev= 218.12'

Device	Routing	Invert	Outlet Devices
#1	Primary	211.00'	18.000" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 211.00' / 210.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=19.19 cfs @ 12.15 hrs HW=217.59' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 19.19 cfs @ 10.86 fps)

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NRCC 24-hr D 10-Year Rainfall=6.04"

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Page 61

Summary for Pond CB2: EX 12" SE

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 4.08" for 10-Year event
Inflow = 5.46 cfs @ 12.07 hrs, Volume= 0.569 af
Outflow = 5.46 cfs @ 12.07 hrs, Volume= 0.569 af, Atten= 0%, Lag= 0.3 min
Primary = 5.46 cfs @ 12.07 hrs, Volume= 0.569 af
Routed to Link 4L : Max Flow - EX 12" Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 216.18' @ 12.07 hrs

Flood Elev= 216.17'

Device	Routing	Invert	Outlet Devices
#1	Primary	211.70'	12.000" Round Culvert L= 155.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 211.70' / 210.40' S= 0.0084 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=5.46 cfs @ 12.07 hrs HW=216.18' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 5.46 cfs @ 6.95 fps)

Summary for Pond DMH1: Diversion Manhole

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 3.86" for 10-Year event
 Inflow = 15.14 cfs @ 12.01 hrs, Volume= 4.450 af
 Outflow = 15.14 cfs @ 12.18 hrs, Volume= 4.450 af, Atten= 0%, Lag= 10.2 min
 Primary = 3.29 cfs @ 12.47 hrs, Volume= 2.713 af
 Routed to Pond 3P : ISM101
 Secondary = 12.39 cfs @ 12.12 hrs, Volume= 1.737 af
 Routed to Pond 10P : EX 18" RCP Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 223.29' @ 12.15 hrs

Flood Elev= 220.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	212.13'	7.500" Round Culvert to DMH1 L= 25.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 212.13' / 209.19' S= 0.1176 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.31 sf
#2	Secondary	216.63'	18.000" Round Culvert to DMH4 L= 322.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 216.63' / 212.80' S= 0.0119 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=3.22 cfs @ 12.47 hrs HW=220.30' TW=215.23' (Dynamic Tailwater)

↑1=Culvert to DMH1 (Outlet Controls 3.22 cfs @ 10.48 fps)

Secondary OutFlow Max=12.47 cfs @ 12.12 hrs HW=223.16' TW=217.45' (Dynamic Tailwater)

↑2=Culvert to DMH4 (Outlet Controls 12.47 cfs @ 7.05 fps)

Summary for Pond DMH10: EX 12" RCP Outfall

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 7.77" for 10-Year event
 Inflow = 8.82 cfs @ 12.00 hrs, Volume= 1.083 af
 Outflow = 8.82 cfs @ 12.02 hrs, Volume= 1.083 af, Atten= 0%, Lag= 1.2 min
 Primary = 8.82 cfs @ 12.02 hrs, Volume= 1.083 af
 Routed to Link 6L : 12" Pipe

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 219.29' @ 12.00 hrs

Flood Elev= 219.29'

Device	Routing	Invert	Outlet Devices
#1	Primary	210.20'	12.000" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 210.20' / 209.20' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=8.82 cfs @ 12.02 hrs HW=219.29' TW=0.00' (Dynamic Tailwater)

↑**1=Culvert** (Barrel Controls 8.82 cfs @ 11.23 fps)

Summary for Pond DMH8: Diversion Manhole

Inflow Area = 1.805 ac, 92.40% Impervious, Inflow Depth = 5.55" for 10-Year event
 Inflow = 8.92 cfs @ 12.10 hrs, Volume= 0.834 af
 Outflow = 8.92 cfs @ 12.10 hrs, Volume= 0.834 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.47 cfs @ 12.10 hrs, Volume= 0.267 af
 Routed to Pond 3P : ISM101
 Secondary = 7.97 cfs @ 12.14 hrs, Volume= 0.569 af
 Routed to Link 4L : Max Flow - EX 12" Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 220.82' @ 12.14 hrs

Flood Elev= 218.43'

Device	Routing	Invert	Outlet Devices
#1	Primary	209.55'	6.000" Round 6" HDPE to ISM101 L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 209.55' / 209.19' S= 0.0144 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Secondary	214.10'	12.000" Round 12" HDPE Bypass L= 88.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.10' / 213.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=1.38 cfs @ 12.10 hrs HW=219.92' TW=217.27' (Dynamic Tailwater)

↑**1=6" HDPE to ISM101** (Outlet Controls 1.38 cfs @ 7.01 fps)

Secondary OutFlow Max=7.97 cfs @ 12.14 hrs HW=220.82' TW=0.00' (Dynamic Tailwater)

↑**2=12" HDPE Bypass** (Barrel Controls 7.97 cfs @ 10.15 fps)

Summary for Link 1L: Max Flow - EX 18" Holliston

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 4.45" for 10-Year event
Inflow = 37.76 cfs @ 12.27 hrs, Volume= 5.130 af
Primary = 15.14 cfs @ 12.01 hrs, Volume= 4.450 af, Atten= 60%, Lag= 0.0 min
Routed to Pond 1D : Holliston Street Drainage Line (Upstream)
Secondary = 22.62 cfs @ 12.27 hrs, Volume= 0.680 af
Routed to Link 5L : 18" Pipe

Primary outflow = Inflow below 15.14 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link 2L: Max Flow - DMH8 to DMH10

Inflow Area = 1.805 ac, 92.40% Impervious, Inflow Depth = 5.57" for 10-Year event
Inflow = 9.79 cfs @ 12.13 hrs, Volume= 0.837 af
Primary = 8.92 cfs @ 12.10 hrs, Volume= 0.834 af, Atten= 9%, Lag= 0.0 min
Routed to Pond DMH8 : Diversion Manhole
Secondary = 0.87 cfs @ 12.13 hrs, Volume= 0.003 af
Routed to Link 4L : Max Flow - EX 12" Outfall

Primary outflow = Inflow below 8.92 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link 3L: Max Flow - EX 12" SE

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 4.26" for 10-Year event
Inflow = 8.61 cfs @ 12.15 hrs, Volume= 0.594 af
Primary = 5.46 cfs @ 12.07 hrs, Volume= 0.569 af, Atten= 37%, Lag= 0.0 min
Routed to Pond CB2 : EX 12" SE
Secondary = 3.15 cfs @ 12.15 hrs, Volume= 0.025 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 5.46 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link 4L: Max Flow - EX 12" Outfall

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 8.19" for 10-Year event
Inflow = 14.29 cfs @ 12.13 hrs, Volume= 1.140 af
Primary = 8.82 cfs @ 12.00 hrs, Volume= 1.083 af, Atten= 38%, Lag= 0.0 min
Routed to Pond DMH10 : EX 12" RCP Outfall
Secondary = 5.47 cfs @ 12.13 hrs, Volume= 0.058 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 8.82 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link 5L: 18" Pipe

Inflow Area = 16.779 ac, 45.61% Impervious, Inflow Depth = 2.39" for 10-Year event
Inflow = 40.04 cfs @ 12.25 hrs, Volume= 3.341 af
Primary = 40.04 cfs @ 12.25 hrs, Volume= 3.341 af, Atten= 0%, Lag= 0.0 min
Routed to Link DP1 : (new Link)

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link 6L: 12" Pipe

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 8.37" for 10-Year event
Inflow = 17.24 cfs @ 12.14 hrs, Volume= 1.166 af
Primary = 17.24 cfs @ 12.14 hrs, Volume= 1.166 af, Atten= 0%, Lag= 0.0 min
Routed to Link DP1 : (new Link)

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link DP1: (new Link)

Inflow Area = 18.451 ac, 49.87% Impervious, Inflow Depth = 2.93" for 10-Year event
Inflow = 51.28 cfs @ 12.18 hrs, Volume= 4.507 af
Primary = 51.28 cfs @ 12.18 hrs, Volume= 4.507 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Subcatchment 1A: Northwest Parking

Runoff = 2.04 cfs @ 12.20 hrs, Volume= 0.204 af, Depth= 5.78"
 Routed to Pond 2P : RGM101

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
6,559	98	Paved parking, HSG D
11,871	74	>75% Grass cover, Good, HSG C
18,430	83	Weighted Average
11,871		64.41% Pervious Area
6,559		35.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.0200	0.17		Sheet Flow, Edge of pavement grass Grass: Short n= 0.150 P2= 3.24"
0.4	40	0.0125	1.68		Shallow Concentrated Flow, Edge of pavement grass Grassed Waterway Kv= 15.0 fps
0.3	40	0.0125	2.27		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
0.4	60	0.0330	2.72		Shallow Concentrated Flow, Swale Entrance Grassed Waterway Kv= 15.0 fps
1.3	140	0.0150	1.84		Shallow Concentrated Flow, Swale Grassed Waterway Kv= 15.0 fps
0.9	55	0.0050	1.06		Shallow Concentrated Flow, Swale to outlet Grassed Waterway Kv= 15.0 fps
13.0	435	Total			

Summary for Subcatchment 1B: Northwest Driveway

Runoff = 3.45 cfs @ 12.17 hrs, Volume= 0.313 af, Depth= 6.25"
 Routed to Pond 1P : Sediment Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
14,424	98	Paved parking, HSG D
11,762	74	>75% Grass cover, Good, HSG C
26,186	87	Weighted Average
11,762		44.92% Pervious Area
14,424		55.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	25	0.0200	1.05		Sheet Flow, Driveway Smooth surfaces n= 0.011 P2= 3.24"
6.9	75	0.0270	0.18		Sheet Flow, Yard Grass: Short n= 0.150 P2= 3.24"
0.3	25	0.0080	1.34		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
0.4	66	0.0200	2.87		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
1.4	211	0.0155	2.53		Shallow Concentrated Flow, Parking Paved Kv= 20.3 fps
9.4	402	Total			

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NRCC 24-hr D 25-Year Rainfall=7.79"

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Page 74

Summary for Subcatchment 2A: Kelley Street

Runoff = 22.40 cfs @ 12.39 hrs, Volume= 3.275 af, Depth= 5.89"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
64,979	98	Paved parking, HSG D
9,897	74	>75% Grass cover, Good, HSG C
214,750	80	>75% Grass cover, Good, HSG D
842	82	Woods/grass comb., Fair, HSG D
290,468	84	Weighted Average
225,489		77.63% Pervious Area
64,979		22.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.3	100	0.0200	0.08		Sheet Flow, Woods Woods: Light underbrush n= 0.400 P2= 3.24"
0.7	35	0.0290	0.85		Shallow Concentrated Flow, Woods Woodland Kv= 5.0 fps
2.2	75	0.0130	0.57		Shallow Concentrated Flow, Woods Woodland Kv= 5.0 fps
0.2	30	0.0330	2.72		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
1.7	167	0.0120	1.64		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
1.0	130	0.0115	2.18		Shallow Concentrated Flow, Road Paved Kv= 20.3 fps
0.5	610	0.0100	22.31	2,198.79	Pipe Channel, Kelley Street Drain Pipe 159.000" x 113.000", R=82.000"/184.000" Pipe Arch Area= 98.6 sf n= 0.013 Concrete pipe, bends & connections
1.5	570	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM101 18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
29.1	1,717	Total			

Summary for Subcatchment 2B: NorthersParking Lot and Parcels

Runoff = 7.08 cfs @ 12.27 hrs, Volume= 0.811 af, Depth= 5.66"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
23,429	98	Paved parking, HSG D
51,501	74	>75% Grass cover, Good, HSG C
74,930	82	Weighted Average
51,501		68.73% Pervious Area
23,429		31.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	30	0.0500	0.19		Sheet Flow, Grass
					Grass: Short n= 0.150 P2= 3.24"
9.0	70	0.0120	0.13		Sheet Flow, Grass
					Grass: Short n= 0.150 P2= 3.24"
2.2	155	0.0060	1.16		Shallow Concentrated Flow, Grass
					Grassed Waterway Kv= 15.0 fps
0.2	40	0.0375	2.90		Shallow Concentrated Flow, End grass
					Grassed Waterway Kv= 15.0 fps
0.1	25	0.0200	2.87		Shallow Concentrated Flow, Parking
					Paved Kv= 20.3 fps
1.7	120	0.0032	1.15		Shallow Concentrated Flow, Parking
					Paved Kv= 20.3 fps
1.4	450	0.0100	5.26	6.46	Pipe Channel, Drainage from rear lot to Holliston
					15.000" Round Area= 1.2 sf Perim= 3.9' r= 0.31'
					n= 0.013 Concrete pipe, bends & connections
0.7	290	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM 101
					18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38'
					n= 0.013 Concrete pipe, bends & connections
17.9	1,180	Total			

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Page 76

Summary for Subcatchment 2C: Holliston Street and School

Runoff = 21.81 cfs @ 12.23 hrs, Volume= 2.467 af, Depth= 6.72"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
132,809	98	Paved parking, HSG D
37,272	74	>75% Grass cover, Good, HSG C
21,746	80	>75% Grass cover, Good, HSG D
179	82	Woods/grass comb., Fair, HSG D
192,006	91	Weighted Average
59,197		30.83% Pervious Area
132,809		69.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
2.3	30	0.0700	0.22		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
3.5	20	0.0100	0.09		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
1.6	160	0.0125	1.68		Shallow Concentrated Flow, Grass Grassed Waterway Kv= 15.0 fps
0.6	220	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM 101 18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
15.4	480	Total			

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Page 77

Summary for Subcatchment 3: Partial School Drainage

Runoff = 2.52 cfs @ 12.13 hrs, Volume= 0.204 af, Depth= 6.48"
Routed to Pond 3P : ISM101

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
10,444	98	Paved parking, HSG D
6,033	74	>75% Grass cover, Good, HSG C
16,477	89	Weighted Average
6,033		36.61% Pervious Area
10,444		63.39% Impervious Area

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

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Page 78

Summary for Subcatchment 4: Eastern Driveway and School Building

Runoff = 12.70 cfs @ 12.13 hrs, Volume= 1.100 af, Depth= 7.31"
 Routed to Link 2L : Max Flow - DMH8 to DMH10

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
72,642	98	Paved parking, HSG D
5,914	74	>75% Grass cover, Good, HSG C
63	80	>75% Grass cover, Good, HSG D
78,619	96	Weighted Average
5,977		7.60% Pervious Area
72,642		92.40% Impervious Area

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

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Page 79

Summary for Subcatchment 5: Western Portion of Paved Lot

Runoff = 3.54 cfs @ 12.13 hrs, Volume= 0.300 af, Depth= 7.07"
Routed to Pond 4P : Sediment Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
18,515	98	Paved parking, HSG D
3,668	74	>75% Grass cover, Good, HSG C
22,183	94	Weighted Average
3,668		16.54% Pervious Area
18,515		83.46% Impervious Area

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

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Page 80

Summary for Subcatchment 6A: Western Portion of Gravel Lot

Runoff = 1.82 cfs @ 12.13 hrs, Volume= 0.159 af, Depth= 7.43"
Routed to Pond 6P : Sediment Forebay (NW)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
10,484	98	Paved parking, HSG D
162	74	>75% Grass cover, Good, HSG C
560	80	>75% Grass cover, Good, HSG D
11,206	97	Weighted Average
722		6.44% Pervious Area
10,484		93.56% Impervious Area

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

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Page 81

Summary for Subcatchment 6B: Central Portion of Gravel Lot

Runoff = 2.92 cfs @ 12.13 hrs, Volume= 0.259 af, Depth= 7.55"
Routed to Pond 7P : Sediment Forebay (Center)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
17,687	98	Paved parking, HSG D
238	74	>75% Grass cover, Good, HSG C
34	80	>75% Grass cover, Good, HSG D
17,959	98	Weighted Average
272		1.51% Pervious Area
17,687		98.49% Impervious Area

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

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Page 82

Summary for Subcatchment 6C: Eastern Portion of Gravel Lot and Paved Lot

Runoff = 3.48 cfs @ 12.13 hrs, Volume= 0.305 af, Depth= 7.43"
 Routed to Reach 1R : Grass Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 25-Year Rainfall=7.79"

Area (sf)	CN	Description
20,797	98	Paved parking, HSG D
586	74	>75% Grass cover, Good, HSG C
16	80	>75% Grass cover, Good, HSG D
79	82	Woods/grass comb., Fair, HSG D
21,478	97	Weighted Average
681		3.17% Pervious Area
20,797		96.83% Impervious Area

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

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Page 83

Summary for Subcatchment 7: Holliston St

Runoff = 3.68 cfs @ 12.20 hrs, Volume= 0.358 af, Depth= 5.54"
 Routed to Pond 10P : EX 18" RCP Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 25-Year Rainfall=7.79"

	Area (sf)	CN	Description
*	8,042	98	Paved parking
	16,394	74	>75% Grass cover, Good, HSG C
	9,349	80	>75% Grass cover, Good, HSG D
	33,785	81	Weighted Average
	25,743		76.20% Pervious Area
	8,042		23.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		Sheet Flow, Sheet: Grass Grass: Short n= 0.150 P2= 3.24"
5.6	50	0.0200	0.15		Sheet Flow, Sheet: Grass Grass: Short n= 0.150 P2= 3.24"
2.4	210	0.0095	1.46		Shallow Concentrated Flow, Grass: Flat Grassed Waterway Kv= 15.0 fps
0.5	69	0.0150	2.49		Shallow Concentrated Flow, Paved Paved Kv= 20.3 fps
12.4	379	Total			

Summary for Reach 1R: Grass Swale

Inflow Area = 0.493 ac, 96.83% Impervious, Inflow Depth = 7.43" for 25-Year event
Inflow = 3.48 cfs @ 12.13 hrs, Volume= 0.305 af
Outflow = 3.48 cfs @ 12.13 hrs, Volume= 0.305 af, Atten= 0%, Lag= 0.2 min
Routed to Pond 7P : Sediment Forebay (Center)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
Max. Velocity= 3.71 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.06 fps, Avg. Travel Time= 0.9 min

Peak Storage= 56 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.25' , Surface Width= 4.50'
Bank-Full Depth= 0.50' Flow Area= 2.3 sf, Capacity= 12.28 cfs

3.00' x 0.50' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 ' / ' Top Width= 6.00'
Length= 60.0' Slope= 0.0250 ' / '
Inlet Invert= 219.50', Outlet Invert= 218.00'



Summary for Pond 1D: Holliston Street Drainage Line (Upstream)

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 5.01" for 25-Year event
 Inflow = 15.14 cfs @ 11.91 hrs, Volume= 5.769 af
 Outflow = 15.14 cfs @ 11.91 hrs, Volume= 5.769 af, Atten= 0%, Lag= 0.0 min
 Primary = 15.14 cfs @ 11.91 hrs, Volume= 5.769 af
 Routed to Pond DMH1 : Diversion Manhole

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 228.15' @ 12.15 hrs

Flood Elev= 222.91'

Device	Routing	Invert	Outlet Devices
#1	Primary	218.20'	18.000" Round Culvert into DMH2 L= 128.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 218.20' / 216.68' S= 0.0119 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=15.31 cfs @ 11.91 hrs HW=224.89' TW=220.42' (Dynamic Tailwater)

↑**1=Culvert into DMH2** (Outlet Controls 15.31 cfs @ 8.66 fps)

Summary for Pond 1P: Sediment Forebay

Inflow Area = 0.601 ac, 55.08% Impervious, Inflow Depth = 6.25" for 25-Year event
 Inflow = 3.45 cfs @ 12.17 hrs, Volume= 0.313 af
 Outflow = 3.40 cfs @ 12.17 hrs, Volume= 0.309 af, Atten= 1%, Lag= 0.2 min
 Primary = 3.40 cfs @ 12.17 hrs, Volume= 0.309 af
 Routed to Pond 2P : RGM101

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 224.65' @ 12.20 hrs Surf.Area= 264 sf Storage= 266 cf

Flood Elev= 224.75' Surf.Area= 277 sf Storage= 292 cf

Plug-Flow detention time= 16.5 min calculated for 0.309 af (99% of inflow)

Center-of-Mass det. time= 8.1 min (808.3 - 800.2)

Volume	Invert	Avail.Storage	Storage Description
#1	223.00'	292 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
223.00	66	0	0
224.00	177	122	122
224.75	277	170	292

Device	Routing	Invert	Outlet Devices
#1	Primary	224.25'	14.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=3.40 cfs @ 12.17 hrs HW=224.64' TW=224.63' (Dynamic Tailwater)

↑ **1=Sharp-Crested Rectangular Weir** (Weir Controls 3.40 cfs @ 0.62 fps)

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Page 87

Summary for Pond 2P: RGM101

Inflow Area = 1.024 ac, 47.03% Impervious, Inflow Depth = 6.00" for 25-Year event
 Inflow = 5.35 cfs @ 12.18 hrs, Volume= 0.512 af
 Outflow = 5.20 cfs @ 12.20 hrs, Volume= 0.508 af, Atten= 3%, Lag= 1.4 min
 Primary = 5.20 cfs @ 12.20 hrs, Volume= 0.508 af
 Routed to Link 1L : Max Flow - EX 18" Holliston

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
 Peak Elev= 224.64' @ 12.20 hrs Surf.Area= 1,978 sf Storage= 831 cf
 Flood Elev= 224.75' Surf.Area= 2,030 sf Storage= 1,042 cf

Plug-Flow detention time= 13.4 min calculated for 0.508 af (99% of inflow)
 Center-of-Mass det. time= 8.3 min (820.2 - 811.9)

Volume	Invert	Avail.Storage	Storage Description
#1	224.20'	1,042 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
224.20	1,759	0	0
224.75	2,030	1,042	1,042

Device	Routing	Invert	Outlet Devices
#1	Primary	222.20'	15.000" Round Culvert L= 35.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 222.20' / 222.00' S= 0.0057 ' / Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf
#2	Device 1	224.30'	30.000" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=5.20 cfs @ 12.20 hrs HW=224.64' TW=0.00' (Dynamic Tailwater)

↑ **1=Culvert** (Passes 5.20 cfs of 7.64 cfs potential flow)
 ↑ **2=Orifice/Grate** (Weir Controls 5.20 cfs @ 1.92 fps)

Summary for Pond 3P: ISM101

Inflow Area = 16.004 ac, 46.66% Impervious, Inflow Depth = 2.76" for 25-Year event
 Inflow = 6.69 cfs @ 12.13 hrs, Volume= 3.684 af
 Outflow = 6.73 cfs @ 12.13 hrs, Volume= 3.684 af, Atten= 0%, Lag= 0.0 min
 Discarded = 2.18 cfs @ 12.14 hrs, Volume= 2.643 af
 Primary = 4.56 cfs @ 12.12 hrs, Volume= 1.040 af
 Routed to Pond 10P : EX 18" RCP Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
 Peak Elev= 219.61' @ 12.14 hrs Surf.Area= 6,474 sf Storage= 28,222 cf
 Flood Elev= 215.00' Surf.Area= 6,474 sf Storage= 28,222 cf

Plug-Flow detention time= 203.3 min calculated for 3.683 af (100% of inflow)
 Center-of-Mass det. time= 203.4 min (1,050.1 - 846.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	208.25'	10,318 cf	37.58'W x 172.26'L x 6.75'H Field A 43,700 cf Overall - 17,904 cf Embedded = 25,796 cf x 40.0% Voids
#2A	209.00'	17,904 cf	ADS_StormTech MC-7200 +Cap x 100 Inside #1 Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap 100 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		28,222 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	208.25'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 206.00' Phase-In= 0.01'
#2	Primary	214.10'	12.000" Round Culvert L= 25.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.10' / 214.00' S= 0.0040 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Discarded OutFlow Max=2.18 cfs @ 12.14 hrs HW=219.61' (Free Discharge)

↑ **1=Exfiltration** (Controls 2.18 cfs)

Primary OutFlow Max=4.63 cfs @ 12.12 hrs HW=219.52' TW=218.02' (Dynamic Tailwater)

↑ **2=Culvert** (Inlet Controls 4.63 cfs @ 5.89 fps)

Pond 3P: ISM101 - Chamber Wizard Field A

Chamber Model = ADS_StormTechMC-7200 +Cap (ADS StormTech®MC-7200 with cap volume)

Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf

Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap

Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

25 Chambers/Row x 6.59' Long +2.73' Cap Length x 2 = 170.26' Row Length +12.0" End Stone x 2 = 172.26' Base Length

4 Rows x 100.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width

9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

100 Chambers x 175.9 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 17,903.6 cf Chamber Storage

43,699.8 cf Field - 17,903.6 cf Chambers = 25,796.2 cf Stone x 40.0% Voids = 10,318.5 cf Stone Storage

Chamber Storage + Stone Storage = 28,222.0 cf = 0.648 af

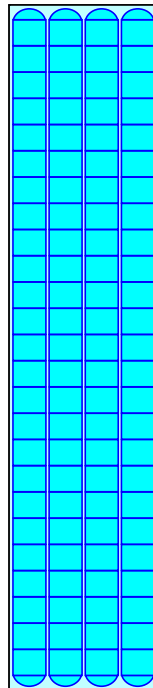
Overall Storage Efficiency = 64.6%

Overall System Size = 172.26' x 37.58' x 6.75'

100 Chambers

1,618.5 cy Field

955.4 cy Stone



Summary for Pond 4P: Sediment Forebay

Inflow Area = 0.509 ac, 83.46% Impervious, Inflow Depth = 7.07" for 25-Year event
 Inflow = 3.54 cfs @ 12.13 hrs, Volume= 0.300 af
 Outflow = 3.52 cfs @ 12.13 hrs, Volume= 0.297 af, Atten= 1%, Lag= 0.3 min
 Primary = 3.52 cfs @ 12.13 hrs, Volume= 0.297 af
 Routed to Pond 5P : RGM102

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 221.37' @ 12.14 hrs Surf.Area= 312 sf Storage= 257 cf

Flood Elev= 222.00' Surf.Area= 444 sf Storage= 497 cf

Plug-Flow detention time= 16.4 min calculated for 0.297 af (99% of inflow)

Center-of-Mass det. time= 8.4 min (775.6 - 767.2)

Volume	Invert	Avail.Storage	Storage Description
#1	220.00'	497 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
220.00	79	0	0
221.00	235	157	157
222.00	444	340	497

Device	Routing	Invert	Outlet Devices
#1	Primary	221.00'	8.0' long + 3.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=3.52 cfs @ 12.13 hrs HW=221.37' TW=221.25' (Dynamic Tailwater)

↑ **1=Broad-Crested Rectangular Weir** (Weir Controls 3.52 cfs @ 1.06 fps)

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Page 91

Summary for Pond 5P: RGM102

Inflow Area = 0.509 ac, 83.46% Impervious, Inflow Depth = 6.99" for 25-Year event
 Inflow = 3.52 cfs @ 12.13 hrs, Volume= 0.297 af
 Outflow = 3.42 cfs @ 12.15 hrs, Volume= 0.297 af, Atten= 3%, Lag= 1.0 min
 Discarded = 0.03 cfs @ 12.15 hrs, Volume= 0.068 af
 Primary = 3.39 cfs @ 12.15 hrs, Volume= 0.229 af
 Routed to Link 3L : Max Flow - EX 12" SE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
 Peak Elev= 221.26' @ 12.15 hrs Surf.Area= 1,344 sf Storage= 1,275 cf
 Flood Elev= 222.00' Surf.Area= 1,768 sf Storage= 2,429 cf

Plug-Flow detention time= 103.0 min calculated for 0.297 af (100% of inflow)
 Center-of-Mass det. time= 103.0 min (878.6 - 775.6)

Volume	Invert	Avail.Storage	Storage Description
#1	220.00'	2,429 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
220.00	697	0	0
221.00	1,196	947	947
222.00	1,768	1,482	2,429

Device	Routing	Invert	Outlet Devices
#1	Discarded	220.00'	1.020 in/hr Exfiltration over Horizontal area Phase-In= 0.01'
#2	Primary	215.20'	12.000" Round Culvert L= 168.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 215.20' / 213.50' S= 0.0101 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	221.00'	30.000" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.03 cfs @ 12.15 hrs HW=221.26' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=3.39 cfs @ 12.15 hrs HW=221.26' TW=0.00' (Dynamic Tailwater)

↑ **2=Culvert** (Passes 3.39 cfs of 6.30 cfs potential flow)

↑ **3=Orifice/Grate** (Weir Controls 3.39 cfs @ 1.66 fps)

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Page 92

Summary for Pond 6P: Sediment Forebay (NW)

Inflow Area = 0.257 ac, 93.56% Impervious, Inflow Depth = 7.43" for 25-Year event
 Inflow = 1.82 cfs @ 12.13 hrs, Volume= 0.159 af
 Outflow = 1.77 cfs @ 12.14 hrs, Volume= 0.156 af, Atten= 2%, Lag= 0.4 min
 Primary = 1.77 cfs @ 12.14 hrs, Volume= 0.156 af
 Routed to Pond 8P : RGM103

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 217.91' @ 12.15 hrs Surf.Area= 273 sf Storage= 219 cf

Flood Elev= 218.00' Surf.Area= 297 sf Storage= 245 cf

Plug-Flow detention time= 25.9 min calculated for 0.156 af (98% of inflow)

Center-of-Mass det. time= 13.4 min (763.4 - 750.0)

Volume	Invert	Avail.Storage	Storage Description
#1	216.00'	245 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
216.00	16	0	0
217.00	105	61	61
217.50	168	68	129
218.00	297	116	245

Device	Routing	Invert	Outlet Devices
#1	Primary	217.50'	8.5' long + 3.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.76 cfs @ 12.14 hrs HW=217.91' TW=217.90' (Dynamic Tailwater)↑1=**Broad-Crested Rectangular Weir**(Weir Controls 1.76 cfs @ 0.44 fps)

Summary for Pond 7P: Sediment Forebay (Center)

Inflow Area = 0.905 ac, 97.58% Impervious, Inflow Depth = 7.49" for 25-Year event
 Inflow = 6.40 cfs @ 12.13 hrs, Volume= 0.565 af
 Outflow = 6.28 cfs @ 12.14 hrs, Volume= 0.552 af, Atten= 2%, Lag= 0.4 min
 Primary = 6.28 cfs @ 12.14 hrs, Volume= 0.552 af
 Routed to Pond 8P : RGM103

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
 Peak Elev= 217.91' @ 12.15 hrs Surf.Area= 797 sf Storage= 852 cf
 Flood Elev= 218.00' Surf.Area= 838 sf Storage= 924 cf

Plug-Flow detention time= 31.5 min calculated for 0.552 af (98% of inflow)
 Center-of-Mass det. time= 16.2 min (763.4 - 747.2)

Volume	Invert	Avail.Storage	Storage Description
#1	216.00'	924 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
216.00	180	0	0
217.00	429	305	305
217.50	605	259	563
218.00	838	361	924

Device	Routing	Invert	Outlet Devices
#1	Primary	217.50'	25.0' long + 12.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=6.24 cfs @ 12.14 hrs HW=217.91' TW=217.90' (Dynamic Tailwater)
 ↑1=**Broad-Crested Rectangular Weir**(Weir Controls 6.24 cfs @ 0.51 fps)

Summary for Pond 8P: RGM103

Inflow Area = 1.163 ac, 96.69% Impervious, Inflow Depth = 7.31" for 25-Year event
 Inflow = 8.06 cfs @ 12.14 hrs, Volume= 0.708 af
 Outflow = 7.92 cfs @ 12.15 hrs, Volume= 0.708 af, Atten= 2%, Lag= 0.7 min
 Discarded = 0.05 cfs @ 12.15 hrs, Volume= 0.106 af
 Primary = 6.48 cfs @ 12.15 hrs, Volume= 0.587 af
 Routed to Link 3L : Max Flow - EX 12" SE
 Secondary = 1.40 cfs @ 12.15 hrs, Volume= 0.015 af
 Routed to Link 3L : Max Flow - EX 12" SE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
 Peak Elev= 217.90' @ 12.15 hrs Surf.Area= 1,970 sf Storage= 2,467 cf
 Flood Elev= 218.00' Surf.Area= 2,056 sf Storage= 2,670 cf

Plug-Flow detention time= 94.6 min calculated for 0.708 af (100% of inflow)
 Center-of-Mass det. time= 94.7 min (858.0 - 763.4)

Volume	Invert	Avail.Storage	Storage Description
#1	216.00'	2,670 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
216.00	714	0	0
217.00	1,311	1,013	1,013
217.50	1,631	736	1,748
218.00	2,056	922	2,670

Device	Routing	Invert	Outlet Devices
#1	Primary	213.40'	12.000" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.40' / 213.20' S= 0.0100 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	217.50'	30.000" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	216.00'	1.020 in/hr Exfiltration over Horizontal area Phase-In= 0.01'
#4	Secondary	217.75'	10.0' long + 3.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.05 cfs @ 12.15 hrs HW=217.90' (Free Discharge)
 ↑ **3=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=6.47 cfs @ 12.15 hrs HW=217.90' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Culvert** (Passes 6.47 cfs of 7.56 cfs potential flow)
 ↑ **2=Orifice/Grate** (Weir Controls 6.47 cfs @ 2.07 fps)

Secondary OutFlow Max=1.40 cfs @ 12.15 hrs HW=217.90' TW=0.00' (Dynamic Tailwater)
 ↑ **4=Broad-Crested Rectangular Weir** (Weir Controls 1.40 cfs @ 0.90 fps)

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Page 95

Summary for Pond 10P: EX 18" RCP Outfall

Inflow Area = 16.779 ac, 45.61% Impervious, Inflow Depth = 2.81" for 25-Year event
Inflow = 20.09 cfs @ 12.16 hrs, Volume= 3.933 af
Outflow = 20.09 cfs @ 12.16 hrs, Volume= 3.933 af, Atten= 0%, Lag= 0.0 min
Primary = 20.09 cfs @ 12.16 hrs, Volume= 3.933 af
Routed to Link 5L : 18" Pipe

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 218.18' @ 12.16 hrs

Flood Elev= 218.12'

Device	Routing	Invert	Outlet Devices
#1	Primary	211.00'	18.000" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 211.00' / 210.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=20.09 cfs @ 12.16 hrs HW=218.18' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 20.09 cfs @ 11.37 fps)

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Page 96

Summary for Pond CB2: EX 12" SE

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 5.52" for 25-Year event
Inflow = 5.46 cfs @ 12.02 hrs, Volume= 0.769 af
Outflow = 5.46 cfs @ 12.02 hrs, Volume= 0.769 af, Atten= 0%, Lag= 0.0 min
Primary = 5.46 cfs @ 12.02 hrs, Volume= 0.769 af
Routed to Link 4L : Max Flow - EX 12" Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 216.18' @ 12.02 hrs

Flood Elev= 216.17'

Device	Routing	Invert	Outlet Devices
#1	Primary	211.70'	12.000" Round Culvert L= 155.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 211.70' / 210.40' S= 0.0084 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=5.46 cfs @ 12.02 hrs HW=216.18' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 5.46 cfs @ 6.95 fps)

Summary for Pond DMH1: Diversion Manhole

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 5.01" for 25-Year event
 Inflow = 15.14 cfs @ 11.91 hrs, Volume= 5.769 af
 Outflow = 15.14 cfs @ 12.12 hrs, Volume= 5.769 af, Atten= 0%, Lag= 12.9 min
 Primary = 3.22 cfs @ 12.48 hrs, Volume= 3.235 af
 Routed to Pond 3P : ISM101
 Secondary = 12.34 cfs @ 12.13 hrs, Volume= 2.534 af
 Routed to Pond 10P : EX 18" RCP Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 223.79' @ 12.15 hrs

Flood Elev= 220.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	212.13'	7.500" Round Culvert to DMH1 L= 25.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 212.13' / 209.19' S= 0.1176 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.31 sf
#2	Secondary	216.63'	18.000" Round Culvert to DMH4 L= 322.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 216.63' / 212.80' S= 0.0119 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=3.20 cfs @ 12.48 hrs HW=220.35' TW=215.33' (Dynamic Tailwater)

↑1=Culvert to DMH1 (Outlet Controls 3.20 cfs @ 10.44 fps)

Secondary OutFlow Max=12.39 cfs @ 12.13 hrs HW=223.66' TW=218.02' (Dynamic Tailwater)

↑2=Culvert to DMH4 (Outlet Controls 12.39 cfs @ 7.01 fps)

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Page 98

Summary for Pond DMH10: EX 12" RCP Outfall

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 10.87" for 25-Year event
 Inflow = 8.82 cfs @ 11.96 hrs, Volume= 1.515 af
 Outflow = 8.82 cfs @ 11.97 hrs, Volume= 1.515 af, Atten= 0%, Lag= 0.6 min
 Primary = 8.82 cfs @ 11.97 hrs, Volume= 1.515 af
 Routed to Link 6L : 12" Pipe

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 219.29' @ 11.96 hrs

Flood Elev= 219.29'

Device	Routing	Invert	Outlet Devices
#1	Primary	210.20'	12.000" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 210.20' / 209.20' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=8.82 cfs @ 11.97 hrs HW=219.29' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 8.82 cfs @ 11.23 fps)

Summary for Pond DMH8: Diversion Manhole

Inflow Area = 1.805 ac, 92.40% Impervious, Inflow Depth = 7.15" for 25-Year event
 Inflow = 8.92 cfs @ 12.06 hrs, Volume= 1.075 af
 Outflow = 8.92 cfs @ 12.07 hrs, Volume= 1.075 af, Atten= 0%, Lag= 0.3 min
 Primary = 1.35 cfs @ 12.06 hrs, Volume= 0.245 af
 Routed to Pond 3P : ISM101
 Secondary = 8.05 cfs @ 12.14 hrs, Volume= 0.831 af
 Routed to Link 4L : Max Flow - EX 12" Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 220.95' @ 12.14 hrs

Flood Elev= 218.43'

Device	Routing	Invert	Outlet Devices
#1	Primary	209.55'	6.000" Round 6" HDPE to ISM101 L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 209.55' / 209.19' S= 0.0144 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Secondary	214.10'	12.000" Round 12" HDPE Bypass L= 88.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.10' / 213.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=1.30 cfs @ 12.06 hrs HW=220.16' TW=217.78' (Dynamic Tailwater)

↑1=6" HDPE to ISM101 (Outlet Controls 1.30 cfs @ 6.63 fps)

Secondary OutFlow Max=8.05 cfs @ 12.14 hrs HW=220.95' TW=0.00' (Dynamic Tailwater)

↑2=12" HDPE Bypass (Barrel Controls 8.05 cfs @ 10.25 fps)

Summary for Link 1L: Max Flow - EX 18" Holliston

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 6.13" for 25-Year event
Inflow = 51.15 cfs @ 12.27 hrs, Volume= 7.062 af
Primary = 15.14 cfs @ 11.91 hrs, Volume= 5.769 af, Atten= 70%, Lag= 0.0 min
Routed to Pond 1D : Holliston Street Drainage Line (Upstream)
Secondary = 36.01 cfs @ 12.27 hrs, Volume= 1.293 af
Routed to Link 5L : 18" Pipe

Primary outflow = Inflow below 15.14 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link 2L: Max Flow - DMH8 to DMH10

Inflow Area = 1.805 ac, 92.40% Impervious, Inflow Depth = 7.31" for 25-Year event
Inflow = 12.70 cfs @ 12.13 hrs, Volume= 1.100 af
Primary = 8.92 cfs @ 12.06 hrs, Volume= 1.075 af, Atten= 30%, Lag= 0.0 min
Routed to Pond DMH8 : Diversion Manhole
Secondary = 3.78 cfs @ 12.13 hrs, Volume= 0.025 af
Routed to Link 4L : Max Flow - EX 12" Outfall

Primary outflow = Inflow below 8.92 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

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Page 102

Summary for Link 3L: Max Flow - EX 12" SE

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 5.96" for 25-Year event
Inflow = 11.26 cfs @ 12.15 hrs, Volume= 0.831 af
Primary = 5.46 cfs @ 12.02 hrs, Volume= 0.769 af, Atten= 52%, Lag= 0.0 min
Routed to Pond CB2 : EX 12" SE
Secondary = 5.80 cfs @ 12.15 hrs, Volume= 0.061 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 5.46 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link 4L: Max Flow - EX 12" Outfall

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 11.66" for 25-Year event
Inflow = 17.26 cfs @ 12.13 hrs, Volume= 1.625 af
Primary = 8.82 cfs @ 11.96 hrs, Volume= 1.515 af, Atten= 49%, Lag= 0.0 min
Routed to Pond DMH10 : EX 12" RCP Outfall
Secondary = 8.44 cfs @ 12.13 hrs, Volume= 0.110 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 8.82 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

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Page 104

Summary for Link 5L: 18" Pipe

Inflow Area = 16.779 ac, 45.61% Impervious, Inflow Depth = 3.74" for 25-Year event

Inflow = 54.13 cfs @ 12.25 hrs, Volume= 5.226 af

Primary = 54.13 cfs @ 12.25 hrs, Volume= 5.226 af, Atten= 0%, Lag= 0.0 min

Routed to Link DP1 : (new Link)

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

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Page 105

Summary for Link 6L: 12" Pipe

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 12.10" for 25-Year event
Inflow = 22.83 cfs @ 12.14 hrs, Volume= 1.686 af
Primary = 22.83 cfs @ 12.14 hrs, Volume= 1.686 af, Atten= 0%, Lag= 0.0 min
Routed to Link DP1 : (new Link)

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link DP1: (new Link)

Inflow Area = 18.451 ac, 49.87% Impervious, Inflow Depth = 4.50" for 25-Year event
Inflow = 68.51 cfs @ 12.17 hrs, Volume= 6.913 af
Primary = 68.51 cfs @ 12.17 hrs, Volume= 6.913 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Subcatchment 1A: Northwest Parking

Runoff = 2.97 cfs @ 12.20 hrs, Volume= 0.303 af, Depth= 8.59"
 Routed to Pond 2P : RGM101

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
6,559	98	Paved parking, HSG D
11,871	74	>75% Grass cover, Good, HSG C
18,430	83	Weighted Average
11,871		64.41% Pervious Area
6,559		35.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.0200	0.17		Sheet Flow, Edge of pavement grass Grass: Short n= 0.150 P2= 3.24"
0.4	40	0.0125	1.68		Shallow Concentrated Flow, Edge of pavement grass Grassed Waterway Kv= 15.0 fps
0.3	40	0.0125	2.27		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
0.4	60	0.0330	2.72		Shallow Concentrated Flow, Swale Entrance Grassed Waterway Kv= 15.0 fps
1.3	140	0.0150	1.84		Shallow Concentrated Flow, Swale Grassed Waterway Kv= 15.0 fps
0.9	55	0.0050	1.06		Shallow Concentrated Flow, Swale to outlet Grassed Waterway Kv= 15.0 fps
13.0	435	Total			

Summary for Subcatchment 1B: Northwest Driveway

Runoff = 4.92 cfs @ 12.17 hrs, Volume= 0.456 af, Depth= 9.10"
 Routed to Pond 1P : Sediment Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
14,424	98	Paved parking, HSG D
11,762	74	>75% Grass cover, Good, HSG C
26,186	87	Weighted Average
11,762		44.92% Pervious Area
14,424		55.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	25	0.0200	1.05		Sheet Flow, Driveway Smooth surfaces n= 0.011 P2= 3.24"
6.9	75	0.0270	0.18		Sheet Flow, Yard Grass: Short n= 0.150 P2= 3.24"
0.3	25	0.0080	1.34		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
0.4	66	0.0200	2.87		Shallow Concentrated Flow, Driveway Paved Kv= 20.3 fps
1.4	211	0.0155	2.53		Shallow Concentrated Flow, Parking Paved Kv= 20.3 fps
9.4	402	Total			

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Page 109

Summary for Subcatchment 2A: Kelley Street

Runoff = 32.52 cfs @ 12.39 hrs, Volume= 4.846 af, Depth= 8.72"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
64,979	98	Paved parking, HSG D
9,897	74	>75% Grass cover, Good, HSG C
214,750	80	>75% Grass cover, Good, HSG D
842	82	Woods/grass comb., Fair, HSG D
290,468	84	Weighted Average
225,489		77.63% Pervious Area
64,979		22.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.3	100	0.0200	0.08		Sheet Flow, Woods Woods: Light underbrush n= 0.400 P2= 3.24"
0.7	35	0.0290	0.85		Shallow Concentrated Flow, Woods Woodland Kv= 5.0 fps
2.2	75	0.0130	0.57		Shallow Concentrated Flow, Woods Woodland Kv= 5.0 fps
0.2	30	0.0330	2.72		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
1.7	167	0.0120	1.64		Shallow Concentrated Flow, Yard Grassed Waterway Kv= 15.0 fps
1.0	130	0.0115	2.18		Shallow Concentrated Flow, Road Paved Kv= 20.3 fps
0.5	610	0.0100	22.31	2,198.79	Pipe Channel, Kelley Street Drain Pipe 159.000" x 113.000", R=82.000"/184.000" Pipe Arch Area= 98.6 sf n= 0.013 Concrete pipe, bends & connections
1.5	570	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM101 18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
29.1	1,717	Total			

Summary for Subcatchment 2B: NorthersParking Lot and Parcels

Runoff = 10.36 cfs @ 12.27 hrs, Volume= 1.213 af, Depth= 8.46"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
23,429	98	Paved parking, HSG D
51,501	74	>75% Grass cover, Good, HSG C
74,930	82	Weighted Average
51,501		68.73% Pervious Area
23,429		31.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	30	0.0500	0.19		Sheet Flow, Grass
					Grass: Short n= 0.150 P2= 3.24"
9.0	70	0.0120	0.13		Sheet Flow, Grass
					Grass: Short n= 0.150 P2= 3.24"
2.2	155	0.0060	1.16		Shallow Concentrated Flow, Grass
					Grassed Waterway Kv= 15.0 fps
0.2	40	0.0375	2.90		Shallow Concentrated Flow, End grass
					Grassed Waterway Kv= 15.0 fps
0.1	25	0.0200	2.87		Shallow Concentrated Flow, Parking
					Paved Kv= 20.3 fps
1.7	120	0.0032	1.15		Shallow Concentrated Flow, Parking
					Paved Kv= 20.3 fps
1.4	450	0.0100	5.26	6.46	Pipe Channel, Drainage from rear lot to Holliston
					15.000" Round Area= 1.2 sf Perim= 3.9' r= 0.31'
					n= 0.013 Concrete pipe, bends & connections
0.7	290	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM 101
					18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38'
					n= 0.013 Concrete pipe, bends & connections
17.9	1,180	Total			

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Page 111

Summary for Subcatchment 2C: Holliston Street and School

Runoff = 30.58 cfs @ 12.23 hrs, Volume= 3.529 af, Depth= 9.61"
 Routed to Link 1L : Max Flow - EX 18" Holliston

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
132,809	98	Paved parking, HSG D
37,272	74	>75% Grass cover, Good, HSG C
21,746	80	>75% Grass cover, Good, HSG D
179	82	Woods/grass comb., Fair, HSG D
192,006	91	Weighted Average
59,197		30.83% Pervious Area
132,809		69.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0100	0.11		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
2.3	30	0.0700	0.22		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
3.5	20	0.0100	0.09		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.24"
1.6	160	0.0125	1.68		Shallow Concentrated Flow, Grass Grassed Waterway Kv= 15.0 fps
0.6	220	0.0120	6.51	11.51	Pipe Channel, Holliston Street to ISM 101 18.000" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Concrete pipe, bends & connections
15.4	480	Total			

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Page 112

Summary for Subcatchment 3: Partial School Drainage

Runoff = 3.56 cfs @ 12.13 hrs, Volume= 0.295 af, Depth= 9.36"
Routed to Pond 3P : ISM101

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
10,444	98	Paved parking, HSG D
6,033	74	>75% Grass cover, Good, HSG C
16,477	89	Weighted Average
6,033		36.61% Pervious Area
10,444		63.39% Impervious Area

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

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Page 113

Summary for Subcatchment 4: Eastern Driveway and School Building

Runoff = 17.53 cfs @ 12.13 hrs, Volume= 1.538 af, Depth=10.23"
Routed to Link 2L : Max Flow - DMH8 to DMH10

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
72,642	98	Paved parking, HSG D
5,914	74	>75% Grass cover, Good, HSG C
63	80	>75% Grass cover, Good, HSG D
78,619	96	Weighted Average
5,977		7.60% Pervious Area
72,642		92.40% Impervious Area

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

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Page 114

Summary for Subcatchment 5: Western Portion of Paved Lot

Runoff = 4.92 cfs @ 12.13 hrs, Volume= 0.424 af, Depth= 9.98"
Routed to Pond 4P : Sediment Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
18,515	98	Paved parking, HSG D
3,668	74	>75% Grass cover, Good, HSG C
22,183	94	Weighted Average
3,668		16.54% Pervious Area
18,515		83.46% Impervious Area

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

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Page 115

Summary for Subcatchment 6A: Western Portion of Gravel Lot

Runoff = 2.50 cfs @ 12.13 hrs, Volume= 0.222 af, Depth=10.35"
 Routed to Pond 6P : Sediment Forebay (NW)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
10,484	98	Paved parking, HSG D
162	74	>75% Grass cover, Good, HSG C
560	80	>75% Grass cover, Good, HSG D
11,206	97	Weighted Average
722		6.44% Pervious Area
10,484		93.56% Impervious Area

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

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Page 116

Summary for Subcatchment 6B: Central Portion of Gravel Lot

Runoff = 4.02 cfs @ 12.13 hrs, Volume= 0.360 af, Depth=10.47"
Routed to Pond 7P : Sediment Forebay (Center)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
17,687	98	Paved parking, HSG D
238	74	>75% Grass cover, Good, HSG C
34	80	>75% Grass cover, Good, HSG D
17,959	98	Weighted Average
272		1.51% Pervious Area
17,687		98.49% Impervious Area

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

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Page 117

Summary for Subcatchment 6C: Eastern Portion of Gravel Lot and Paved Lot

Runoff = 4.80 cfs @ 12.13 hrs, Volume= 0.425 af, Depth=10.35"
 Routed to Reach 1R : Grass Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 100-Year Rainfall=10.71"

Area (sf)	CN	Description
20,797	98	Paved parking, HSG D
586	74	>75% Grass cover, Good, HSG C
16	80	>75% Grass cover, Good, HSG D
79	82	Woods/grass comb., Fair, HSG D
21,478	97	Weighted Average
681		3.17% Pervious Area
20,797		96.83% Impervious Area

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

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Page 118

Summary for Subcatchment 7: Holliston St

Runoff = 5.42 cfs @ 12.20 hrs, Volume= 0.539 af, Depth= 8.33"
 Routed to Pond 10P : EX 18" RCP Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D 100-Year Rainfall=10.71"

	Area (sf)	CN	Description
*	8,042	98	Paved parking
	16,394	74	>75% Grass cover, Good, HSG C
	9,349	80	>75% Grass cover, Good, HSG D
	33,785	81	Weighted Average
	25,743		76.20% Pervious Area
	8,042		23.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		Sheet Flow, Sheet: Grass Grass: Short n= 0.150 P2= 3.24"
5.6	50	0.0200	0.15		Sheet Flow, Sheet: Grass Grass: Short n= 0.150 P2= 3.24"
2.4	210	0.0095	1.46		Shallow Concentrated Flow, Grass: Flat Grassed Waterway Kv= 15.0 fps
0.5	69	0.0150	2.49		Shallow Concentrated Flow, Paved Paved Kv= 20.3 fps
12.4	379	Total			

Summary for Reach 1R: Grass Swale

Inflow Area = 0.493 ac, 96.83% Impervious, Inflow Depth = 10.35" for 100-Year event
Inflow = 4.80 cfs @ 12.13 hrs, Volume= 0.425 af
Outflow = 4.80 cfs @ 12.13 hrs, Volume= 0.425 af, Atten= 0%, Lag= 0.2 min
Routed to Pond 7P : Sediment Forebay (Center)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
Max. Velocity= 4.11 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.20 fps, Avg. Travel Time= 0.8 min

Peak Storage= 70 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.30' , Surface Width= 4.80'
Bank-Full Depth= 0.50' Flow Area= 2.3 sf, Capacity= 12.28 cfs

3.00' x 0.50' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 ' / ' Top Width= 6.00'
Length= 60.0' Slope= 0.0250 ' / '
Inlet Invert= 219.50', Outlet Invert= 218.00'



Summary for Pond 1D: Holliston Street Drainage Line (Upstream)

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 6.80" for 100-Year event
 Inflow = 15.14 cfs @ 11.69 hrs, Volume= 7.836 af
 Outflow = 15.14 cfs @ 11.81 hrs, Volume= 7.836 af, Atten= 0%, Lag= 7.2 min
 Primary = 15.14 cfs @ 11.81 hrs, Volume= 7.836 af
 Routed to Pond DMH1 : Diversion Manhole

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 229.32' @ 12.15 hrs

Flood Elev= 222.91'

Device	Routing	Invert	Outlet Devices
#1	Primary	218.20'	18.000" Round Culvert into DMH2 L= 128.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 218.20' / 216.68' S= 0.0119 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=15.18 cfs @ 11.81 hrs HW=225.06' TW=220.66' (Dynamic Tailwater)

↑1=Culvert into DMH2 (Outlet Controls 15.18 cfs @ 8.59 fps)

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Page 121

Summary for Pond 1P: Sediment Forebay

Inflow Area = 0.601 ac, 55.08% Impervious, Inflow Depth = 9.10" for 100-Year event
 Inflow = 4.92 cfs @ 12.17 hrs, Volume= 0.456 af
 Outflow = 4.86 cfs @ 12.17 hrs, Volume= 0.452 af, Atten= 1%, Lag= 0.2 min
 Primary = 4.86 cfs @ 12.17 hrs, Volume= 0.452 af
 Routed to Pond 2P : RGM101

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 224.75' @ 12.19 hrs Surf.Area= 277 sf Storage= 292 cf

Flood Elev= 224.75' Surf.Area= 277 sf Storage= 292 cf

Plug-Flow detention time= 12.2 min calculated for 0.452 af (99% of inflow)

Center-of-Mass det. time= 6.2 min (794.0 - 787.8)

Volume	Invert	Avail.Storage	Storage Description
#1	223.00'	292 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
223.00	66	0	0
224.00	177	122	122
224.75	277	170	292

Device	Routing	Invert	Outlet Devices
#1	Primary	224.25'	14.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=4.85 cfs @ 12.17 hrs HW=224.74' TW=224.73' (Dynamic Tailwater)

↑1=Sharp-Crested Rectangular Weir (Weir Controls 4.85 cfs @ 0.71 fps)

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Page 122

Summary for Pond 2P: RGM101

Inflow Area = 1.024 ac, 47.03% Impervious, Inflow Depth = 8.84" for 100-Year event
 Inflow = 7.71 cfs @ 12.18 hrs, Volume= 0.755 af
 Outflow = 7.52 cfs @ 12.20 hrs, Volume= 0.751 af, Atten= 2%, Lag= 1.0 min
 Primary = 7.52 cfs @ 12.20 hrs, Volume= 0.751 af
 Routed to Link 1L : Max Flow - EX 18" Holliston

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 224.74' @ 12.20 hrs Surf.Area= 2,026 sf Storage= 1,024 cf

Flood Elev= 224.75' Surf.Area= 2,030 sf Storage= 1,042 cf

Plug-Flow detention time= 10.5 min calculated for 0.751 af (99% of inflow)

Center-of-Mass det. time= 7.0 min (804.7 - 797.8)

Volume	Invert	Avail.Storage	Storage Description
#1	224.20'	1,042 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
224.20	1,759	0	0
224.75	2,030	1,042	1,042

Device	Routing	Invert	Outlet Devices
#1	Primary	222.20'	15.000" Round Culvert L= 35.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 222.20' / 222.00' S= 0.0057 ' / Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.23 sf
#2	Device 1	224.30'	30.000" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=7.52 cfs @ 12.20 hrs HW=224.74' TW=0.00' (Dynamic Tailwater)

↑ **1=Culvert** (Passes 7.52 cfs of 7.90 cfs potential flow)
 ↑ **2=Orifice/Grate** (Weir Controls 7.52 cfs @ 2.17 fps)

Summary for Pond 3P: ISM101

Inflow Area = 16.004 ac, 46.66% Impervious, Inflow Depth = 3.24" for 100-Year event
 Inflow = 7.16 cfs @ 12.13 hrs, Volume= 4.326 af
 Outflow = 7.12 cfs @ 12.13 hrs, Volume= 4.326 af, Atten= 0%, Lag= 0.3 min
 Discarded = 2.39 cfs @ 12.14 hrs, Volume= 2.861 af
 Primary = 4.77 cfs @ 12.12 hrs, Volume= 1.465 af
 Routed to Pond 10P : EX 18" RCP Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
 Peak Elev= 220.88' @ 12.14 hrs Surf.Area= 6,474 sf Storage= 28,222 cf
 Flood Elev= 215.00' Surf.Area= 6,474 sf Storage= 28,222 cf

Plug-Flow detention time= 190.8 min calculated for 4.326 af (100% of inflow)
 Center-of-Mass det. time= 190.8 min (1,014.1 - 823.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	208.25'	10,318 cf	37.58'W x 172.26'L x 6.75'H Field A 43,700 cf Overall - 17,904 cf Embedded = 25,796 cf x 40.0% Voids
#2A	209.00'	17,904 cf	ADS_StormTech MC-7200 +Cap x 100 Inside #1 Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap 100 Chambers in 4 Rows Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf
		28,222 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	208.25'	2.410 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 206.00' Phase-In= 0.01'
#2	Primary	214.10'	12.000" Round Culvert L= 25.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.10' / 214.00' S= 0.0040 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Discarded OutFlow Max=2.39 cfs @ 12.14 hrs HW=220.88' (Free Discharge)

↑ **1=Exfiltration** (Controls 2.39 cfs)

Primary OutFlow Max=4.81 cfs @ 12.12 hrs HW=220.68' TW=219.06' (Dynamic Tailwater)

↑ **2=Culvert** (Inlet Controls 4.81 cfs @ 6.13 fps)

Pond 3P: ISM101 - Chamber Wizard Field A**Chamber Model = ADS_StormTechMC-7200 +Cap (ADS StormTech®MC-7200 with cap volume)**

Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf

Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap

Cap Storage= 39.5 cf x 2 x 4 rows = 316.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

25 Chambers/Row x 6.59' Long +2.73' Cap Length x 2 = 170.26' Row Length +12.0" End Stone x 2 =
172.26' Base Length

4 Rows x 100.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width

9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

100 Chambers x 175.9 cf + 39.5 cf Cap Volume x 2 x 4 Rows = 17,903.6 cf Chamber Storage

43,699.8 cf Field - 17,903.6 cf Chambers = 25,796.2 cf Stone x 40.0% Voids = 10,318.5 cf Stone Storage

Chamber Storage + Stone Storage = 28,222.0 cf = 0.648 af

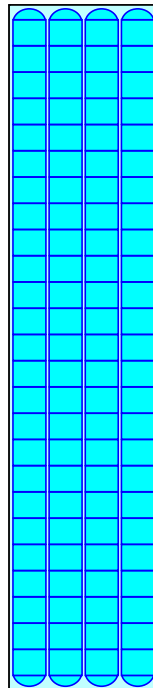
Overall Storage Efficiency = 64.6%

Overall System Size = 172.26' x 37.58' x 6.75'

100 Chambers

1,618.5 cy Field

955.4 cy Stone



Summary for Pond 4P: Sediment Forebay

Inflow Area = 0.509 ac, 83.46% Impervious, Inflow Depth = 9.98" for 100-Year event
 Inflow = 4.92 cfs @ 12.13 hrs, Volume= 0.424 af
 Outflow = 4.88 cfs @ 12.13 hrs, Volume= 0.420 af, Atten= 1%, Lag= 0.3 min
 Primary = 4.88 cfs @ 12.13 hrs, Volume= 0.420 af
 Routed to Pond 5P : RGM102

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 221.45' @ 12.14 hrs Surf.Area= 328 sf Storage= 283 cf

Flood Elev= 222.00' Surf.Area= 444 sf Storage= 497 cf

Plug-Flow detention time= 12.2 min calculated for 0.420 af (99% of inflow)

Center-of-Mass det. time= 6.4 min (765.2 - 758.7)

Volume	Invert	Avail.Storage	Storage Description
#1	220.00'	497 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
220.00	79	0	0
221.00	235	157	157
222.00	444	340	497

Device	Routing	Invert	Outlet Devices
#1	Primary	221.00'	8.0' long + 3.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=4.88 cfs @ 12.13 hrs HW=221.45' TW=221.32' (Dynamic Tailwater)

↑ **1=Broad-Crested Rectangular Weir**(Weir Controls 4.88 cfs @ 1.17 fps)

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Page 126

Summary for Pond 5P: RGM102

Inflow Area = 0.509 ac, 83.46% Impervious, Inflow Depth = 9.90" for 100-Year event
 Inflow = 4.88 cfs @ 12.13 hrs, Volume= 0.420 af
 Outflow = 4.76 cfs @ 12.15 hrs, Volume= 0.420 af, Atten= 2%, Lag= 0.9 min
 Discarded = 0.03 cfs @ 12.15 hrs, Volume= 0.071 af
 Primary = 4.73 cfs @ 12.15 hrs, Volume= 0.349 af
 Routed to Link 3L : Max Flow - EX 12" SE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 221.32' @ 12.15 hrs Surf.Area= 1,381 sf Storage= 1,364 cf

Flood Elev= 222.00' Surf.Area= 1,768 sf Storage= 2,429 cf

Plug-Flow detention time= 78.6 min calculated for 0.420 af (100% of inflow)

Center-of-Mass det. time= 78.6 min (843.8 - 765.2)

Volume	Invert	Avail.Storage	Storage Description
#1	220.00'	2,429 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
220.00	697	0	0
221.00	1,196	947	947
222.00	1,768	1,482	2,429

Device	Routing	Invert	Outlet Devices
#1	Discarded	220.00'	1.020 in/hr Exfiltration over Horizontal area Phase-In= 0.01'
#2	Primary	215.20'	12.000" Round Culvert L= 168.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 215.20' / 213.50' S= 0.0101 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	221.00'	30.000" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.03 cfs @ 12.15 hrs HW=221.32' (Free Discharge)↑ **1=Exfiltration** (Exfiltration Controls 0.03 cfs)**Primary OutFlow** Max=4.73 cfs @ 12.15 hrs HW=221.32' TW=0.00' (Dynamic Tailwater)↑ **2=Culvert** (Passes 4.73 cfs of 6.33 cfs potential flow)↑ **3=Orifice/Grate** (Weir Controls 4.73 cfs @ 1.86 fps)

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Page 127

Summary for Pond 6P: Sediment Forebay (NW)

Inflow Area = 0.257 ac, 93.56% Impervious, Inflow Depth = 10.35" for 100-Year event
 Inflow = 2.50 cfs @ 12.13 hrs, Volume= 0.222 af
 Outflow = 2.41 cfs @ 12.13 hrs, Volume= 0.219 af, Atten= 4%, Lag= 0.3 min
 Primary = 2.41 cfs @ 12.13 hrs, Volume= 0.219 af
 Routed to Pond 8P : RGM103

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 218.00' @ 12.15 hrs Surf.Area= 297 sf Storage= 245 cf

Flood Elev= 218.00' Surf.Area= 297 sf Storage= 245 cf

Plug-Flow detention time= 19.4 min calculated for 0.219 af (99% of inflow)

Center-of-Mass det. time= 10.3 min (754.8 - 744.5)

Volume	Invert	Avail.Storage	Storage Description
#1	216.00'	245 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
216.00	16	0	0
217.00	105	61	61
217.50	168	68	129
218.00	297	116	245

Device	Routing	Invert	Outlet Devices
#1	Primary	217.50'	8.5' long + 3.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.35 cfs @ 12.13 hrs HW=217.99' TW=217.98' (Dynamic Tailwater)↑1=**Broad-Crested Rectangular Weir**(Weir Controls 2.35 cfs @ 0.48 fps)

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NRCC 24-hr D 100-Year Rainfall=10.71"

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Page 128

Summary for Pond 7P: Sediment Forebay (Center)

Inflow Area = 0.905 ac, 97.58% Impervious, Inflow Depth = 10.40" for 100-Year event
 Inflow = 8.81 cfs @ 12.13 hrs, Volume= 0.785 af
 Outflow = 8.57 cfs @ 12.13 hrs, Volume= 0.772 af, Atten= 3%, Lag= 0.3 min
 Primary = 8.57 cfs @ 12.13 hrs, Volume= 0.772 af
 Routed to Pond 8P : RGM103

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 218.00' @ 12.15 hrs Surf.Area= 838 sf Storage= 924 cf

Flood Elev= 218.00' Surf.Area= 838 sf Storage= 924 cf

Plug-Flow detention time= 23.6 min calculated for 0.772 af (98% of inflow)

Center-of-Mass det. time= 12.4 min (754.7 - 742.3)

Volume	Invert	Avail.Storage	Storage Description
#1	216.00'	924 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
216.00	180	0	0
217.00	429	305	305
217.50	605	259	563
218.00	838	361	924

Device	Routing	Invert	Outlet Devices
#1	Primary	217.50'	25.0' long + 12.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=8.42 cfs @ 12.13 hrs HW=217.99' TW=217.98' (Dynamic Tailwater)↑**1=Broad-Crested Rectangular Weir**(Weir Controls 8.42 cfs @ 0.55 fps)

Summary for Pond 8P: RGM103

Inflow Area = 1.163 ac, 96.69% Impervious, Inflow Depth = 10.23" for 100-Year event
 Inflow = 10.99 cfs @ 12.13 hrs, Volume= 0.991 af
 Outflow = 10.64 cfs @ 12.15 hrs, Volume= 0.991 af, Atten= 3%, Lag= 1.1 min
 Discarded = 0.05 cfs @ 12.15 hrs, Volume= 0.110 af
 Primary = 7.65 cfs @ 12.15 hrs, Volume= 0.844 af
 Routed to Link 3L : Max Flow - EX 12" SE
 Secondary = 2.94 cfs @ 12.15 hrs, Volume= 0.037 af
 Routed to Link 3L : Max Flow - EX 12" SE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
 Peak Elev= 217.99' @ 12.15 hrs Surf.Area= 2,047 sf Storage= 2,648 cf
 Flood Elev= 218.00' Surf.Area= 2,056 sf Storage= 2,670 cf

Plug-Flow detention time= 71.5 min calculated for 0.991 af (100% of inflow)
 Center-of-Mass det. time= 71.6 min (826.3 - 754.7)

Volume	Invert	Avail.Storage	Storage Description
#1	216.00'	2,670 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
216.00	714	0	0
217.00	1,311	1,013	1,013
217.50	1,631	736	1,748
218.00	2,056	922	2,670

Device	Routing	Invert	Outlet Devices
#1	Primary	213.40'	12.000" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.40' / 213.20' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	217.50'	30.000" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	216.00'	1.020 in/hr Exfiltration over Horizontal area Phase-In= 0.01'
#4	Secondary	217.75'	10.0' long + 3.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.05 cfs @ 12.15 hrs HW=217.99' (Free Discharge)
 ↑ **3=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=7.65 cfs @ 12.15 hrs HW=217.99' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Culvert** (Inlet Controls 7.65 cfs @ 9.74 fps)
 ↑ **2=Orifice/Grate** (Passes 7.65 cfs of 8.79 cfs potential flow)

Secondary OutFlow Max=2.94 cfs @ 12.15 hrs HW=217.99' TW=0.00' (Dynamic Tailwater)
 ↑ **4=Broad-Crested Rectangular Weir** (Weir Controls 2.94 cfs @ 1.14 fps)

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Page 130

Summary for Pond 10P: EX 18" RCP Outfall

Inflow Area = 16.779 ac, 45.61% Impervious, Inflow Depth = 4.32" for 100-Year event
Inflow = 21.82 cfs @ 12.16 hrs, Volume= 6.046 af
Outflow = 21.82 cfs @ 12.16 hrs, Volume= 6.046 af, Atten= 0%, Lag= 0.0 min
Primary = 21.82 cfs @ 12.16 hrs, Volume= 6.046 af
Routed to Link 5L : 18" Pipe

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 219.38' @ 12.16 hrs

Flood Elev= 218.12'

Device	Routing	Invert	Outlet Devices
#1	Primary	211.00'	18.000" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 211.00' / 210.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=21.82 cfs @ 12.16 hrs HW=219.38' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 21.82 cfs @ 12.35 fps)

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Page 131

Summary for Pond CB2: EX 12" SE

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 7.83" for 100-Year event
Inflow = 5.46 cfs @ 11.96 hrs, Volume= 1.091 af
Outflow = 5.46 cfs @ 11.97 hrs, Volume= 1.091 af, Atten= 0%, Lag= 0.3 min
Primary = 5.46 cfs @ 11.97 hrs, Volume= 1.091 af
Routed to Link 4L : Max Flow - EX 12" Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 216.18' @ 11.96 hrs

Flood Elev= 216.17'

Device	Routing	Invert	Outlet Devices
#1	Primary	211.70'	12.000" Round Culvert L= 155.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 211.70' / 210.40' S= 0.0084 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=5.46 cfs @ 11.97 hrs HW=216.18' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 5.46 cfs @ 6.95 fps)

Summary for Pond DMH1: Diversion Manhole

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 6.80" for 100-Year event
 Inflow = 15.14 cfs @ 11.81 hrs, Volume= 7.836 af
 Outflow = 15.14 cfs @ 11.91 hrs, Volume= 7.836 af, Atten= 0%, Lag= 6.6 min
 Primary = 3.20 cfs @ 13.15 hrs, Volume= 3.794 af
 Routed to Pond 3P : ISM101
 Secondary = 12.34 cfs @ 12.12 hrs, Volume= 4.042 af
 Routed to Pond 10P : EX 18" RCP Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 224.95' @ 12.15 hrs

Flood Elev= 220.55'

Device	Routing	Invert	Outlet Devices
#1	Primary	212.13'	7.500" Round Culvert to DMH1 L= 25.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 212.13' / 209.19' S= 0.1176 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.31 sf
#2	Secondary	216.63'	18.000" Round Culvert to DMH4 L= 322.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 216.63' / 212.80' S= 0.0119 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=3.19 cfs @ 13.15 hrs HW=220.21' TW=215.22' (Dynamic Tailwater)

↑1=Culvert to DMH1 (Outlet Controls 3.19 cfs @ 10.41 fps)

Secondary OutFlow Max=12.37 cfs @ 12.12 hrs HW=224.68' TW=219.06' (Dynamic Tailwater)

↑2=Culvert to DMH4 (Outlet Controls 12.37 cfs @ 7.00 fps)

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Page 133

Summary for Pond DMH10: EX 12" RCP Outfall

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 15.62" for 100-Year event
Inflow = 8.82 cfs @ 11.88 hrs, Volume= 2.176 af
Outflow = 8.82 cfs @ 11.88 hrs, Volume= 2.176 af, Atten= 0%, Lag= 0.0 min
Primary = 8.82 cfs @ 11.88 hrs, Volume= 2.176 af
Routed to Link 6L : 12" Pipe

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 219.29' @ 11.88 hrs

Flood Elev= 219.29'

Device	Routing	Invert	Outlet Devices
#1	Primary	210.20'	12.000" Round Culvert L= 100.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 210.20' / 209.20' S= 0.0100 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=8.82 cfs @ 11.88 hrs HW=219.29' TW=0.00' (Dynamic Tailwater)↑**1=Culvert** (Barrel Controls 8.82 cfs @ 11.23 fps)

Summary for Pond DMH8: Diversion Manhole

Inflow Area = 1.805 ac, 92.40% Impervious, Inflow Depth = 9.68" for 100-Year event
 Inflow = 8.92 cfs @ 12.00 hrs, Volume= 1.455 af
 Outflow = 8.92 cfs @ 12.02 hrs, Volume= 1.455 af, Atten= 0%, Lag= 1.2 min
 Primary = 1.26 cfs @ 11.99 hrs, Volume= 0.237 af
 Routed to Pond 3P : ISM101
 Secondary = 8.35 cfs @ 12.14 hrs, Volume= 1.219 af
 Routed to Link 4L : Max Flow - EX 12" Outfall

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 221.48' @ 12.14 hrs

Flood Elev= 218.43'

Device	Routing	Invert	Outlet Devices
#1	Primary	209.55'	6.000" Round 6" HDPE to ISM101 L= 25.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 209.55' / 209.19' S= 0.0144 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Secondary	214.10'	12.000" Round 12" HDPE Bypass L= 88.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.10' / 213.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=1.25 cfs @ 11.99 hrs HW=220.30' TW=218.13' (Dynamic Tailwater)

↑ **1=6" HDPE to ISM101** (Outlet Controls 1.25 cfs @ 6.34 fps)

Secondary OutFlow Max=8.35 cfs @ 12.14 hrs HW=221.48' TW=0.00' (Dynamic Tailwater)

↑ **2=12" HDPE Bypass** (Barrel Controls 8.35 cfs @ 10.63 fps)

Summary for Link 1L: Max Flow - EX 18" Holliston

Inflow Area = 13.820 ac, 40.23% Impervious, Inflow Depth = 8.98" for 100-Year event
Inflow = 73.31 cfs @ 12.27 hrs, Volume= 10.339 af
Primary = 15.14 cfs @ 11.69 hrs, Volume= 7.836 af, Atten= 79%, Lag= 0.0 min
Routed to Pond 1D : Holliston Street Drainage Line (Upstream)
Secondary = 58.17 cfs @ 12.27 hrs, Volume= 2.503 af
Routed to Link 5L : 18" Pipe

Primary outflow = Inflow below 15.14 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link 2L: Max Flow - DMH8 to DMH10

Inflow Area = 1.805 ac, 92.40% Impervious, Inflow Depth = 10.23" for 100-Year event
Inflow = 17.53 cfs @ 12.13 hrs, Volume= 1.538 af
Primary = 8.92 cfs @ 12.00 hrs, Volume= 1.455 af, Atten= 49%, Lag= 0.0 min
Routed to Pond DMH8 : Diversion Manhole
Secondary = 8.61 cfs @ 12.13 hrs, Volume= 0.082 af
Routed to Link 4L : Max Flow - EX 12" Outfall

Primary outflow = Inflow below 8.92 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link 3L: Max Flow - EX 12" SE

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 8.83" for 100-Year event
Inflow = 15.31 cfs @ 12.15 hrs, Volume= 1.230 af
Primary = 5.46 cfs @ 11.96 hrs, Volume= 1.091 af, Atten= 64%, Lag= 0.0 min
Routed to Pond CB2 : EX 12" SE
Secondary = 9.85 cfs @ 12.15 hrs, Volume= 0.139 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 5.46 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

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Page 138

Summary for Link 4L: Max Flow - EX 12" Outfall

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 17.17" for 100-Year event
Inflow = 22.40 cfs @ 12.13 hrs, Volume= 2.393 af
Primary = 8.82 cfs @ 11.88 hrs, Volume= 2.176 af, Atten= 61%, Lag= 0.0 min
Routed to Pond DMH10 : EX 12" RCP Outfall
Secondary = 13.58 cfs @ 12.13 hrs, Volume= 0.216 af
Routed to Link 6L : 12" Pipe

Primary outflow = Inflow below 8.82 cfs, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

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Page 139

Summary for Link 5L: 18" Pipe

Inflow Area = 16.779 ac, 45.61% Impervious, Inflow Depth = 6.11" for 100-Year event
Inflow = 78.02 cfs @ 12.25 hrs, Volume= 8.549 af
Primary = 78.02 cfs @ 12.25 hrs, Volume= 8.549 af, Atten= 0%, Lag= 0.0 min
Routed to Link DP1 : (new Link)

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

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Page 140

Summary for Link 6L: 12" Pipe

Inflow Area = 1.672 ac, 92.66% Impervious, Inflow Depth = 18.17" for 100-Year event
Inflow = 31.90 cfs @ 12.14 hrs, Volume= 2.531 af
Primary = 31.90 cfs @ 12.14 hrs, Volume= 2.531 af, Atten= 0%, Lag= 0.0 min
Routed to Link DP1 : (new Link)

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Summary for Link DP1: (new Link)

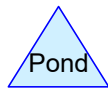
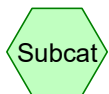
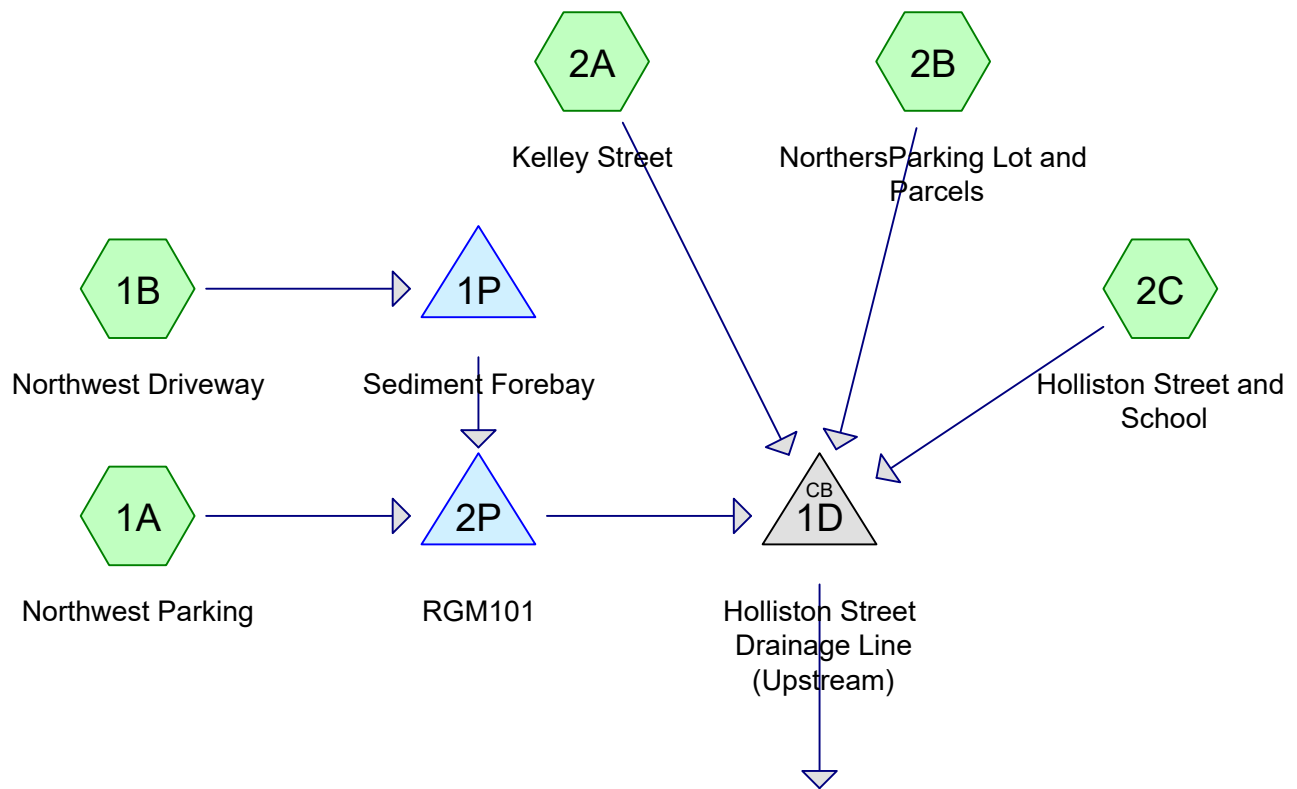
Inflow Area = 18.451 ac, 49.87% Impervious, Inflow Depth = 7.21" for 100-Year event

Inflow = 97.87 cfs @ 12.18 hrs, Volume= 11.080 af

Primary = 97.87 cfs @ 12.18 hrs, Volume= 11.080 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

Flow Limit for 1L



Routing Diagram for Flow Limits

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Flow Limits

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Page 2

Stage-Discharge for Pond 1D: Holliston Street Drainage Line (Upstream)

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
218.20	0.00	218.72	1.34	219.24	4.54	219.76	7.66
218.21	0.00	218.73	1.38	219.25	4.61	219.77	7.71
218.22	0.00	218.74	1.43	219.26	4.68	219.78	7.75
218.23	0.00	218.75	1.48	219.27	4.75	219.79	7.80
218.24	0.01	218.76	1.53	219.28	4.82	219.80	7.84
218.25	0.01	218.77	1.58	219.29	4.89	219.81	7.89
218.26	0.02	218.78	1.64	219.30	4.96	219.82	7.94
218.27	0.03	218.79	1.69	219.31	5.03	219.83	7.98
218.28	0.03	218.80	1.74	219.32	5.10	219.84	8.03
218.29	0.04	218.81	1.79	219.33	5.17	219.85	8.07
218.30	0.05	218.82	1.85	219.34	5.24	219.86	8.12
218.31	0.07	218.83	1.90	219.35	5.31	219.87	8.16
218.32	0.08	218.84	1.96	219.36	5.38	219.88	8.21
218.33	0.09	218.85	2.01	219.37	5.45	219.89	8.25
218.34	0.11	218.86	2.07	219.38	5.52	219.90	8.29
218.35	0.12	218.87	2.13	219.39	5.58	219.91	8.34
218.36	0.14	218.88	2.19	219.40	5.65	219.92	8.38
218.37	0.16	218.89	2.24	219.41	5.72	219.93	8.42
218.38	0.17	218.90	2.30	219.42	5.79	219.94	8.47
218.39	0.19	218.91	2.36	219.43	5.86	219.95	8.51
218.40	0.21	218.92	2.42	219.44	5.92	219.96	8.55
218.41	0.23	218.93	2.48	219.45	5.99	219.97	8.59
218.42	0.26	218.94	2.54	219.46	6.06	219.98	8.64
218.43	0.28	218.95	2.61	219.47	6.12	219.99	8.68
218.44	0.30	218.96	2.67	219.48	6.19	220.00	8.72
218.45	0.33	218.97	2.73	219.49	6.25	220.01	8.76
218.46	0.36	218.98	2.79	219.50	6.32	220.02	8.80
218.47	0.38	218.99	2.86	219.51	6.38	220.03	8.84
218.48	0.41	219.00	2.92	219.52	6.44	220.04	8.88
218.49	0.44	219.01	2.98	219.53	6.50	220.05	8.92
218.50	0.47	219.02	3.05	219.54	6.57	220.06	8.96
218.51	0.50	219.03	3.11	219.55	6.63	220.07	9.00
218.52	0.53	219.04	3.18	219.56	6.69	220.08	9.04
218.53	0.56	219.05	3.24	219.57	6.75	220.09	9.08
218.54	0.60	219.06	3.31	219.58	6.80	220.10	9.12
218.55	0.63	219.07	3.38	219.59	6.86	220.11	9.16
218.56	0.67	219.08	3.44	219.60	6.92	220.12	9.20
218.57	0.70	219.09	3.51	219.61	6.97	220.13	9.24
218.58	0.74	219.10	3.58	219.62	7.02	220.14	9.28
218.59	0.78	219.11	3.64	219.63	7.07	220.15	9.32
218.60	0.81	219.12	3.71	219.64	7.12	220.16	9.36
218.61	0.85	219.13	3.78	219.65	7.17	220.17	9.40
218.62	0.89	219.14	3.85	219.66	7.22	220.18	9.44
218.63	0.93	219.15	3.92	219.67	7.26	220.19	9.47
218.64	0.98	219.16	3.98	219.68	7.30	220.20	9.51
218.65	1.02	219.17	4.05	219.69	7.34	220.21	9.55
218.66	1.06	219.18	4.12	219.70	7.37	220.22	9.59
218.67	1.11	219.19	4.19	219.71	7.42	220.23	9.63
218.68	1.15	219.20	4.26	219.72	7.47	220.24	9.66
218.69	1.20	219.21	4.33	219.73	7.51	220.25	9.70
218.70	1.24	219.22	4.40	219.74	7.56	220.26	9.74
218.71	1.29	219.23	4.47	219.75	7.61	220.27	9.78

Flow Limits

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Page 3

Stage-Discharge for Pond 1D: Holliston Street Drainage Line (Upstream) (continued)

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
220.28	9.81	220.80	11.57	221.32	12.82	221.84	13.84
220.29	9.85	220.81	11.60	221.33	12.84	221.85	13.86
220.30	9.89	220.82	11.64	221.34	12.86	221.86	13.88
220.31	9.92	220.83	11.67	221.35	12.88	221.87	13.90
220.32	9.96	220.84	11.70	221.36	12.90	221.88	13.92
220.33	10.00	220.85	11.73	221.37	12.92	221.89	13.94
220.34	10.03	220.86	11.76	221.38	12.94	221.90	13.96
220.35	10.07	220.87	11.79	221.39	12.96	221.91	13.98
220.36	10.10	220.88	11.82	221.40	12.98	221.92	13.99
220.37	10.14	220.89	11.85	221.41	13.00	221.93	14.01
220.38	10.18	220.90	11.88	221.42	13.02	221.94	14.03
220.39	10.21	220.91	11.91	221.43	13.04	221.95	14.05
220.40	10.25	220.92	11.94	221.44	13.07	221.96	14.07
220.41	10.28	220.93	11.97	221.45	13.09	221.97	14.09
220.42	10.32	220.94	12.00	221.46	13.11	221.98	14.11
220.43	10.35	220.95	12.03	221.47	13.12	221.99	14.12
220.44	10.39	220.96	12.06	221.48	13.14	222.00	14.14
220.45	10.42	220.97	12.09	221.49	13.16	222.01	14.16
220.46	10.46	220.98	12.11	221.50	13.18	222.02	14.18
220.47	10.49	220.99	12.13	221.51	13.20	222.03	14.20
220.48	10.52	221.00	12.15	221.52	13.22	222.04	14.22
220.49	10.56	221.01	12.17	221.53	13.24	222.05	14.23
220.50	10.59	221.02	12.19	221.54	13.26	222.06	14.25
220.51	10.63	221.03	12.22	221.55	13.28	222.07	14.27
220.52	10.66	221.04	12.24	221.56	13.30	222.08	14.29
220.53	10.70	221.05	12.26	221.57	13.32	222.09	14.31
220.54	10.73	221.06	12.28	221.58	13.34	222.10	14.33
220.55	10.76	221.07	12.30	221.59	13.36	222.11	14.34
220.56	10.80	221.08	12.32	221.60	13.38	222.12	14.36
220.57	10.83	221.09	12.34	221.61	13.40	222.13	14.38
220.58	10.86	221.10	12.36	221.62	13.42	222.14	14.40
220.59	10.90	221.11	12.39	221.63	13.44	222.15	14.42
220.60	10.93	221.12	12.41	221.64	13.46	222.16	14.44
220.61	10.96	221.13	12.43	221.65	13.48	222.17	14.45
220.62	11.00	221.14	12.45	221.66	13.50	222.18	14.47
220.63	11.03	221.15	12.47	221.67	13.52	222.19	14.49
220.64	11.06	221.16	12.49	221.68	13.54	222.20	14.51
220.65	11.09	221.17	12.51	221.69	13.56	222.21	14.53
220.66	11.13	221.18	12.53	221.70	13.58	222.22	14.54
220.67	11.16	221.19	12.55	221.71	13.60	222.23	14.56
220.68	11.19	221.20	12.57	221.72	13.61	222.24	14.58
220.69	11.22	221.21	12.60	221.73	13.63	222.25	14.60
220.70	11.26	221.22	12.62	221.74	13.65	222.26	14.62
220.71	11.29	221.23	12.64	221.75	13.67	222.27	14.63
220.72	11.32	221.24	12.66	221.76	13.69	222.28	14.65
220.73	11.35	221.25	12.68	221.77	13.71	222.29	14.67
220.74	11.38	221.26	12.70	221.78	13.73	222.30	14.69
220.75	11.42	221.27	12.72	221.79	13.75	222.31	14.71
220.76	11.45	221.28	12.74	221.80	13.77	222.32	14.72
220.77	11.48	221.29	12.76	221.81	13.79	222.33	14.74
220.78	11.51	221.30	12.78	221.82	13.81	222.34	14.76
220.79	11.54	221.31	12.80	221.83	13.82	222.35	14.78

Flow Limits

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Page 4

Stage-Discharge for Pond 1D: Holliston Street Drainage Line (Upstream) (continued)

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
222.36	14.79	222.88	15.69	223.40	16.53	223.92	17.34
222.37	14.81	222.89	15.70	223.41	16.55	223.93	17.35
222.38	14.83	222.90	15.72	223.42	16.56	223.94	17.37
222.39	14.85	222.91	15.74	223.43	16.58	223.95	17.38
222.40	14.86	222.92	15.75	223.44	16.60	223.96	17.40
222.41	14.88	222.93	15.77	223.45	16.61	223.97	17.41
222.42	14.90	222.94	15.79	223.46	16.63	223.98	17.43
222.43	14.92	222.95	15.80	223.47	16.64	223.99	17.44
222.44	14.94	222.96	15.82	223.48	16.66	224.00	17.46
222.45	14.95	222.97	15.84	223.49	16.67	224.01	17.47
222.46	14.97	222.98	15.85	223.50	16.69	224.02	17.49
222.47	14.99	222.99	15.87	223.51	16.71	224.03	17.50
222.48	15.00	223.00	15.89	223.52	16.72	224.04	17.52
222.49	15.02	223.01	15.90	223.53	16.74	224.05	17.53
222.50	15.04	223.02	15.92	223.54	16.75	224.06	17.55
222.51	15.06	223.03	15.94	223.55	16.77	224.07	17.56
222.52	15.07	223.04	15.95	223.56	16.78	224.08	17.58
222.53	15.09	223.05	15.97	223.57	16.80	224.09	17.59
222.54	15.11	223.06	15.98	223.58	16.82	224.10	17.61
222.55	15.13	223.07	16.00	223.59	16.83	224.11	17.62
222.56	15.14	223.08	16.02	223.60	16.85	224.12	17.64
222.57	15.16	223.09	16.03	223.61	16.86	224.13	17.65
222.58	15.18	223.10	16.05	223.62	16.88	224.14	17.67
222.59	15.20	223.11	16.07	223.63	16.89	224.15	17.68
222.60	15.21	223.12	16.08	223.64	16.91	224.16	17.70
222.61	15.23	223.13	16.10	223.65	16.92	224.17	17.71
222.62	15.25	223.14	16.12	223.66	16.94	224.18	17.72
222.63	15.26	223.15	16.13	223.67	16.95	224.19	17.74
222.64	15.28	223.16	16.15	223.68	16.97	224.20	17.75
222.65	15.30	223.17	16.16	223.69	16.99	224.21	17.77
222.66	15.32	223.18	16.18	223.70	17.00	224.22	17.78
222.67	15.33	223.19	16.20	223.71	17.02	224.23	17.80
222.68	15.35	223.20	16.21	223.72	17.03	224.24	17.81
222.69	15.37	223.21	16.23	223.73	17.05	224.25	17.83
222.70	15.38	223.22	16.24	223.74	17.06	224.26	17.84
222.71	15.40	223.23	16.26	223.75	17.08	224.27	17.86
222.72	15.42	223.24	16.28	223.76	17.09	224.28	17.87
222.73	15.43	223.25	16.29	223.77	17.11	224.29	17.89
222.74	15.45	223.26	16.31	223.78	17.12	224.30	17.90
222.75	15.47	223.27	16.33	223.79	17.14	224.31	17.92
222.76	15.49	223.28	16.34	223.80	17.15	224.32	17.93
222.77	15.50	223.29	16.36	223.81	17.17	224.33	17.94
222.78	15.52	223.30	16.37	223.82	17.18	224.34	17.96
222.79	15.54	223.31	16.39	223.83	17.20	224.35	17.97
222.80	15.55	223.32	16.41	223.84	17.22	224.36	17.99
222.81	15.57	223.33	16.42	223.85	17.23	224.37	18.00
222.82	15.59	223.34	16.44	223.86	17.25	224.38	18.02
222.83	15.60	223.35	16.45	223.87	17.26	224.39	18.03
222.84	15.62	223.36	16.47	223.88	17.28	224.40	18.05
222.85	15.64	223.37	16.48	223.89	17.29	224.41	18.06
222.86	15.65	223.38	16.50	223.90	17.31	224.42	18.08

Lowest rim elevation of upstream drainage structure is 222.56. The peak flow rate possible occurs at the surcharge elevation of this structure: therefore, the outlet flow is limited to 15.14 cfs.

Note: The max flow is representative of both existing and proposed conditions as the size, slope, and rim elevation are consistent.

Flow Limits

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Page 5

Stage-Discharge for Pond 1D: Holliston Street Drainage Line (Upstream) (continued)

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
224.44	18.10	224.96	18.84	225.48	19.55	226.00	20.24
224.45	18.12	224.97	18.86	225.49	19.56	226.01	20.25
224.46	18.13	224.98	18.87	225.50	19.58	226.02	20.26
224.47	18.15	224.99	18.88	225.51	19.59	226.03	20.27
224.48	18.16	225.00	18.90	225.52	19.60	226.04	20.29
224.49	18.18	225.01	18.91	225.53	19.62	226.05	20.30
224.50	18.19	225.02	18.92	225.54	19.63	226.06	20.31
224.51	18.21	225.03	18.94	225.55	19.64	226.07	20.33
224.52	18.22	225.04	18.95	225.56	19.66	226.08	20.34
224.53	18.23	225.05	18.97	225.57	19.67	226.09	20.35
224.54	18.25	225.06	18.98	225.58	19.68	226.10	20.36
224.55	18.26	225.07	18.99	225.59	19.70	226.11	20.38
224.56	18.28	225.08	19.01	225.60	19.71	226.12	20.39
224.57	18.29	225.09	19.02	225.61	19.72	226.13	20.40
224.58	18.31	225.10	19.04	225.62	19.74	226.14	20.42
224.59	18.32	225.11	19.05	225.63	19.75	226.15	20.43
224.60	18.33	225.12	19.06	225.64	19.76	226.16	20.44
224.61	18.35	225.13	19.08	225.65	19.78	226.17	20.45
224.62	18.36	225.14	19.09	225.66	19.79	226.18	20.47
224.63	18.38	225.15	19.10	225.67	19.80	226.19	20.48
224.64	18.39	225.16	19.12	225.68	19.82	226.20	20.49
224.65	18.41	225.17	19.13	225.69	19.83	226.21	20.50
224.66	18.42	225.18	19.14	225.70	19.84	226.22	20.52
224.67	18.43	225.19	19.16	225.71	19.86	226.23	20.53
224.68	18.45	225.20	19.17	225.72	19.87	226.24	20.54
224.69	18.46	225.21	19.19	225.73	19.88	226.25	20.56
224.70	18.48	225.22	19.20	225.74	19.90	226.26	20.57
224.71	18.49	225.23	19.21	225.75	19.91	226.27	20.58
224.72	18.51	225.24	19.23	225.76	19.92	226.28	20.59
224.73	18.52	225.25	19.24	225.77	19.94	226.29	20.61
224.74	18.53	225.26	19.25	225.78	19.95	226.30	20.62
224.75	18.55	225.27	19.27	225.79	19.96	226.31	20.63
224.76	18.56	225.28	19.28	225.80	19.97	226.32	20.64
224.77	18.58	225.29	19.29	225.81	19.99	226.33	20.66
224.78	18.59	225.30	19.31	225.82	20.00	226.34	20.67
224.79	18.60	225.31	19.32	225.83	20.01	226.35	20.68
224.80	18.62	225.32	19.34	225.84	20.03	226.36	20.70
224.81	18.63	225.33	19.35	225.85	20.04	226.37	20.71
224.82	18.65	225.34	19.36	225.86	20.05	226.38	20.72
224.83	18.66	225.35	19.38	225.87	20.07	226.39	20.73
224.84	18.67	225.36	19.39	225.88	20.08	226.40	20.75
224.85	18.69	225.37	19.40	225.89	20.09	226.41	20.76
224.86	18.70	225.38	19.42	225.90	20.11	226.42	20.77
224.87	18.72	225.39	19.43	225.91	20.12	226.43	20.78
224.88	18.73	225.40	19.44	225.92	20.13	226.44	20.80
224.89	18.74	225.41	19.46	225.93	20.14	226.45	20.81
224.90	18.76	225.42	19.47	225.94	20.16	226.46	20.82
224.91	18.77	225.43	19.48	225.95	20.17	226.47	20.83
224.92	18.79	225.44	19.50	225.96	20.18	226.48	20.85
224.93	18.80	225.45	19.51	225.97	20.20	226.49	20.86
224.94	18.81	225.46	19.52	225.98	20.21	226.50	20.87
224.95	18.83	225.47	19.54	225.99	20.22	226.51	20.88

Flow Limits

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Page 6

Stage-Discharge for Pond 1D: Holliston Street Drainage Line (Upstream) (continued)

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
226.52	20.90	227.04	21.54	227.56	22.16	228.08	22.77
226.53	20.91	227.05	21.55	227.57	22.17	228.09	22.78
226.54	20.92	227.06	21.56	227.58	22.19	228.10	22.79
226.55	20.93	227.07	21.58	227.59	22.20	228.11	22.80
226.56	20.95	227.08	21.59	227.60	22.21	228.12	22.81
226.57	20.96	227.09	21.60	227.61	22.22	228.13	22.83
226.58	20.97	227.10	21.61	227.62	22.23	228.14	22.84
226.59	20.98	227.11	21.62	227.63	22.24	228.15	22.85
226.60	21.00	227.12	21.64	227.64	22.26	228.16	22.86
226.61	21.01	227.13	21.65	227.65	22.27	228.17	22.87
226.62	21.02	227.14	21.66	227.66	22.28	228.18	22.88
226.63	21.03	227.15	21.67	227.67	22.29	228.19	22.89
226.64	21.05	227.16	21.68	227.68	22.30	228.20	22.91
226.65	21.06	227.17	21.70	227.69	22.31	228.21	22.92
226.66	21.07	227.18	21.71	227.70	22.33	228.22	22.93
226.67	21.08	227.19	21.72	227.71	22.34	228.23	22.94
226.68	21.10	227.20	21.73	227.72	22.35	228.24	22.95
226.69	21.11	227.21	21.74	227.73	22.36	228.25	22.96
226.70	21.12	227.22	21.76	227.74	22.37	228.26	22.97
226.71	21.13	227.23	21.77	227.75	22.38	228.27	22.99
226.72	21.15	227.24	21.78	227.76	22.40	228.28	23.00
226.73	21.16	227.25	21.79	227.77	22.41	228.29	23.01
226.74	21.17	227.26	21.80	227.78	22.42	228.30	23.02
226.75	21.18	227.27	21.82	227.79	22.43	228.31	23.03
226.76	21.20	227.28	21.83	227.80	22.44	228.32	23.04
226.77	21.21	227.29	21.84	227.81	22.46	228.33	23.05
226.78	21.22	227.30	21.85	227.82	22.47	228.34	23.06
226.79	21.23	227.31	21.86	227.83	22.48	228.35	23.08
226.80	21.24	227.32	21.88	227.84	22.49	228.36	23.09
226.81	21.26	227.33	21.89	227.85	22.50	228.37	23.10
226.82	21.27	227.34	21.90	227.86	22.51	228.38	23.11
226.83	21.28	227.35	21.91	227.87	22.52	228.39	23.12
226.84	21.29	227.36	21.92	227.88	22.54	228.40	23.13
226.85	21.31	227.37	21.94	227.89	22.55	228.41	23.14
226.86	21.32	227.38	21.95	227.90	22.56	228.42	23.16
226.87	21.33	227.39	21.96	227.91	22.57	228.43	23.17
226.88	21.34	227.40	21.97	227.92	22.58	228.44	23.18
226.89	21.36	227.41	21.98	227.93	22.59	228.45	23.19
226.90	21.37	227.42	22.00	227.94	22.61	228.46	23.20
226.91	21.38	227.43	22.01	227.95	22.62	228.47	23.21
226.92	21.39	227.44	22.02	227.96	22.63	228.48	23.22
226.93	21.40	227.45	22.03	227.97	22.64	228.49	23.23
226.94	21.42	227.46	22.04	227.98	22.65	228.50	23.25
226.95	21.43	227.47	22.06	227.99	22.66	228.51	23.26
226.96	21.44	227.48	22.07	228.00	22.68	228.52	23.27
226.97	21.45	227.49	22.08	228.01	22.69	228.53	23.28
226.98	21.47	227.50	22.09	228.02	22.70	228.54	23.29
226.99	21.48	227.51	22.10	228.03	22.71	228.55	23.30
227.00	21.49	227.52	22.11	228.04	22.72	228.56	23.31
227.01	21.50	227.53	22.13	228.05	22.73	228.57	23.32
227.02	21.51	227.54	22.14	228.06	22.74	228.58	23.34
227.03	21.53	227.55	22.15	228.07	22.76	228.59	23.35

Flow Limits

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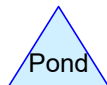
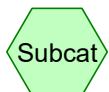
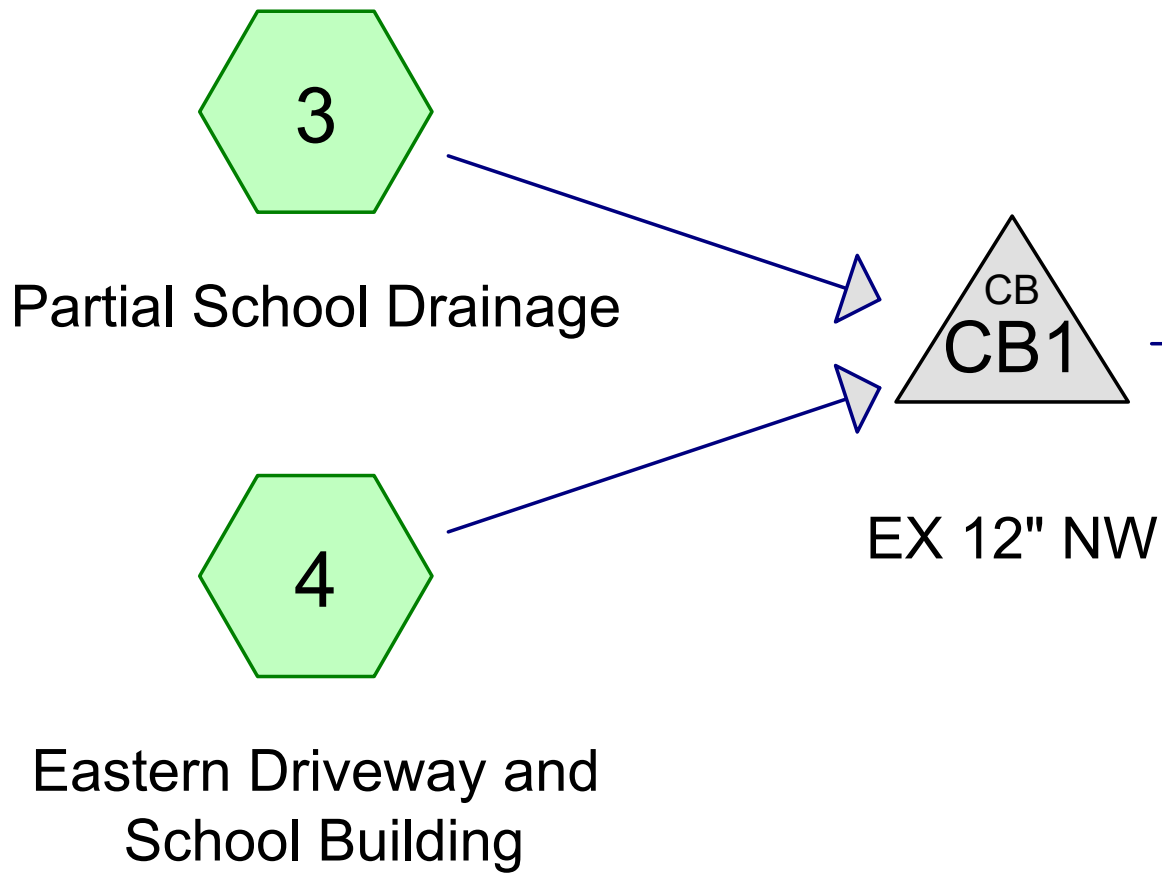
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Page 7

Stage-Discharge for Pond 1D: Holliston Street Drainage Line (Upstream) (continued)

Elevation (feet)	Primary (cfs)
228.60	23.36
228.61	23.37
228.62	23.38
228.63	23.39
228.64	23.40
228.65	23.41
228.66	23.43
228.67	23.44
228.68	23.45
228.69	23.46
228.70	23.47
228.71	23.48
228.72	23.49
228.73	23.50
228.74	23.51
228.75	23.53
228.76	23.54
228.77	23.55
228.78	23.56
228.79	23.57
228.80	23.58
228.81	23.59
228.82	23.60
228.83	23.61
228.84	23.63
228.85	23.64
228.86	23.65
228.87	23.66
228.88	23.67
228.89	23.68
228.90	23.69
228.91	23.70
228.92	23.71
228.93	23.72
228.94	23.74
228.95	23.75
228.96	23.76
228.97	23.77
228.98	23.78
228.99	23.79
229.00	23.80
229.01	23.81
229.02	23.82
229.03	23.84

Flow Limit for Existing 2L



Routing Diagram for Flow Limits_Existing

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Flow Limits_Existing

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Page 2

Stage-Discharge for Pond CB1: EX 12" NW

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
214.60	0.00	215.12	0.50	215.64	1.69	216.16	2.54
214.61	0.00	215.13	0.52	215.65	1.72	216.17	2.56
214.62	0.00	215.14	0.54	215.66	1.74	216.18	2.57
214.63	0.00	215.15	0.56	215.67	1.76	216.19	2.59
214.64	0.00	215.16	0.58	215.68	1.78	216.20	2.61
214.65	0.00	215.17	0.60	215.69	1.80	216.21	2.63
214.66	0.01	215.18	0.62	215.70	1.83	216.22	2.65
214.67	0.01	215.19	0.64	215.71	1.85	216.23	2.67
214.68	0.01	215.20	0.66	215.72	1.87	216.24	2.69
214.69	0.01	215.21	0.68	215.73	1.89	216.25	2.70
214.70	0.02	215.22	0.70	215.74	1.91	216.26	2.72
214.71	0.02	215.23	0.73	215.75	1.92	216.27	2.74
214.72	0.02	215.24	0.75	215.76	1.94	216.28	2.76
214.73	0.03	215.25	0.77	215.77	1.96	216.29	2.78
214.74	0.03	215.26	0.79	215.78	1.98	216.30	2.79
214.75	0.04	215.27	0.81	215.79	1.99	216.31	2.81
214.76	0.04	215.28	0.84	215.80	2.01	216.32	2.83
214.77	0.05	215.29	0.86	215.81	2.02	216.33	2.84
214.78	0.05	215.30	0.88	215.82	2.04	216.34	2.86
214.79	0.06	215.31	0.90	215.83	2.05	216.35	2.88
214.80	0.07	215.32	0.93	215.84	2.06	216.36	2.90
214.81	0.08	215.33	0.95	215.85	2.07	216.37	2.91
214.82	0.08	215.34	0.98	215.86	2.08	216.38	2.93
214.83	0.09	215.35	1.00	215.87	2.09	216.39	2.95
214.84	0.10	215.36	1.02	215.88	2.10	216.40	2.96
214.85	0.11	215.37	1.05	215.89	2.10	216.41	2.98
214.86	0.12	215.38	1.07	215.90	2.11	216.42	2.99
214.87	0.13	215.39	1.09	215.91	2.11	216.43	3.01
214.88	0.14	215.40	1.12	215.92	2.10	216.44	3.03
214.89	0.15	215.41	1.14	215.93	2.08	216.45	3.04
214.90	0.16	215.42	1.17	215.94	2.07	216.46	3.06
214.91	0.17	215.43	1.19	215.95	2.09	216.47	3.08
214.92	0.19	215.44	1.22	215.96	2.12	216.48	3.09
214.93	0.20	215.45	1.24	215.97	2.14	216.49	3.11
214.94	0.21	215.46	1.26	215.98	2.16	216.50	3.12
214.95	0.22	215.47	1.29	215.99	2.19	216.51	3.14
214.96	0.24	215.48	1.31	216.00	2.21	216.52	3.15
214.97	0.25	215.49	1.34	216.01	2.23	216.53	3.17
214.98	0.27	215.50	1.36	216.02	2.25	216.54	3.18
214.99	0.28	215.51	1.39	216.03	2.27	216.55	3.20
215.00	0.30	215.52	1.41	216.04	2.29	216.56	3.21
215.01	0.31	215.53	1.44	216.05	2.32	216.57	3.23
215.02	0.33	215.54	1.46	216.06	2.34	216.58	3.24
215.03	0.34	215.55	1.48	216.07	2.36	216.59	3.26
215.04	0.36	215.56	1.51	216.08	2.38	216.60	3.27
215.05	0.38	215.57	1.53	216.09	2.40	216.61	3.29
215.06	0.39	215.58	1.56	216.10	2.42	216.62	3.30
215.07	0.41	215.59	1.58	216.11	2.44	216.63	3.32
215.08	0.43	215.60	1.60	216.12	2.46	216.64	3.33
215.09	0.45	215.61	1.63	216.13	2.48	216.65	3.35
215.10	0.46	215.62	1.65	216.14	2.50	216.66	3.36
215.11	0.48	215.63	1.67	216.15	2.52	216.67	3.38

Flow Limits_Existing

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Page 3

Stage-Discharge for Pond CB1: EX 12" NW (continued)

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
216.68	3.39	217.20	4.07	217.72	4.65	218.24	5.17
216.69	3.41	217.21	4.08	217.73	4.66	218.25	5.18
216.70	3.42	217.22	4.10	217.74	4.67	218.26	5.19
216.71	3.43	217.23	4.11	217.75	4.68	218.27	5.20
216.72	3.45	217.24	4.12	217.76	4.69	218.28	5.21
216.73	3.46	217.25	4.13	217.77	4.70	218.29	5.22
216.74	3.48	217.26	4.14	217.78	4.71	218.30	5.22
216.75	3.49	217.27	4.15	217.79	4.73	218.31	5.23
216.76	3.50	217.28	4.17	217.80	4.74	218.32	5.24
216.77	3.52	217.29	4.18	217.81	4.75	218.33	5.25
216.78	3.53	217.30	4.19	217.82	4.76	218.34	5.26
216.79	3.55	217.31	4.20	217.83	4.77	218.35	5.27
216.80	3.56	217.32	4.21	217.84	4.78	218.36	5.28
216.81	3.57	217.33	4.22	217.85	4.79	218.37	5.29
216.82	3.59	217.34	4.24	217.86	4.80	218.38	5.30
216.83	3.60	217.35	4.25	217.87	4.81	218.39	5.31
216.84	3.61	217.36	4.26	217.88	4.82	218.40	5.32
216.85	3.63	217.37	4.27	217.89	4.83	218.41	5.33
216.86	3.64	217.38	4.28	217.90	4.84	218.42	5.34
216.87	3.65	217.39	4.29	217.91	4.85	218.43	5.34
216.88	3.67	217.40	4.30	217.92	4.86	218.44	5.35
216.89	3.68	217.41	4.32	217.93	4.87	218.45	5.36
216.90	3.69	217.42	4.33	217.94	4.88	218.46	5.37
216.91	3.71	217.43	4.34	217.95	4.89	218.47	5.38
216.92	3.72	217.44	4.35	217.96	4.90	218.48	5.39
216.93	3.73	217.45	4.36	217.97	4.91	218.49	5.40
216.94	3.75	217.46	4.37	217.98	4.92	218.50	5.41
216.95	3.76	217.47	4.38	217.99	4.93	218.51	5.42
216.96	3.77	217.48	4.39	218.00	4.94	218.52	5.43
216.97	3.79	217.49	4.40	218.01	4.95	218.53	5.44
216.98	3.80	217.50	4.42	218.02	4.96	218.54	5.44
216.99	3.81	217.51	4.43	218.03	4.97	218.55	5.45
217.00	3.82	217.52	4.44	218.04	4.98	218.56	5.46
217.01	3.84	217.53	4.45	218.05	4.99	218.57	5.47
217.02	3.85	217.54	4.46	218.06	5.00	218.58	5.48
217.03	3.86	217.55	4.47	218.07	5.01	218.59	5.49
217.04	3.87	217.56	4.48	218.08	5.02	218.60	5.50
217.05	3.89	217.57	4.49	218.09	5.03	218.61	5.51
217.06	3.90	217.58	4.50	218.10	5.03	218.62	5.52
217.07	3.91	217.59	4.51	218.11	5.04	218.63	5.52
217.08	3.92	217.60	4.52	218.12	5.05	218.64	5.53
217.09	3.94	217.61	4.54	218.13	5.06	218.65	5.54
217.10	3.95	217.62	4.55	218.14	5.07	218.66	5.55
217.11	3.96	217.63	4.56	218.15	5.08	218.67	5.56
217.12	3.97	217.64	4.57	218.16	5.09	218.68	5.57
217.13	3.99	217.65	4.58	218.17	5.10	218.69	5.58
217.14	4.00	217.66	4.59	218.18	5.11	218.70	5.59
217.15	4.01	217.67	4.60	218.19	5.12	218.71	5.59
217.16	4.02	217.68	4.61	218.20	5.13	218.72	5.60
217.17	4.04	217.69	4.62	218.21	5.14	218.73	5.61
217.18	4.05	217.70	4.63	218.22	5.15	218.74	5.62
217.19	4.06	217.71	4.64	218.23	5.16	218.75	5.63

Lowest rim elevation of upstream drainage structure is 218.43. The peak flow rate possible occurs at the surcharge elevation of this structure: therefore, the outlet flow is limited to 5.34 cfs.

Flow Limits_Existing

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NRCC 24-hr D 2-Year Rainfall=3.83"

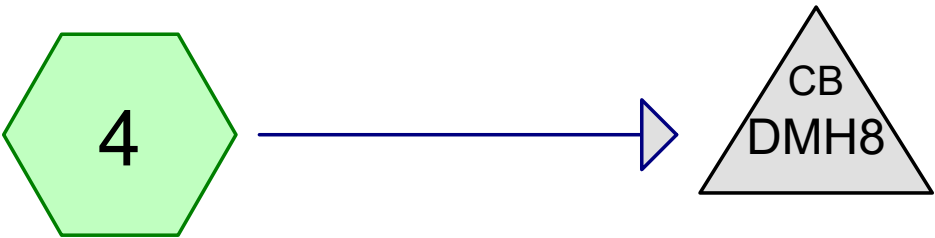
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Page 4

Stage-Discharge for Pond CB1: EX 12" NW (continued)

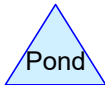
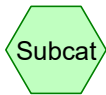
Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
218.76	5.64	219.28	6.07	219.80	6.47	220.32	6.86
218.77	5.65	219.29	6.08	219.81	6.48	220.33	6.86
218.78	5.65	219.30	6.09	219.82	6.49	220.34	6.87
218.79	5.66	219.31	6.09	219.83	6.50	220.35	6.88
218.80	5.67	219.32	6.10	219.84	6.50	220.36	6.88
218.81	5.68	219.33	6.11	219.85	6.51	220.37	6.89
218.82	5.69	219.34	6.12	219.86	6.52	220.38	6.90
218.83	5.70	219.35	6.13	219.87	6.53	220.39	6.90
218.84	5.71	219.36	6.13	219.88	6.53	220.40	6.91
218.85	5.71	219.37	6.14	219.89	6.54	220.41	6.92
218.86	5.72	219.38	6.15	219.90	6.55	220.42	6.93
218.87	5.73	219.39	6.16	219.91	6.56	220.43	6.93
218.88	5.74	219.40	6.17	219.92	6.56	220.44	6.94
218.89	5.75	219.41	6.17	219.93	6.57	220.45	6.95
218.90	5.76	219.42	6.18	219.94	6.58	220.46	6.95
218.91	5.77	219.43	6.19	219.95	6.59	220.47	6.96
218.92	5.77	219.44	6.20	219.96	6.59	220.48	6.97
218.93	5.78	219.45	6.21	219.97	6.60	220.49	6.97
218.94	5.79	219.46	6.21	219.98	6.61	220.50	6.98
218.95	5.80	219.47	6.22	219.99	6.62	220.51	6.99
218.96	5.81	219.48	6.23	220.00	6.62	220.52	7.00
218.97	5.82	219.49	6.24	220.01	6.63	220.53	7.00
218.98	5.82	219.50	6.24	220.02	6.64	220.54	7.01
218.99	5.83	219.51	6.25	220.03	6.65	220.55	7.02
219.00	5.84	219.52	6.26	220.04	6.65	220.56	7.02
219.01	5.85	219.53	6.27	220.05	6.66	220.57	7.03
219.02	5.86	219.54	6.28	220.06	6.67	220.58	7.04
219.03	5.87	219.55	6.28	220.07	6.67	220.59	7.04
219.04	5.87	219.56	6.29	220.08	6.68	220.60	7.05
219.05	5.88	219.57	6.30	220.09	6.69	220.61	7.06
219.06	5.89	219.58	6.31	220.10	6.70	220.62	7.07
219.07	5.90	219.59	6.31	220.11	6.70	220.63	7.07
219.08	5.91	219.60	6.32	220.12	6.71	220.64	7.08
219.09	5.92	219.61	6.33	220.13	6.72	220.65	7.09
219.10	5.92	219.62	6.34	220.14	6.73	220.66	7.09
219.11	5.93	219.63	6.35	220.15	6.73	220.67	7.10
219.12	5.94	219.64	6.35	220.16	6.74	220.68	7.11
219.13	5.95	219.65	6.36	220.17	6.75	220.69	7.11
219.14	5.96	219.66	6.37	220.18	6.75	220.70	7.12
219.15	5.97	219.67	6.38	220.19	6.76	220.71	7.13
219.16	5.97	219.68	6.38	220.20	6.77	220.72	7.13
219.17	5.98	219.69	6.39	220.21	6.78	220.73	7.14
219.18	5.99	219.70	6.40	220.22	6.78	220.74	7.15
219.19	6.00	219.71	6.41	220.23	6.79	220.75	7.15
219.20	6.01	219.72	6.41	220.24	6.80	220.76	7.16
219.21	6.01	219.73	6.42	220.25	6.81	220.77	7.17
219.22	6.02	219.74	6.43	220.26	6.81	220.78	7.17
219.23	6.03	219.75	6.44	220.27	6.82	220.79	7.18
219.24	6.04	219.76	6.44	220.28	6.83	220.80	7.19
219.25	6.05	219.77	6.45	220.29	6.83	220.81	7.20
219.26	6.05	219.78	6.46	220.30	6.84		
219.27	6.06	219.79	6.47	220.31	6.85		

Flow Limit for Proposed 2L



Eastern Driveway and
School Building

Diversion Manhole



Flow Limits

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Page 2

Stage-Discharge for Pond DMH8: Diversion Manhole

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
209.55	0.00	0.00	0.00	210.07	0.49	0.49	0.00
209.56	0.00	0.00	0.00	210.08	0.50	0.50	0.00
209.57	0.00	0.00	0.00	210.09	0.51	0.51	0.00
209.58	0.00	0.00	0.00	210.10	0.52	0.52	0.00
209.59	0.00	0.00	0.00	210.11	0.53	0.53	0.00
209.60	0.01	0.01	0.00	210.12	0.53	0.53	0.00
209.61	0.01	0.01	0.00	210.13	0.54	0.54	0.00
209.62	0.01	0.01	0.00	210.14	0.55	0.55	0.00
209.63	0.02	0.02	0.00	210.15	0.56	0.56	0.00
209.64	0.02	0.02	0.00	210.16	0.57	0.57	0.00
209.65	0.03	0.03	0.00	210.17	0.58	0.58	0.00
209.66	0.04	0.04	0.00	210.18	0.58	0.58	0.00
209.67	0.04	0.04	0.00	210.19	0.59	0.59	0.00
209.68	0.05	0.05	0.00	210.20	0.60	0.60	0.00
209.69	0.06	0.06	0.00	210.21	0.61	0.61	0.00
209.70	0.07	0.07	0.00	210.22	0.61	0.61	0.00
209.71	0.07	0.07	0.00	210.23	0.62	0.62	0.00
209.72	0.08	0.08	0.00	210.24	0.63	0.63	0.00
209.73	0.09	0.09	0.00	210.25	0.63	0.63	0.00
209.74	0.10	0.10	0.00	210.26	0.64	0.64	0.00
209.75	0.11	0.11	0.00	210.27	0.64	0.64	0.00
209.76	0.12	0.12	0.00	210.28	0.65	0.65	0.00
209.77	0.13	0.13	0.00	210.29	0.65	0.65	0.00
209.78	0.14	0.14	0.00	210.30	0.66	0.66	0.00
209.79	0.16	0.16	0.00	210.31	0.67	0.67	0.00
209.80	0.17	0.17	0.00	210.32	0.67	0.67	0.00
209.81	0.18	0.18	0.00	210.33	0.68	0.68	0.00
209.82	0.19	0.19	0.00	210.34	0.68	0.68	0.00
209.83	0.20	0.20	0.00	210.35	0.69	0.69	0.00
209.84	0.22	0.22	0.00	210.36	0.69	0.69	0.00
209.85	0.23	0.23	0.00	210.37	0.70	0.70	0.00
209.86	0.24	0.24	0.00	210.38	0.70	0.70	0.00
209.87	0.26	0.26	0.00	210.39	0.71	0.71	0.00
209.88	0.27	0.27	0.00	210.40	0.71	0.71	0.00
209.89	0.28	0.28	0.00	210.41	0.72	0.72	0.00
209.90	0.30	0.30	0.00	210.42	0.72	0.72	0.00
209.91	0.31	0.31	0.00	210.43	0.73	0.73	0.00
209.92	0.32	0.32	0.00	210.44	0.73	0.73	0.00
209.93	0.34	0.34	0.00	210.45	0.74	0.74	0.00
209.94	0.35	0.35	0.00	210.46	0.74	0.74	0.00
209.95	0.36	0.36	0.00	210.47	0.75	0.75	0.00
209.96	0.38	0.38	0.00	210.48	0.75	0.75	0.00
209.97	0.39	0.39	0.00	210.49	0.76	0.76	0.00
209.98	0.40	0.40	0.00	210.50	0.76	0.76	0.00
209.99	0.41	0.41	0.00	210.51	0.77	0.77	0.00
210.00	0.43	0.43	0.00	210.52	0.77	0.77	0.00
210.01	0.44	0.44	0.00	210.53	0.77	0.77	0.00
210.02	0.45	0.45	0.00	210.54	0.78	0.78	0.00
210.03	0.46	0.46	0.00	210.55	0.78	0.78	0.00
210.04	0.47	0.47	0.00	210.56	0.79	0.79	0.00
210.05	0.47	0.47	0.00	210.57	0.79	0.79	0.00
210.06	0.48	0.48	0.00	210.58	0.80	0.80	0.00

Flow Limits

Prepared by Woodard & Curran, Inc

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NRCC 24-hr D 2-Year Rainfall=3.83"

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Page 3

Stage-Discharge for Pond DMH8: Diversion Manhole (continued)

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
210.59	0.80	0.80	0.00	211.11	1.01	1.01	0.00
210.60	0.81	0.81	0.00	211.12	1.01	1.01	0.00
210.61	0.81	0.81	0.00	211.13	1.01	1.01	0.00
210.62	0.81	0.81	0.00	211.14	1.02	1.02	0.00
210.63	0.82	0.82	0.00	211.15	1.02	1.02	0.00
210.64	0.82	0.82	0.00	211.16	1.02	1.02	0.00
210.65	0.83	0.83	0.00	211.17	1.03	1.03	0.00
210.66	0.83	0.83	0.00	211.18	1.03	1.03	0.00
210.67	0.84	0.84	0.00	211.19	1.03	1.03	0.00
210.68	0.84	0.84	0.00	211.20	1.04	1.04	0.00
210.69	0.84	0.84	0.00	211.21	1.04	1.04	0.00
210.70	0.85	0.85	0.00	211.22	1.05	1.05	0.00
210.71	0.85	0.85	0.00	211.23	1.05	1.05	0.00
210.72	0.86	0.86	0.00	211.24	1.05	1.05	0.00
210.73	0.86	0.86	0.00	211.25	1.06	1.06	0.00
210.74	0.87	0.87	0.00	211.26	1.06	1.06	0.00
210.75	0.87	0.87	0.00	211.27	1.06	1.06	0.00
210.76	0.87	0.87	0.00	211.28	1.07	1.07	0.00
210.77	0.88	0.88	0.00	211.29	1.07	1.07	0.00
210.78	0.88	0.88	0.00	211.30	1.07	1.07	0.00
210.79	0.89	0.89	0.00	211.31	1.08	1.08	0.00
210.80	0.89	0.89	0.00	211.32	1.08	1.08	0.00
210.81	0.89	0.89	0.00	211.33	1.08	1.08	0.00
210.82	0.90	0.90	0.00	211.34	1.09	1.09	0.00
210.83	0.90	0.90	0.00	211.35	1.09	1.09	0.00
210.84	0.91	0.91	0.00	211.36	1.09	1.09	0.00
210.85	0.91	0.91	0.00	211.37	1.10	1.10	0.00
210.86	0.91	0.91	0.00	211.38	1.10	1.10	0.00
210.87	0.92	0.92	0.00	211.39	1.10	1.10	0.00
210.88	0.92	0.92	0.00	211.40	1.10	1.10	0.00
210.89	0.93	0.93	0.00	211.41	1.11	1.11	0.00
210.90	0.93	0.93	0.00	211.42	1.11	1.11	0.00
210.91	0.93	0.93	0.00	211.43	1.11	1.11	0.00
210.92	0.94	0.94	0.00	211.44	1.12	1.12	0.00
210.93	0.94	0.94	0.00	211.45	1.12	1.12	0.00
210.94	0.94	0.94	0.00	211.46	1.12	1.12	0.00
210.95	0.95	0.95	0.00	211.47	1.13	1.13	0.00
210.96	0.95	0.95	0.00	211.48	1.13	1.13	0.00
210.97	0.96	0.96	0.00	211.49	1.13	1.13	0.00
210.98	0.96	0.96	0.00	211.50	1.14	1.14	0.00
210.99	0.96	0.96	0.00	211.51	1.14	1.14	0.00
211.00	0.97	0.97	0.00	211.52	1.14	1.14	0.00
211.01	0.97	0.97	0.00	211.53	1.15	1.15	0.00
211.02	0.97	0.97	0.00	211.54	1.15	1.15	0.00
211.03	0.98	0.98	0.00	211.55	1.15	1.15	0.00
211.04	0.98	0.98	0.00	211.56	1.16	1.16	0.00
211.05	0.99	0.99	0.00	211.57	1.16	1.16	0.00
211.06	0.99	0.99	0.00	211.58	1.16	1.16	0.00
211.07	0.99	0.99	0.00	211.59	1.16	1.16	0.00
211.08	1.00	1.00	0.00	211.60	1.17	1.17	0.00
211.09	1.00	1.00	0.00	211.61	1.17	1.17	0.00
211.10	1.00	1.00	0.00	211.62	1.17	1.17	0.00

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Page 4

Stage-Discharge for Pond DMH8: Diversion Manhole (continued)

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
211.63	1.18	1.18	0.00	212.15	1.33	1.33	0.00
211.64	1.18	1.18	0.00	212.16	1.33	1.33	0.00
211.65	1.18	1.18	0.00	212.17	1.33	1.33	0.00
211.66	1.19	1.19	0.00	212.18	1.33	1.33	0.00
211.67	1.19	1.19	0.00	212.19	1.34	1.34	0.00
211.68	1.19	1.19	0.00	212.20	1.34	1.34	0.00
211.69	1.19	1.19	0.00	212.21	1.34	1.34	0.00
211.70	1.20	1.20	0.00	212.22	1.34	1.34	0.00
211.71	1.20	1.20	0.00	212.23	1.35	1.35	0.00
211.72	1.20	1.20	0.00	212.24	1.35	1.35	0.00
211.73	1.21	1.21	0.00	212.25	1.35	1.35	0.00
211.74	1.21	1.21	0.00	212.26	1.35	1.35	0.00
211.75	1.21	1.21	0.00	212.27	1.36	1.36	0.00
211.76	1.22	1.22	0.00	212.28	1.36	1.36	0.00
211.77	1.22	1.22	0.00	212.29	1.36	1.36	0.00
211.78	1.22	1.22	0.00	212.30	1.37	1.37	0.00
211.79	1.22	1.22	0.00	212.31	1.37	1.37	0.00
211.80	1.23	1.23	0.00	212.32	1.37	1.37	0.00
211.81	1.23	1.23	0.00	212.33	1.37	1.37	0.00
211.82	1.23	1.23	0.00	212.34	1.38	1.38	0.00
211.83	1.24	1.24	0.00	212.35	1.38	1.38	0.00
211.84	1.24	1.24	0.00	212.36	1.38	1.38	0.00
211.85	1.24	1.24	0.00	212.37	1.38	1.38	0.00
211.86	1.24	1.24	0.00	212.38	1.39	1.39	0.00
211.87	1.25	1.25	0.00	212.39	1.39	1.39	0.00
211.88	1.25	1.25	0.00	212.40	1.39	1.39	0.00
211.89	1.25	1.25	0.00	212.41	1.39	1.39	0.00
211.90	1.26	1.26	0.00	212.42	1.40	1.40	0.00
211.91	1.26	1.26	0.00	212.43	1.40	1.40	0.00
211.92	1.26	1.26	0.00	212.44	1.40	1.40	0.00
211.93	1.26	1.26	0.00	212.45	1.40	1.40	0.00
211.94	1.27	1.27	0.00	212.46	1.41	1.41	0.00
211.95	1.27	1.27	0.00	212.47	1.41	1.41	0.00
211.96	1.27	1.27	0.00	212.48	1.41	1.41	0.00
211.97	1.28	1.28	0.00	212.49	1.41	1.41	0.00
211.98	1.28	1.28	0.00	212.50	1.42	1.42	0.00
211.99	1.28	1.28	0.00	212.51	1.42	1.42	0.00
212.00	1.28	1.28	0.00	212.52	1.42	1.42	0.00
212.01	1.29	1.29	0.00	212.53	1.42	1.42	0.00
212.02	1.29	1.29	0.00	212.54	1.43	1.43	0.00
212.03	1.29	1.29	0.00	212.55	1.43	1.43	0.00
212.04	1.30	1.30	0.00	212.56	1.43	1.43	0.00
212.05	1.30	1.30	0.00	212.57	1.43	1.43	0.00
212.06	1.30	1.30	0.00	212.58	1.44	1.44	0.00
212.07	1.30	1.30	0.00	212.59	1.44	1.44	0.00
212.08	1.31	1.31	0.00	212.60	1.44	1.44	0.00
212.09	1.31	1.31	0.00	212.61	1.44	1.44	0.00
212.10	1.31	1.31	0.00	212.62	1.45	1.45	0.00
212.11	1.31	1.31	0.00	212.63	1.45	1.45	0.00
212.12	1.32	1.32	0.00	212.64	1.45	1.45	0.00
212.13	1.32	1.32	0.00	212.65	1.45	1.45	0.00
212.14	1.32	1.32	0.00	212.66	1.46	1.46	0.00

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Page 5

Stage-Discharge for Pond DMH8: Diversion Manhole (continued)

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
212.67	1.46	1.46	0.00	213.19	1.58	1.58	0.00
212.68	1.46	1.46	0.00	213.20	1.58	1.58	0.00
212.69	1.46	1.46	0.00	213.21	1.59	1.59	0.00
212.70	1.47	1.47	0.00	213.22	1.59	1.59	0.00
212.71	1.47	1.47	0.00	213.23	1.59	1.59	0.00
212.72	1.47	1.47	0.00	213.24	1.59	1.59	0.00
212.73	1.47	1.47	0.00	213.25	1.59	1.59	0.00
212.74	1.48	1.48	0.00	213.26	1.60	1.60	0.00
212.75	1.48	1.48	0.00	213.27	1.60	1.60	0.00
212.76	1.48	1.48	0.00	213.28	1.60	1.60	0.00
212.77	1.48	1.48	0.00	213.29	1.60	1.60	0.00
212.78	1.49	1.49	0.00	213.30	1.61	1.61	0.00
212.79	1.49	1.49	0.00	213.31	1.61	1.61	0.00
212.80	1.49	1.49	0.00	213.32	1.61	1.61	0.00
212.81	1.49	1.49	0.00	213.33	1.61	1.61	0.00
212.82	1.49	1.49	0.00	213.34	1.61	1.61	0.00
212.83	1.50	1.50	0.00	213.35	1.62	1.62	0.00
212.84	1.50	1.50	0.00	213.36	1.62	1.62	0.00
212.85	1.50	1.50	0.00	213.37	1.62	1.62	0.00
212.86	1.50	1.50	0.00	213.38	1.62	1.62	0.00
212.87	1.51	1.51	0.00	213.39	1.63	1.63	0.00
212.88	1.51	1.51	0.00	213.40	1.63	1.63	0.00
212.89	1.51	1.51	0.00	213.41	1.63	1.63	0.00
212.90	1.51	1.51	0.00	213.42	1.63	1.63	0.00
212.91	1.52	1.52	0.00	213.43	1.63	1.63	0.00
212.92	1.52	1.52	0.00	213.44	1.64	1.64	0.00
212.93	1.52	1.52	0.00	213.45	1.64	1.64	0.00
212.94	1.52	1.52	0.00	213.46	1.64	1.64	0.00
212.95	1.53	1.53	0.00	213.47	1.64	1.64	0.00
212.96	1.53	1.53	0.00	213.48	1.64	1.64	0.00
212.97	1.53	1.53	0.00	213.49	1.65	1.65	0.00
212.98	1.53	1.53	0.00	213.50	1.65	1.65	0.00
212.99	1.53	1.53	0.00	213.51	1.65	1.65	0.00
213.00	1.54	1.54	0.00	213.52	1.65	1.65	0.00
213.01	1.54	1.54	0.00	213.53	1.66	1.66	0.00
213.02	1.54	1.54	0.00	213.54	1.66	1.66	0.00
213.03	1.54	1.54	0.00	213.55	1.66	1.66	0.00
213.04	1.55	1.55	0.00	213.56	1.66	1.66	0.00
213.05	1.55	1.55	0.00	213.57	1.66	1.66	0.00
213.06	1.55	1.55	0.00	213.58	1.67	1.67	0.00
213.07	1.55	1.55	0.00	213.59	1.67	1.67	0.00
213.08	1.56	1.56	0.00	213.60	1.67	1.67	0.00
213.09	1.56	1.56	0.00	213.61	1.67	1.67	0.00
213.10	1.56	1.56	0.00	213.62	1.68	1.68	0.00
213.11	1.56	1.56	0.00	213.63	1.68	1.68	0.00
213.12	1.56	1.56	0.00	213.64	1.68	1.68	0.00
213.13	1.57	1.57	0.00	213.65	1.68	1.68	0.00
213.14	1.57	1.57	0.00	213.66	1.68	1.68	0.00
213.15	1.57	1.57	0.00	213.67	1.69	1.69	0.00
213.16	1.57	1.57	0.00	213.68	1.69	1.69	0.00
213.17	1.58	1.58	0.00	213.69	1.69	1.69	0.00
213.18	1.58	1.58	0.00	213.70	1.69	1.69	0.00

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Page 6

Stage-Discharge for Pond DMH8: Diversion Manhole (continued)

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
213.71	1.69	1.69	0.00	214.23	1.87	1.80	0.07
213.72	1.70	1.70	0.00	214.24	1.89	1.80	0.09
213.73	1.70	1.70	0.00	214.25	1.90	1.80	0.10
213.74	1.70	1.70	0.00	214.26	1.92	1.81	0.11
213.75	1.70	1.70	0.00	214.27	1.93	1.81	0.12
213.76	1.70	1.70	0.00	214.28	1.95	1.81	0.14
213.77	1.71	1.71	0.00	214.29	1.97	1.81	0.15
213.78	1.71	1.71	0.00	214.30	1.98	1.81	0.17
213.79	1.71	1.71	0.00	214.31	2.00	1.82	0.19
213.80	1.71	1.71	0.00	214.32	2.02	1.82	0.20
213.81	1.72	1.72	0.00	214.33	2.04	1.82	0.22
213.82	1.72	1.72	0.00	214.34	2.06	1.82	0.24
213.83	1.72	1.72	0.00	214.35	2.09	1.82	0.26
213.84	1.72	1.72	0.00	214.36	2.11	1.83	0.28
213.85	1.72	1.72	0.00	214.37	2.13	1.83	0.30
213.86	1.73	1.73	0.00	214.38	2.15	1.83	0.32
213.87	1.73	1.73	0.00	214.39	2.18	1.83	0.35
213.88	1.73	1.73	0.00	214.40	2.20	1.83	0.37
213.89	1.73	1.73	0.00	214.41	2.23	1.84	0.39
213.90	1.73	1.73	0.00	214.42	2.25	1.84	0.42
213.91	1.74	1.74	0.00	214.43	2.28	1.84	0.44
213.92	1.74	1.74	0.00	214.44	2.31	1.84	0.47
213.93	1.74	1.74	0.00	214.45	2.34	1.84	0.49
213.94	1.74	1.74	0.00	214.46	2.37	1.85	0.52
213.95	1.74	1.74	0.00	214.47	2.39	1.85	0.55
213.96	1.75	1.75	0.00	214.48	2.42	1.85	0.57
213.97	1.75	1.75	0.00	214.49	2.45	1.85	0.60
213.98	1.75	1.75	0.00	214.50	2.48	1.85	0.63
213.99	1.75	1.75	0.00	214.51	2.52	1.86	0.66
214.00	1.75	1.75	0.00	214.52	2.55	1.86	0.69
214.01	1.76	1.76	0.00	214.53	2.58	1.86	0.72
214.02	1.76	1.76	0.00	214.54	2.61	1.86	0.75
214.03	1.76	1.76	0.00	214.55	2.65	1.86	0.78
214.04	1.76	1.76	0.00	214.56	2.68	1.86	0.81
214.05	1.76	1.76	0.00	214.57	2.71	1.87	0.85
214.06	1.77	1.77	0.00	214.58	2.75	1.87	0.88
214.07	1.77	1.77	0.00	214.59	2.78	1.87	0.91
214.08	1.77	1.77	0.00	214.60	2.82	1.87	0.95
214.09	1.77	1.77	0.00	214.61	2.85	1.87	0.98
214.10	1.77	1.77	0.00	214.62	2.89	1.88	1.01
214.11	1.78	1.78	0.00	214.63	2.93	1.88	1.05
214.12	1.78	1.78	0.00	214.64	2.96	1.88	1.08
214.13	1.78	1.78	0.00	214.65	3.00	1.88	1.12
214.14	1.79	1.78	0.01	214.66	3.04	1.88	1.15
214.15	1.79	1.78	0.01	214.67	3.07	1.89	1.19
214.16	1.80	1.79	0.02	214.68	3.11	1.89	1.22
214.17	1.81	1.79	0.02	214.69	3.15	1.89	1.26
214.18	1.82	1.79	0.03	214.70	3.19	1.89	1.30
214.19	1.83	1.79	0.04	214.71	3.23	1.89	1.33
214.20	1.84	1.79	0.04	214.72	3.27	1.90	1.37
214.21	1.85	1.80	0.05	214.73	3.31	1.90	1.41
214.22	1.86	1.80	0.06	214.74	3.34	1.90	1.45

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Printed 8/19/2024

Page 7

Stage-Discharge for Pond DMH8: Diversion Manhole (continued)

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
214.75	3.38	1.90	1.48	215.27	5.09	2.00	3.10
214.76	3.42	1.90	1.52	215.28	5.12	2.00	3.12
214.77	3.46	1.90	1.56	215.29	5.14	2.00	3.14
214.78	3.50	1.91	1.60	215.30	5.17	2.00	3.16
214.79	3.54	1.91	1.63	215.31	5.19	2.00	3.19
214.80	3.58	1.91	1.67	215.32	5.21	2.00	3.21
214.81	3.62	1.91	1.71	215.33	5.24	2.01	3.23
214.82	3.66	1.91	1.75	215.34	5.26	2.01	3.25
214.83	3.70	1.92	1.79	215.35	5.29	2.01	3.28
214.84	3.74	1.92	1.83	215.36	5.31	2.01	3.30
214.85	3.78	1.92	1.86	215.37	5.33	2.01	3.32
214.86	3.82	1.92	1.90	215.38	5.36	2.02	3.34
214.87	3.86	1.92	1.94	215.39	5.38	2.02	3.36
214.88	3.90	1.92	1.98	215.40	5.40	2.02	3.38
214.89	3.94	1.93	2.01	215.41	5.42	2.02	3.40
214.90	3.98	1.93	2.05	215.42	5.45	2.02	3.42
214.91	4.02	1.93	2.09	215.43	5.47	2.02	3.45
214.92	4.06	1.93	2.13	215.44	5.49	2.03	3.47
214.93	4.10	1.93	2.16	215.45	5.51	2.03	3.49
214.94	4.13	1.94	2.20	215.46	5.54	2.03	3.51
214.95	4.17	1.94	2.23	215.47	5.56	2.03	3.53
214.96	4.21	1.94	2.27	215.48	5.58	2.03	3.55
214.97	4.25	1.94	2.30	215.49	5.60	2.03	3.57
214.98	4.28	1.94	2.34	215.50	5.62	2.04	3.59
214.99	4.32	1.95	2.37	215.51	5.65	2.04	3.61
215.00	4.35	1.95	2.40	215.52	5.67	2.04	3.63
215.01	4.39	1.95	2.44	215.53	5.69	2.04	3.65
215.02	4.42	1.95	2.47	215.54	5.71	2.04	3.67
215.03	4.45	1.95	2.50	215.55	5.73	2.05	3.69
215.04	4.48	1.95	2.53	215.56	5.75	2.05	3.71
215.05	4.51	1.96	2.56	215.57	5.77	2.05	3.72
215.06	4.54	1.96	2.58	215.58	5.79	2.05	3.74
215.07	4.57	1.96	2.61	215.59	5.82	2.05	3.76
215.08	4.60	1.96	2.63	215.60	5.84	2.05	3.78
215.09	4.62	1.96	2.66	215.61	5.86	2.06	3.80
215.10	4.64	1.97	2.67	215.62	5.88	2.06	3.82
215.11	4.67	1.97	2.70	215.63	5.90	2.06	3.84
215.12	4.70	1.97	2.73	215.64	5.92	2.06	3.86
215.13	4.72	1.97	2.75	215.65	5.94	2.06	3.88
215.14	4.75	1.97	2.78	215.66	5.96	2.06	3.89
215.15	4.78	1.97	2.80	215.67	5.98	2.07	3.91
215.16	4.81	1.98	2.83	215.68	6.00	2.07	3.93
215.17	4.83	1.98	2.86	215.69	6.02	2.07	3.95
215.18	4.86	1.98	2.88	215.70	6.04	2.07	3.97
215.19	4.89	1.98	2.90	215.71	6.06	2.07	3.98
215.20	4.91	1.98	2.93	215.72	6.08	2.07	4.00
215.21	4.94	1.99	2.95	215.73	6.09	2.08	4.02
215.22	4.96	1.99	2.98	215.74	6.11	2.08	4.03
215.23	4.99	1.99	3.00	215.75	6.12	2.08	4.04
215.24	5.02	1.99	3.03	215.76	6.13	2.08	4.05
215.25	5.04	1.99	3.05	215.77	6.14	2.08	4.06
215.26	5.07	1.99	3.07	215.78	6.16	2.09	4.07

Flow Limits

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Page 8

Stage-Discharge for Pond DMH8: Diversion Manhole (continued)

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
215.79	6.17	2.09	4.08	216.31	6.81	2.17	4.64
215.80	6.18	2.09	4.10	216.32	6.83	2.18	4.65
215.81	6.20	2.09	4.11	216.33	6.84	2.18	4.66
215.82	6.21	2.09	4.12	216.34	6.85	2.18	4.67
215.83	6.22	2.09	4.13	216.35	6.86	2.18	4.68
215.84	6.24	2.10	4.14	216.36	6.87	2.18	4.69
215.85	6.25	2.10	4.15	216.37	6.88	2.18	4.70
215.86	6.26	2.10	4.16	216.38	6.89	2.19	4.71
215.87	6.27	2.10	4.17	216.39	6.91	2.19	4.72
215.88	6.29	2.10	4.19	216.40	6.92	2.19	4.73
215.89	6.30	2.10	4.20	216.41	6.93	2.19	4.74
215.90	6.31	2.11	4.21	216.42	6.94	2.19	4.75
215.91	6.33	2.11	4.22	216.43	6.95	2.19	4.76
215.92	6.34	2.11	4.23	216.44	6.96	2.20	4.77
215.93	6.35	2.11	4.24	216.45	6.98	2.20	4.78
215.94	6.36	2.11	4.25	216.46	6.99	2.20	4.79
215.95	6.38	2.11	4.26	216.47	7.00	2.20	4.80
215.96	6.39	2.12	4.27	216.48	7.01	2.20	4.81
215.97	6.40	2.12	4.28	216.49	7.02	2.20	4.82
215.98	6.41	2.12	4.30	216.50	7.03	2.21	4.83
215.99	6.43	2.12	4.31	216.51	7.04	2.21	4.84
216.00	6.44	2.12	4.32	216.52	7.05	2.21	4.85
216.01	6.45	2.12	4.33	216.53	7.07	2.21	4.86
216.02	6.46	2.13	4.34	216.54	7.08	2.21	4.87
216.03	6.48	2.13	4.35	216.55	7.09	2.21	4.87
216.04	6.49	2.13	4.36	216.56	7.10	2.21	4.88
216.05	6.50	2.13	4.37	216.57	7.11	2.22	4.89
216.06	6.51	2.13	4.38	216.58	7.12	2.22	4.90
216.07	6.53	2.13	4.39	216.59	7.13	2.22	4.91
216.08	6.54	2.14	4.40	216.60	7.14	2.22	4.92
216.09	6.55	2.14	4.41	216.61	7.15	2.22	4.93
216.10	6.56	2.14	4.42	216.62	7.17	2.22	4.94
216.11	6.58	2.14	4.43	216.63	7.18	2.23	4.95
216.12	6.59	2.14	4.44	216.64	7.19	2.23	4.96
216.13	6.60	2.14	4.46	216.65	7.20	2.23	4.97
216.14	6.61	2.15	4.47	216.66	7.21	2.23	4.98
216.15	6.62	2.15	4.48	216.67	7.22	2.23	4.99
216.16	6.64	2.15	4.49	216.68	7.23	2.23	5.00
216.17	6.65	2.15	4.50	216.69	7.24	2.24	5.01
216.18	6.66	2.15	4.51	216.70	7.25	2.24	5.02
216.19	6.67	2.15	4.52	216.71	7.26	2.24	5.03
216.20	6.68	2.16	4.53	216.72	7.27	2.24	5.03
216.21	6.70	2.16	4.54	216.73	7.29	2.24	5.04
216.22	6.71	2.16	4.55	216.74	7.30	2.24	5.05
216.23	6.72	2.16	4.56	216.75	7.31	2.25	5.06
216.24	6.73	2.16	4.57	216.76	7.32	2.25	5.07
216.25	6.74	2.16	4.58	216.77	7.33	2.25	5.08
216.26	6.75	2.17	4.59	216.78	7.34	2.25	5.09
216.27	6.77	2.17	4.60	216.79	7.35	2.25	5.10
216.28	6.78	2.17	4.61	216.80	7.36	2.25	5.11
216.29	6.79	2.17	4.62	216.81	7.37	2.25	5.12
216.30	6.80	2.17	4.63	216.82	7.38	2.26	5.13

Flow Limits

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Page 9

Stage-Discharge for Pond DMH8: Diversion Manhole (continued)

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
216.83	7.39	2.26	5.14	217.35	7.93	2.34	5.59
216.84	7.40	2.26	5.14	217.36	7.94	2.34	5.60
216.85	7.41	2.26	5.15	217.37	7.95	2.34	5.60
216.86	7.43	2.26	5.16	217.38	7.96	2.34	5.61
216.87	7.44	2.26	5.17	217.39	7.97	2.34	5.62
216.88	7.45	2.27	5.18	217.40	7.98	2.35	5.63
216.89	7.46	2.27	5.19	217.41	7.98	2.35	5.64
216.90	7.47	2.27	5.20	217.42	7.99	2.35	5.65
216.91	7.48	2.27	5.21	217.43	8.00	2.35	5.65
216.92	7.49	2.27	5.22	217.44	8.01	2.35	5.66
216.93	7.50	2.27	5.23	217.45	8.02	2.35	5.67
216.94	7.51	2.28	5.23	217.46	8.03	2.36	5.68
216.95	7.52	2.28	5.24	217.47	8.04	2.36	5.69
216.96	7.53	2.28	5.25	217.48	8.05	2.36	5.69
216.97	7.54	2.28	5.26	217.49	8.06	2.36	5.70
216.98	7.55	2.28	5.27	217.50	8.07	2.36	5.71
216.99	7.56	2.28	5.28	217.51	8.08	2.36	5.72
217.00	7.57	2.28	5.29	217.52	8.09	2.36	5.73
217.01	7.58	2.29	5.30	217.53	8.10	2.37	5.74
217.02	7.59	2.29	5.30	217.54	8.11	2.37	5.74
217.03	7.60	2.29	5.31	217.55	8.12	2.37	5.75
217.04	7.61	2.29	5.32	217.56	8.13	2.37	5.76
217.05	7.62	2.29	5.33	217.57	8.14	2.37	5.77
217.06	7.63	2.29	5.34	217.58	8.15	2.37	5.78
217.07	7.64	2.30	5.35	217.59	8.16	2.37	5.78
217.08	7.65	2.30	5.36	217.60	8.17	2.38	5.79
217.09	7.66	2.30	5.37	217.61	8.18	2.38	5.80
217.10	7.67	2.30	5.37	217.62	8.19	2.38	5.81
217.11	7.69	2.30	5.38	217.63	8.20	2.38	5.82
217.12	7.70	2.30	5.39	217.64	8.21	2.38	5.82
217.13	7.71	2.30	5.40	217.65	8.22	2.38	5.83
217.14	7.72	2.31	5.41	217.66	8.23	2.39	5.84
217.15	7.73	2.31	5.42	217.67	8.23	2.39	5.85
217.16	7.74	2.31	5.43	217.68	8.24	2.39	5.86
217.17	7.75	2.31	5.44	217.69	8.25	2.39	5.86
217.18	7.76	2.31	5.44	217.70	8.26	2.39	5.87
217.19	7.77	2.31	5.45	217.71	8.27	2.39	5.88
217.20	7.78	2.32	5.46	217.72	8.28	2.39	5.89
217.21	7.79	2.32	5.47	217.73	8.29	2.40	5.90
217.22	7.80	2.32	5.48	217.74	8.30	2.40	5.90
217.23	7.81	2.32	5.49	217.75	8.31	2.40	5.91
217.24	7.82	2.32	5.49	217.76	8.32	2.40	5.92
217.25	7.83	2.32	5.50	217.77	8.33	2.40	5.93
217.26	7.84	2.32	5.51	217.78	8.34	2.40	5.94
217.27	7.85	2.33	5.52	217.79	8.35	2.40	5.94
217.28	7.86	2.33	5.53	217.80	8.36	2.41	5.95
217.29	7.87	2.33	5.54	217.81	8.37	2.41	5.96
217.30	7.88	2.33	5.55	217.82	8.38	2.41	5.97
217.31	7.89	2.33	5.55	217.83	8.38	2.41	5.97
217.32	7.90	2.33	5.56	217.84	8.39	2.41	5.98
217.33	7.91	2.34	5.57	217.85	8.40	2.41	5.99
217.34	7.92	2.34	5.58	217.86	8.41	2.42	6.00

Flow Limits

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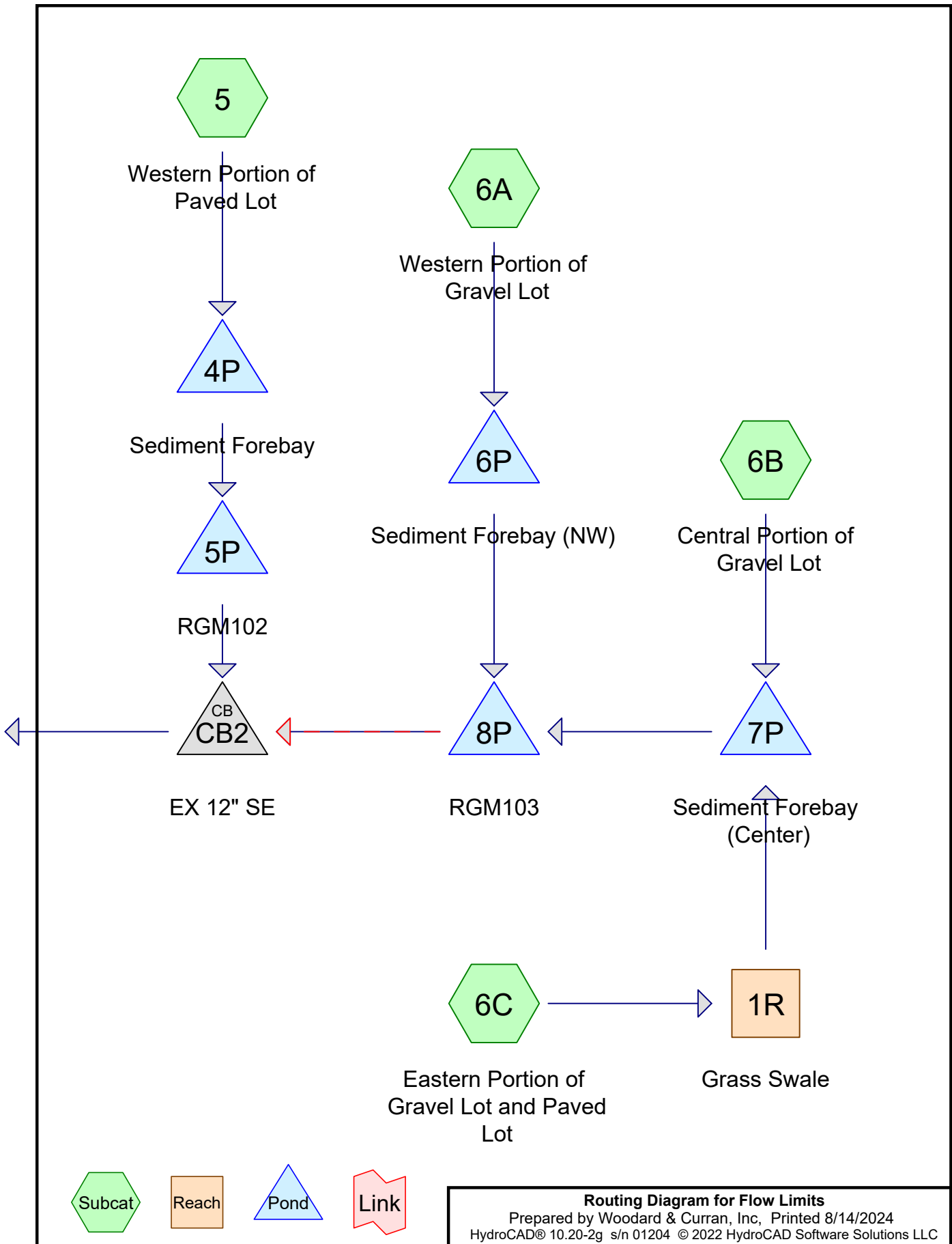
Page 10

Stage-Discharge for Pond DMH8: Diversion Manhole (continued)

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
217.87	8.42	2.42	6.01	218.39	8.89	2.49	6.40
217.88	8.43	2.42	6.01	218.40	8.90	2.49	6.40
217.89	8.44	2.42	6.02	218.41	8.91	2.50	6.41
217.90	8.45	2.42	6.03	218.42	8.91	2.50	6.42
217.91	8.46	2.42	6.04	218.43	8.92	2.50	6.43
217.92	8.47	2.42	6.04				
217.93	8.48	2.43	6.05				
217.94	8.49	2.43	6.06				
217.95	8.50	2.43	6.07				
217.96	8.50	2.43	6.07				
217.97	8.51	2.43	6.08				
217.98	8.52	2.43	6.09				
217.99	8.53	2.43	6.10				
218.00	8.54	2.44	6.11				
218.01	8.55	2.44	6.11				
218.02	8.56	2.44	6.12				
218.03	8.57	2.44	6.13				
218.04	8.58	2.44	6.14				
218.05	8.59	2.44	6.14				
218.06	8.60	2.44	6.15				
218.07	8.60	2.45	6.16				
218.08	8.61	2.45	6.17				
218.09	8.62	2.45	6.17				
218.10	8.63	2.45	6.18				
218.11	8.64	2.45	6.19				
218.12	8.65	2.45	6.20				
218.13	8.66	2.45	6.20				
218.14	8.67	2.46	6.21				
218.15	8.68	2.46	6.22				
218.16	8.69	2.46	6.23				
218.17	8.69	2.46	6.23				
218.18	8.70	2.46	6.24				
218.19	8.71	2.46	6.25				
218.20	8.72	2.46	6.26				
218.21	8.73	2.47	6.26				
218.22	8.74	2.47	6.27				
218.23	8.75	2.47	6.28				
218.24	8.76	2.47	6.29				
218.25	8.77	2.47	6.29				
218.26	8.77	2.47	6.30				
218.27	8.78	2.48	6.31				
218.28	8.79	2.48	6.32				
218.29	8.80	2.48	6.32				
218.30	8.81	2.48	6.33				
218.31	8.82	2.48	6.34				
218.32	8.83	2.48	6.34				
218.33	8.84	2.48	6.35				
218.34	8.84	2.49	6.36				
218.35	8.85	2.49	6.37				
218.36	8.86	2.49	6.37				
218.37	8.87	2.49	6.38				
218.38	8.88	2.49	6.39				

Lowest rim elevation of upstream drainage structure is 218.43. The peak flow rate possible occurs at the surcharge elevation of this structure: therefore, the outlet flow is limited to 8.92 cfs.

Flow Limit for 3L



Flow Limits

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Page 12

Stage-Discharge for Pond CB2: EX 12" SE

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
211.70	0.00	212.22	0.99	212.74	2.78	213.26	3.41
211.71	0.00	212.23	1.02	212.75	2.80	213.27	3.42
211.72	0.00	212.24	1.05	212.76	2.83	213.28	3.42
211.73	0.00	212.25	1.09	212.77	2.86	213.29	3.43
211.74	0.01	212.26	1.12	212.78	2.88	213.30	3.44
211.75	0.01	212.27	1.16	212.79	2.90	213.31	3.45
211.76	0.01	212.28	1.19	212.80	2.93	213.32	3.46
211.77	0.02	212.29	1.23	212.81	2.95	213.33	3.47
211.78	0.02	212.30	1.27	212.82	2.98	213.34	3.48
211.79	0.03	212.31	1.30	212.83	3.00	213.35	3.49
211.80	0.04	212.32	1.34	212.84	3.03	213.36	3.50
211.81	0.04	212.33	1.38	212.85	3.05	213.37	3.51
211.82	0.05	212.34	1.41	212.86	3.07	213.38	3.51
211.83	0.06	212.35	1.45	212.87	3.10	213.39	3.52
211.84	0.07	212.36	1.49	212.88	3.12	213.40	3.53
211.85	0.09	212.37	1.53	212.89	3.14	213.41	3.54
211.86	0.10	212.38	1.56	212.90	3.16	213.42	3.55
211.87	0.11	212.39	1.60	212.91	3.19	213.43	3.56
211.88	0.13	212.40	1.64	212.92	3.21	213.44	3.57
211.89	0.14	212.41	1.68	212.93	3.23	213.45	3.58
211.90	0.16	212.42	1.71	212.94	3.25	213.46	3.59
211.91	0.17	212.43	1.75	212.95	3.28	213.47	3.59
211.92	0.19	212.44	1.79	212.96	3.30	213.48	3.60
211.93	0.21	212.45	1.83	212.97	3.32	213.49	3.61
211.94	0.22	212.46	1.87	212.98	3.34	213.50	3.62
211.95	0.24	212.47	1.91	212.99	3.33	213.51	3.63
211.96	0.26	212.48	1.94	213.00	3.33	213.52	3.64
211.97	0.28	212.49	1.98	213.01	3.31	213.53	3.65
211.98	0.30	212.50	2.02	213.02	3.29	213.54	3.65
211.99	0.33	212.51	2.06	213.03	3.24	213.55	3.66
212.00	0.35	212.52	2.10	213.04	3.20	213.56	3.67
212.01	0.37	212.53	2.13	213.05	3.21	213.57	3.68
212.02	0.40	212.54	2.17	213.06	3.22	213.58	3.69
212.03	0.42	212.55	2.21	213.07	3.23	213.59	3.70
212.04	0.45	212.56	2.25	213.08	3.24	213.60	3.71
212.05	0.47	212.57	2.28	213.09	3.25	213.61	3.71
212.06	0.50	212.58	2.32	213.10	3.26	213.62	3.72
212.07	0.52	212.59	2.36	213.11	3.27	213.63	3.73
212.08	0.55	212.60	2.39	213.12	3.28	213.64	3.74
212.09	0.58	212.61	2.43	213.13	3.29	213.65	3.75
212.10	0.61	212.62	2.47	213.14	3.29	213.66	3.76
212.11	0.64	212.63	2.50	213.15	3.30	213.67	3.76
212.12	0.67	212.64	2.53	213.16	3.31	213.68	3.77
212.13	0.70	212.65	2.56	213.17	3.32	213.69	3.78
212.14	0.73	212.66	2.58	213.18	3.33	213.70	3.79
212.15	0.76	212.67	2.61	213.19	3.34	213.71	3.80
212.16	0.79	212.68	2.63	213.20	3.35	213.72	3.80
212.17	0.82	212.69	2.66	213.21	3.36	213.73	3.81
212.18	0.85	212.70	2.67	213.22	3.37	213.74	3.82
212.19	0.89	212.71	2.70	213.23	3.38	213.75	3.83
212.20	0.92	212.72	2.73	213.24	3.39	213.76	3.84
212.21	0.95	212.73	2.75	213.25	3.40	213.77	3.85

Flow Limits

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Page 13

Stage-Discharge for Pond CB2: EX 12" SE (continued)

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
213.78	3.85	214.30	4.25	214.82	4.62	215.34	4.96
213.79	3.86	214.31	4.26	214.83	4.63	215.35	4.96
213.80	3.87	214.32	4.27	214.84	4.63	215.36	4.97
213.81	3.88	214.33	4.28	214.85	4.64	215.37	4.98
213.82	3.89	214.34	4.28	214.86	4.65	215.38	4.98
213.83	3.89	214.35	4.29	214.87	4.65	215.39	4.99
213.84	3.90	214.36	4.30	214.88	4.66	215.40	5.00
213.85	3.91	214.37	4.30	214.89	4.67	215.41	5.00
213.86	3.92	214.38	4.31	214.90	4.67	215.42	5.01
213.87	3.93	214.39	4.32	214.91	4.68	215.43	5.01
213.88	3.93	214.40	4.33	214.92	4.69	215.44	5.02
213.89	3.94	214.41	4.33	214.93	4.69	215.45	5.03
213.90	3.95	214.42	4.34	214.94	4.70	215.46	5.03
213.91	3.96	214.43	4.35	214.95	4.71	215.47	5.04
213.92	3.97	214.44	4.36	214.96	4.71	215.48	5.05
213.93	3.97	214.45	4.36	214.97	4.72	215.49	5.05
213.94	3.98	214.46	4.37	214.98	4.73	215.50	5.06
213.95	3.99	214.47	4.38	214.99	4.73	215.51	5.06
213.96	4.00	214.48	4.38	215.00	4.74	215.52	5.07
213.97	4.00	214.49	4.39	215.01	4.75	215.53	5.08
213.98	4.01	214.50	4.40	215.02	4.75	215.54	5.08
213.99	4.02	214.51	4.41	215.03	4.76	215.55	5.09
214.00	4.03	214.52	4.41	215.04	4.77	215.56	5.09
214.01	4.04	214.53	4.42	215.05	4.77	215.57	5.10
214.02	4.04	214.54	4.43	215.06	4.78	215.58	5.11
214.03	4.05	214.55	4.43	215.07	4.79	215.59	5.11
214.04	4.06	214.56	4.44	215.08	4.79	215.60	5.12
214.05	4.07	214.57	4.45	215.09	4.80	215.61	5.13
214.06	4.07	214.58	4.45	215.10	4.80	215.62	5.13
214.07	4.08	214.59	4.46	215.11	4.81	215.63	5.14
214.08	4.09	214.60	4.47	215.12	4.82	215.64	5.14
214.09	4.10	214.61	4.48	215.13	4.82	215.65	5.15
214.10	4.10	214.62	4.48	215.14	4.83	215.66	5.16
214.11	4.11	214.63	4.49	215.15	4.84	215.67	5.16
214.12	4.12	214.64	4.50	215.16	4.84	215.68	5.17
214.13	4.13	214.65	4.50	215.17	4.85	215.69	5.17
214.14	4.13	214.66	4.51	215.18	4.86	215.70	5.18
214.15	4.14	214.67	4.52	215.19	4.86	215.71	5.19
214.16	4.15	214.68	4.52	215.20	4.87	215.72	5.19
214.17	4.16	214.69	4.53	215.21	4.88	215.73	5.20
214.18	4.16	214.70	4.54	215.22	4.88	215.74	5.20
214.19	4.17	214.71	4.54	215.23	4.89	215.75	5.21
214.20	4.18	214.72	4.55	215.24	4.89	215.76	5.22
214.21	4.19	214.73	4.56	215.25	4.90	215.77	5.22
214.22	4.19	214.74	4.57	215.26	4.91	215.78	5.23
214.23	4.20	214.75	4.57	215.27	4.91	215.79	5.23
214.24	4.21	214.76	4.58	215.28	4.92	215.80	5.24
214.25	4.22	214.77	4.59	215.29	4.93	215.81	5.25
214.26	4.22	214.78	4.59	215.30	4.93	215.82	5.25
214.27	4.23	214.79	4.60	215.31	4.94	215.83	5.26
214.28	4.24	214.80	4.61	215.32	4.95	215.84	5.26
214.29	4.25	214.81	4.61	215.33	4.95	215.85	5.27

Flow Limits

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NRCC 24-hr D 2-Year Rainfall=3.83"

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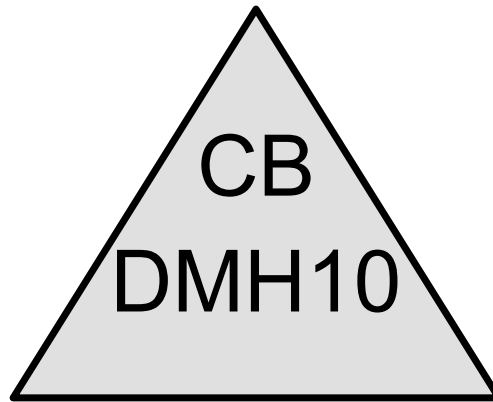
Page 14

Stage-Discharge for Pond CB2: EX 12" SE (continued)

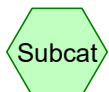
Elevation (feet)	Primary (cfs)
215.86	5.28
215.87	5.28
215.88	5.29
215.89	5.29
215.90	5.30
215.91	5.30
215.92	5.31
215.93	5.32
215.94	5.32
215.95	5.33
215.96	5.33
215.97	5.34
215.98	5.35
215.99	5.35
216.00	5.36
216.01	5.36
216.02	5.37
216.03	5.37
216.04	5.38
216.05	5.39
216.06	5.39
216.07	5.40
216.08	5.40
216.09	5.41
216.10	5.42
216.11	5.42
216.12	5.43
216.13	5.43
216.14	5.44
216.15	5.44
216.16	5.45
216.17	5.46

Note: The max flow is representative of both existing and proposed conditions as the size, slope, and rim elevation are consistent.

Lowest rim elevation of upstream drainage structure is 216.17. The peak flow rate possible occurs at the surcharge elevation of this structure: therefore, the outlet flow is limited to 5.46 cfs.



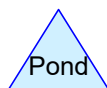
EX 12" RCP Outfall



Subcat



Reach



Pond



Link

Routing Diagram for Flow Limits

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Flow Limits

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Page 2

Stage-Discharge for Pond DMH10: EX 12" RCP Outfall

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
210.20	0.00	210.72	1.01	211.24	2.78	211.76	3.65
210.21	0.00	210.73	1.05	211.25	2.80	211.77	3.67
210.22	0.00	210.74	1.08	211.26	2.83	211.78	3.68
210.23	0.00	210.75	1.12	211.27	2.86	211.79	3.69
210.24	0.01	210.76	1.15	211.28	2.88	211.80	3.70
210.25	0.01	210.77	1.19	211.29	2.90	211.81	3.71
210.26	0.01	210.78	1.22	211.30	2.93	211.82	3.72
210.27	0.02	210.79	1.26	211.31	2.95	211.83	3.74
210.28	0.02	210.80	1.30	211.32	2.98	211.84	3.75
210.29	0.03	210.81	1.33	211.33	3.00	211.85	3.76
210.30	0.04	210.82	1.37	211.34	3.03	211.86	3.77
210.31	0.05	210.83	1.41	211.35	3.05	211.87	3.78
210.32	0.06	210.84	1.45	211.36	3.07	211.88	3.79
210.33	0.07	210.85	1.48	211.37	3.10	211.89	3.80
210.34	0.08	210.86	1.52	211.38	3.12	211.90	3.82
210.35	0.09	210.87	1.56	211.39	3.14	211.91	3.83
210.36	0.11	210.88	1.60	211.40	3.16	211.92	3.84
210.37	0.12	210.89	1.63	211.41	3.19	211.93	3.85
210.38	0.13	210.90	1.67	211.42	3.21	211.94	3.86
210.39	0.15	210.91	1.71	211.43	3.23	211.95	3.87
210.40	0.17	210.92	1.75	211.44	3.25	211.96	3.88
210.41	0.18	210.93	1.79	211.45	3.28	211.97	3.89
210.42	0.20	210.94	1.83	211.46	3.30	211.98	3.90
210.43	0.22	210.95	1.86	211.47	3.32	211.99	3.91
210.44	0.24	210.96	1.90	211.48	3.34	212.00	3.93
210.45	0.26	210.97	1.94	211.49	3.36	212.01	3.94
210.46	0.28	210.98	1.98	211.50	3.38	212.02	3.95
210.47	0.30	210.99	2.01	211.51	3.40	212.03	3.96
210.48	0.32	211.00	2.05	211.52	3.42	212.04	3.97
210.49	0.35	211.01	2.09	211.53	3.43	212.05	3.98
210.50	0.37	211.02	2.13	211.54	3.39	212.06	3.99
210.51	0.39	211.03	2.16	211.55	3.40	212.07	4.00
210.52	0.42	211.04	2.20	211.56	3.41	212.08	4.01
210.53	0.44	211.05	2.23	211.57	3.42	212.09	4.02
210.54	0.47	211.06	2.27	211.58	3.44	212.10	4.03
210.55	0.49	211.07	2.30	211.59	3.45	212.11	4.04
210.56	0.52	211.08	2.34	211.60	3.46	212.12	4.05
210.57	0.55	211.09	2.37	211.61	3.47	212.13	4.07
210.58	0.57	211.10	2.40	211.62	3.49	212.14	4.08
210.59	0.60	211.11	2.44	211.63	3.50	212.15	4.09
210.60	0.63	211.12	2.47	211.64	3.51	212.16	4.10
210.61	0.66	211.13	2.50	211.65	3.52	212.17	4.11
210.62	0.69	211.14	2.53	211.66	3.54	212.18	4.12
210.63	0.72	211.15	2.56	211.67	3.55	212.19	4.13
210.64	0.75	211.16	2.58	211.68	3.56	212.20	4.14
210.65	0.78	211.17	2.61	211.69	3.57	212.21	4.15
210.66	0.81	211.18	2.63	211.70	3.58	212.22	4.16
210.67	0.85	211.19	2.66	211.71	3.60	212.23	4.17
210.68	0.88	211.20	2.67	211.72	3.61	212.24	4.18
210.69	0.91	211.21	2.70	211.73	3.62	212.25	4.19
210.70	0.95	211.22	2.73	211.74	3.63	212.26	4.20
210.71	0.98	211.23	2.75	211.75	3.64	212.27	4.21

Flow Limits

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Page 3

Stage-Discharge for Pond DMH10: EX 12" RCP Outfall (continued)

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
212.28	4.22	212.80	4.72	213.32	5.17	213.84	5.58
212.29	4.23	212.81	4.73	213.33	5.18	213.85	5.59
212.30	4.24	212.82	4.74	213.34	5.19	213.86	5.60
212.31	4.25	212.83	4.75	213.35	5.19	213.87	5.61
212.32	4.26	212.84	4.75	213.36	5.20	213.88	5.61
212.33	4.27	212.85	4.76	213.37	5.21	213.89	5.62
212.34	4.28	212.86	4.77	213.38	5.22	213.90	5.63
212.35	4.29	212.87	4.78	213.39	5.23	213.91	5.64
212.36	4.30	212.88	4.79	213.40	5.23	213.92	5.64
212.37	4.31	212.89	4.80	213.41	5.24	213.93	5.65
212.38	4.32	212.90	4.81	213.42	5.25	213.94	5.66
212.39	4.33	212.91	4.82	213.43	5.26	213.95	5.67
212.40	4.34	212.92	4.83	213.44	5.27	213.96	5.67
212.41	4.35	212.93	4.83	213.45	5.28	213.97	5.68
212.42	4.36	212.94	4.84	213.46	5.28	213.98	5.69
212.43	4.37	212.95	4.85	213.47	5.29	213.99	5.70
212.44	4.38	212.96	4.86	213.48	5.30	214.00	5.70
212.45	4.39	212.97	4.87	213.49	5.31	214.01	5.71
212.46	4.40	212.98	4.88	213.50	5.32	214.02	5.72
212.47	4.41	212.99	4.89	213.51	5.32	214.03	5.73
212.48	4.42	213.00	4.90	213.52	5.33	214.04	5.73
212.49	4.43	213.01	4.90	213.53	5.34	214.05	5.74
212.50	4.44	213.02	4.91	213.54	5.35	214.06	5.75
212.51	4.45	213.03	4.92	213.55	5.36	214.07	5.76
212.52	4.46	213.04	4.93	213.56	5.36	214.08	5.76
212.53	4.47	213.05	4.94	213.57	5.37	214.09	5.77
212.54	4.48	213.06	4.95	213.58	5.38	214.10	5.78
212.55	4.49	213.07	4.96	213.59	5.39	214.11	5.79
212.56	4.50	213.08	4.97	213.60	5.40	214.12	5.79
212.57	4.50	213.09	4.97	213.61	5.40	214.13	5.80
212.58	4.51	213.10	4.98	213.62	5.41	214.14	5.81
212.59	4.52	213.11	4.99	213.63	5.42	214.15	5.82
212.60	4.53	213.12	5.00	213.64	5.43	214.16	5.82
212.61	4.54	213.13	5.01	213.65	5.43	214.17	5.83
212.62	4.55	213.14	5.02	213.66	5.44	214.18	5.84
212.63	4.56	213.15	5.03	213.67	5.45	214.19	5.84
212.64	4.57	213.16	5.03	213.68	5.46	214.20	5.85
212.65	4.58	213.17	5.04	213.69	5.47	214.21	5.86
212.66	4.59	213.18	5.05	213.70	5.47	214.22	5.87
212.67	4.60	213.19	5.06	213.71	5.48	214.23	5.87
212.68	4.61	213.20	5.07	213.72	5.49	214.24	5.88
212.69	4.62	213.21	5.08	213.73	5.50	214.25	5.89
212.70	4.63	213.22	5.08	213.74	5.51	214.26	5.90
212.71	4.64	213.23	5.09	213.75	5.51	214.27	5.90
212.72	4.64	213.24	5.10	213.76	5.52	214.28	5.91
212.73	4.65	213.25	5.11	213.77	5.53	214.29	5.92
212.74	4.66	213.26	5.12	213.78	5.54	214.30	5.92
212.75	4.67	213.27	5.13	213.79	5.54	214.31	5.93
212.76	4.68	213.28	5.14	213.80	5.55	214.32	5.94
212.77	4.69	213.29	5.14	213.81	5.56	214.33	5.95
212.78	4.70	213.30	5.15	213.82	5.57	214.34	5.95
212.79	4.71	213.31	5.16	213.83	5.57	214.35	5.96

Flow Limits

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Page 4

Stage-Discharge for Pond DMH10: EX 12" RCP Outfall (continued)

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
214.36	5.97	214.88	6.33	215.40	6.67	215.92	7.00
214.37	5.98	214.89	6.34	215.41	6.68	215.93	7.00
214.38	5.98	214.90	6.34	215.42	6.69	215.94	7.01
214.39	5.99	214.91	6.35	215.43	6.69	215.95	7.02
214.40	6.00	214.92	6.36	215.44	6.70	215.96	7.02
214.41	6.00	214.93	6.36	215.45	6.70	215.97	7.03
214.42	6.01	214.94	6.37	215.46	6.71	215.98	7.03
214.43	6.02	214.95	6.38	215.47	6.72	215.99	7.04
214.44	6.03	214.96	6.38	215.48	6.72	216.00	7.05
214.45	6.03	214.97	6.39	215.49	6.73	216.01	7.05
214.46	6.04	214.98	6.40	215.50	6.74	216.02	7.06
214.47	6.05	214.99	6.40	215.51	6.74	216.03	7.07
214.48	6.05	215.00	6.41	215.52	6.75	216.04	7.07
214.49	6.06	215.01	6.42	215.53	6.76	216.05	7.08
214.50	6.07	215.02	6.42	215.54	6.76	216.06	7.08
214.51	6.07	215.03	6.43	215.55	6.77	216.07	7.09
214.52	6.08	215.04	6.44	215.56	6.77	216.08	7.10
214.53	6.09	215.05	6.44	215.57	6.78	216.09	7.10
214.54	6.10	215.06	6.45	215.58	6.79	216.10	7.11
214.55	6.10	215.07	6.46	215.59	6.79	216.11	7.11
214.56	6.11	215.08	6.46	215.60	6.80	216.12	7.12
214.57	6.12	215.09	6.47	215.61	6.81	216.13	7.13
214.58	6.12	215.10	6.48	215.62	6.81	216.14	7.13
214.59	6.13	215.11	6.48	215.63	6.82	216.15	7.14
214.60	6.14	215.12	6.49	215.64	6.82	216.16	7.14
214.61	6.14	215.13	6.50	215.65	6.83	216.17	7.15
214.62	6.15	215.14	6.50	215.66	6.84	216.18	7.16
214.63	6.16	215.15	6.51	215.67	6.84	216.19	7.16
214.64	6.17	215.16	6.52	215.68	6.85	216.20	7.17
214.65	6.17	215.17	6.52	215.69	6.86	216.21	7.17
214.66	6.18	215.18	6.53	215.70	6.86	216.22	7.18
214.67	6.19	215.19	6.54	215.71	6.87	216.23	7.19
214.68	6.19	215.20	6.54	215.72	6.87	216.24	7.19
214.69	6.20	215.21	6.55	215.73	6.88	216.25	7.20
214.70	6.21	215.22	6.56	215.74	6.89	216.26	7.20
214.71	6.21	215.23	6.56	215.75	6.89	216.27	7.21
214.72	6.22	215.24	6.57	215.76	6.90	216.28	7.22
214.73	6.23	215.25	6.58	215.77	6.91	216.29	7.22
214.74	6.23	215.26	6.58	215.78	6.91	216.30	7.23
214.75	6.24	215.27	6.59	215.79	6.92	216.31	7.23
214.76	6.25	215.28	6.60	215.80	6.92	216.32	7.24
214.77	6.26	215.29	6.60	215.81	6.93	216.33	7.24
214.78	6.26	215.30	6.61	215.82	6.94	216.34	7.25
214.79	6.27	215.31	6.61	215.83	6.94	216.35	7.26
214.80	6.28	215.32	6.62	215.84	6.95	216.36	7.26
214.81	6.28	215.33	6.63	215.85	6.96	216.37	7.27
214.82	6.29	215.34	6.63	215.86	6.96	216.38	7.27
214.83	6.30	215.35	6.64	215.87	6.97	216.39	7.28
214.84	6.30	215.36	6.65	215.88	6.97	216.40	7.29
214.85	6.31	215.37	6.65	215.89	6.98	216.41	7.29
214.86	6.32	215.38	6.66	215.90	6.99	216.42	7.30
214.87	6.32	215.39	6.67	215.91	6.99	216.43	7.30

Flow Limits

Prepared by Woodard & Curran, Inc

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NRCC 24-hr D 2-Year Rainfall=3.83"

Printed 8/14/2024

Page 5

Stage-Discharge for Pond DMH10: EX 12" RCP Outfall (continued)

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
216.44	7.31	216.96	7.61	217.48	7.89	218.00	8.17
216.45	7.32	216.97	7.61	217.49	7.90	218.01	8.18
216.46	7.32	216.98	7.62	217.50	7.91	218.02	8.18
216.47	7.33	216.99	7.62	217.51	7.91	218.03	8.19
216.48	7.33	217.00	7.63	217.52	7.92	218.04	8.19
216.49	7.34	217.01	7.64	217.53	7.92	218.05	8.20
216.50	7.34	217.02	7.64	217.54	7.93	218.06	8.20
216.51	7.35	217.03	7.65	217.55	7.93	218.07	8.21
216.52	7.36	217.04	7.65	217.56	7.94	218.08	8.21
216.53	7.36	217.05	7.66	217.57	7.94	218.09	8.22
216.54	7.37	217.06	7.66	217.58	7.95	218.10	8.22
216.55	7.37	217.07	7.67	217.59	7.95	218.11	8.23
216.56	7.38	217.08	7.68	217.60	7.96	218.12	8.23
216.57	7.39	217.09	7.68	217.61	7.97	218.13	8.24
216.58	7.39	217.10	7.69	217.62	7.97	218.14	8.25
216.59	7.40	217.11	7.69	217.63	7.98	218.15	8.25
216.60	7.40	217.12	7.70	217.64	7.98	218.16	8.26
216.61	7.41	217.13	7.70	217.65	7.99	218.17	8.26
216.62	7.41	217.14	7.71	217.66	7.99	218.18	8.27
216.63	7.42	217.15	7.71	217.67	8.00	218.19	8.27
216.64	7.43	217.16	7.72	217.68	8.00	218.20	8.28
216.65	7.43	217.17	7.73	217.69	8.01	218.21	8.28
216.66	7.44	217.18	7.73	217.70	8.01	218.22	8.29
216.67	7.44	217.19	7.74	217.71	8.02	218.23	8.29
216.68	7.45	217.20	7.74	217.72	8.02	218.24	8.30
216.69	7.45	217.21	7.75	217.73	8.03	218.25	8.30
216.70	7.46	217.22	7.75	217.74	8.03	218.26	8.31
216.71	7.47	217.23	7.76	217.75	8.04	218.27	8.31
216.72	7.47	217.24	7.76	217.76	8.05	218.28	8.32
216.73	7.48	217.25	7.77	217.77	8.05	218.29	8.32
216.74	7.48	217.26	7.77	217.78	8.06	218.30	8.33
216.75	7.49	217.27	7.78	217.79	8.06	218.31	8.33
216.76	7.49	217.28	7.79	217.80	8.07	218.32	8.34
216.77	7.50	217.29	7.79	217.81	8.07	218.33	8.34
216.78	7.51	217.30	7.80	217.82	8.08	218.34	8.35
216.79	7.51	217.31	7.80	217.83	8.08	218.35	8.35
216.80	7.52	217.32	7.81	217.84	8.09	218.36	8.36
216.81	7.52	217.33	7.81	217.85	8.09	218.37	8.36
216.82	7.53	217.34	7.82	217.86	8.10	218.38	8.37
216.83	7.53	217.35	7.82	217.87	8.10	218.39	8.37
216.84	7.54	217.36	7.83	217.88	8.11	218.40	8.38
216.85	7.55	217.37	7.84	217.89	8.11	218.41	8.38
216.86	7.55	217.38	7.84	217.90	8.12	218.42	8.39
216.87	7.56	217.39	7.85	217.91	8.12	218.43	8.39
216.88	7.56	217.40	7.85	217.92	8.13	218.44	8.40
216.89	7.57	217.41	7.86	217.93	8.14	218.45	8.40
216.90	7.57	217.42	7.86	217.94	8.14	218.46	8.41
216.91	7.58	217.43	7.87	217.95	8.15	218.47	8.41
216.92	7.59	217.44	7.87	217.96	8.15	218.48	8.42
216.93	7.59	217.45	7.88	217.97	8.16	218.49	8.42
216.94	7.60	217.46	7.88	217.98	8.16	218.50	8.43
216.95	7.60	217.47	7.89	217.99	8.17	218.51	8.44

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NRCC 24-hr D 2-Year Rainfall=3.83"

Printed 8/14/2024

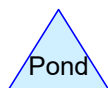
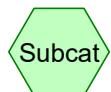
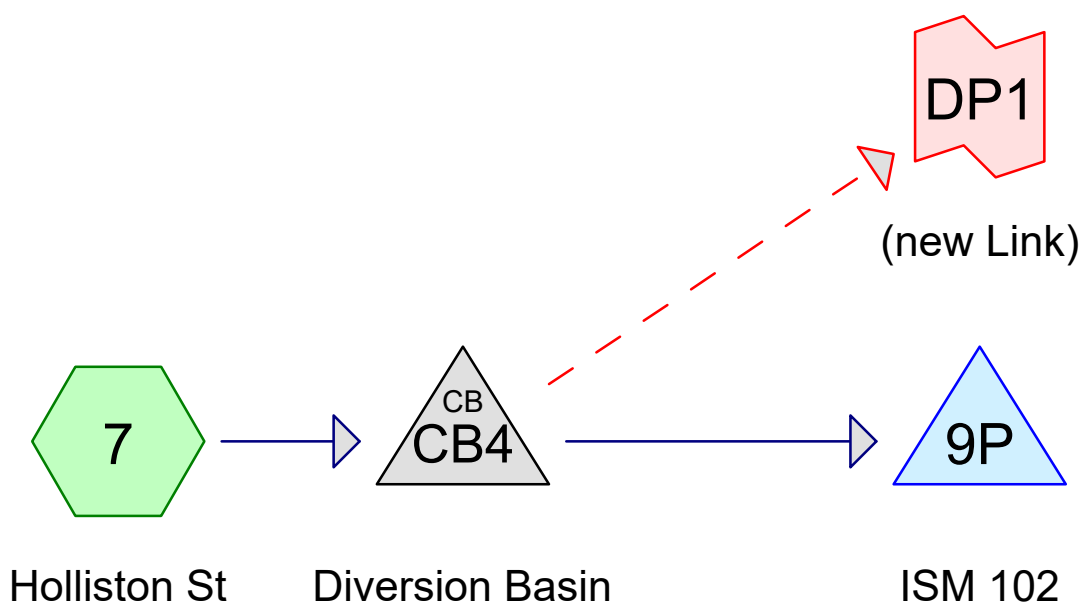
Page 6

Stage-Discharge for Pond DMH10: EX 12" RCP Outfall (continued)

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
218.52	8.44	219.04	8.70
218.53	8.45	219.05	8.70
218.54	8.45	219.06	8.71
218.55	8.46	219.07	8.71
218.56	8.46	219.08	8.72
218.57	8.47	219.09	8.72
218.58	8.47	219.10	8.73
218.59	8.48	219.11	8.73
218.60	8.48	219.12	8.74
218.61	8.49	219.13	8.74
218.62	8.49	219.14	8.75
218.63	8.50	219.15	8.75
218.64	8.50	219.16	8.76
218.65	8.51	219.17	8.76
218.66	8.51	219.18	8.77
218.67	8.52	219.19	8.77
218.68	8.52	219.20	8.78
218.69	8.53	219.21	8.78
218.70	8.53	219.22	8.79
218.71	8.54	219.23	8.79
218.72	8.54	219.24	8.80
218.73	8.55	219.25	8.80
218.74	8.55	219.26	8.81
218.75	8.56	219.27	8.81
218.76	8.56	219.28	8.82
218.77	8.57	219.29	8.82
218.78	8.57		
218.79	8.58		
218.80	8.58		
218.81	8.59		
218.82	8.59		
218.83	8.60		
218.84	8.60		
218.85	8.61		
218.86	8.61		
218.87	8.62		
218.88	8.62		
218.89	8.63		
218.90	8.63		
218.91	8.64		
218.92	8.64		
218.93	8.65		
218.94	8.65		
218.95	8.66		
218.96	8.66		
218.97	8.67		
218.98	8.67		
218.99	8.68		
219.00	8.68		
219.01	8.69		
219.02	8.69		
219.03	8.69		

Note: The max flow is representative of both existing and proposed conditions as the size, slope, and rim elevation are consistent.

Lowest rim elevation of upstream drainage structure is 219.29. The peak flow rate possible occurs at the surcharge elevation of this structure: therefore, the outlet flow is limited to 8.82 cfs.



Summary for Subcatchment 7: Holliston St

Runoff = 0.14 cfs @ 12.22 hrs, Volume= 0.017 af, Depth= 0.26"
 Routed to Pond CB4 : Diversion Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs
 NRCC 24-hr D ISM 102 WQV Rainfall=1.40"

	Area (sf)	CN	Description
*	8,042	98	Paved parking
	16,394	74	>75% Grass cover, Good, HSG C
	9,349	80	>75% Grass cover, Good, HSG D
	33,785	81	Weighted Average
	25,743		76.20% Pervious Area
	8,042		23.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0500	0.21		Sheet Flow, Sheet: Grass Grass: Short n= 0.150 P2= 3.24"
5.6	50	0.0200	0.15		Sheet Flow, Sheet: Grass Grass: Short n= 0.150 P2= 3.24"
2.4	210	0.0095	1.46		Shallow Concentrated Flow, Grass: Flat Grassed Waterway Kv= 15.0 fps
0.5	69	0.0150	2.49		Shallow Concentrated Flow, Paved Paved Kv= 20.3 fps
12.4	379	Total			

1" of water quality volume over the contributing impervious area is equal to 670 cf or 0.015 af. The 1.40" storm event generates 0.017 af of runoff which is fully diverted to ISM102.

Summary for Pond 9P: ISM 102

Inflow Area = 0.776 ac, 23.80% Impervious, Inflow Depth = 0.26" for ISM 102 WQV event
 Inflow = 0.14 cfs @ 12.22 hrs, Volume= 0.017 af
 Outflow = 0.01 cfs @ 17.76 hrs, Volume= 0.017 af, Atten= 93%, Lag= 332.6 min
 Discarded = 0.01 cfs @ 17.76 hrs, Volume= 0.017 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 210.74' @ 17.76 hrs Surf.Area= 213 sf Storage= 334 cf

Flood Elev= 215.00' Surf.Area= 213 sf Storage= 835 cf

Plug-Flow detention time= 411.0 min calculated for 0.017 af (100% of inflow)

Center-of-Mass det. time= 411.0 min (1,352.3 - 941.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	208.25'	404 cf	10.33'W x 20.65'L x 6.75'H Field A 1,440 cf Overall - 431 cf Embedded = 1,010 cf x 40.0% Voids
#2A	209.00'	431 cf	ADS_StormTech MC-7200 +Cap x 2 Inside #1 Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap Cap Storage= 39.5 cf x 2 x 1 rows = 79.0 cf
		835 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	208.25'	1.020 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 206.00' Phase-In= 0.01'

Discarded OutFlow Max=0.01 cfs @ 17.76 hrs HW=210.74' (Free Discharge)

↑ **1=Exfiltration** (Controls 0.01 cfs)

Pond 9P: ISM 102 - Chamber Wizard Field A**Chamber Model = ADS_StormTechMC-7200+Cap (ADS StormTech®MC-7200 with cap volume)**

Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf

Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap

Cap Storage= 39.5 cf x 2 x 1 rows = 79.0 cf

2 Chambers/Row x 6.59' Long +2.73' Cap Length x 2 = 18.65' Row Length +12.0" End Stone x 2 = 20.65'
Base Length

1 Rows x 100.0" Wide + 12.0" Side Stone x 2 = 10.33' Base Width

9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

2 Chambers x 175.9 cf + 39.5 cf Cap Volume x 2 x 1 Rows = 430.8 cf Chamber Storage

1,440.3 cf Field - 430.8 cf Chambers = 1,009.6 cf Stone x 40.0% Voids = 403.8 cf Stone Storage

Chamber Storage + Stone Storage = 834.6 cf = 0.019 af

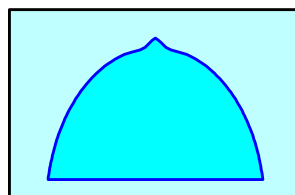
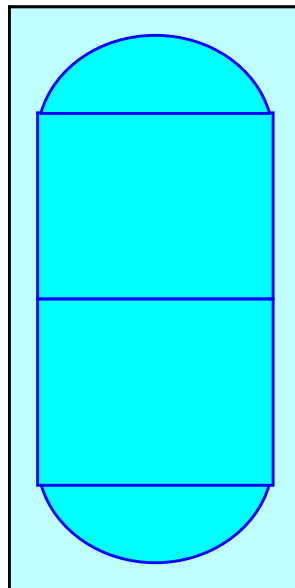
Overall Storage Efficiency = 57.9%

Overall System Size = 20.65' x 10.33' x 6.75'

2 Chambers

53.3 cy Field

37.4 cy Stone



Summary for Pond CB4: Diversion Basin

Inflow Area = 0.776 ac, 23.80% Impervious, Inflow Depth = 0.26" for ISM 102 WQV event
 Inflow = 0.14 cfs @ 12.22 hrs, Volume= 0.017 af
 Outflow = 0.14 cfs @ 12.22 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.14 cfs @ 12.22 hrs, Volume= 0.017 af
 Routed to Pond 9P : ISM 102
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link DP1 : (new Link)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 213.93' @ 12.22 hrs

Flood Elev= 218.01'

Device	Routing	Invert	Outlet Devices
#1	Primary	213.75'	12.000" Round 12" HDPE to ISM102 L= 10.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.75' / 213.25' S= 0.0500 ' S= 0.0500 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Secondary	214.00'	10.000" Round 10" RCP Outlet L= 40.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.00' / 212.80' S= 0.0300 ' S= 0.0300 ' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.55 sf

Primary OutFlow Max=0.14 cfs @ 12.22 hrs HW=213.93' TW=209.02' (Dynamic Tailwater)

↑1=12" HDPE to ISM102 (Inlet Controls 0.14 cfs @ 1.46 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=213.75' TW=0.00' (Dynamic Tailwater)

↑2=10" RCP Outlet (Controls 0.00 cfs)

100% of water quality flow is diverted to ISM102 via the primary outlet

APPENDIX D: STORMWATER DESIGN CALCUALTIONS

WQV Calculations

BATT Summary

TSS Removal Calculations

Riprap Sizing Calculations



40 Shattuck Road | Suite 110 T 800.426.4262
Andover, Massachusetts 01810 T 978.557.8150
www.woodardcurran.com F 978.557.7948

CLIENT: Medway, MA
PROJECT: Medway Middle School Green Stormwater Infrastructure
DESIGNED BY: CDJ DATE: 8/20/2024
CHECKED BY: CNQ DATE: 8/26/2024
PROJECT NO. 0234166.09 SHEET NO. 1 of 5

WQV and Basin Sizing

RGM 101: Enhanced Biofiltration Basin

Minimum Requirements		
Biofiltration Media Depth	18	in
Outlet End Pea Gravel Depth	3	in
Outlet End Crushed Stone	14	in
PVC Liner Gap (10% of Base)	4.5	ft
ISR Volume (26% WQV)	455	CF
Required Basin WQV*	1,749	CF
Pretreatment Volume**	120	CF

*Calculated as 1" of runoff over the total catchment impervious area.

**Calculated as 10% of 1" of runoff over contributing catchment impervious area.

Note: Sediment forebay treats a portion of the entire watershed with a contributing WQV for 1,202 CF from 14,424 SF of impervious area.

Basin Details		
Max Base Length	45	ft
Bottom of Basin Footprint	1,759	SF
Bottom of Basin Elevation	224.20	ft
Outlet Control Elevation	224.30	ft
Bottom of Media Elevation	222.70	ft
Outlet Invert Elevation	222.20	ft
Bottom of Stone Elevation	221.20	ft
Catchment Impervious Area	20,983	SF

Provided		
Biofiltration Media Depth (30% Voids)	18	in
Outlet End Pea Gravel Depth (40% Voids)	4	in
Outlet End Crushed Stone (40% Voids)	14	in
Max Gap in Liner	4.5	ft
ISR Volume	704	CF
Pretreatment Volume	170	CF

Min. Requirement Met?

Yes

Yes

Yes

Yes

Yes

Yes

Ponding Volume	189	CF	Includes ponding in sediment forebay above the forebay weir.
Media Storage Volume	1,847	CF	
Total WQV Provided	2,036	CF	

Provided WQV > Required WQV; therefore, the water quality goal has been met.



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CLIENT: Medway, MA
PROJECT: Medway Middle School Green Stormwater Infrastructure
DESIGNED BY: CDJ DATE: 8/20/2024
CHECKED BY: CNQ DATE: 8/26/2024
PROJECT NO. 0234166.09 SHEET NO. 2 of 5

WQV and Basin Sizing

RGM 102: Bioretention Basin

Minimum Requirements		
Biofiltration Media Depth	24	in
Gravel Base Depth	8	in
Required Basin WQV*	1,543	CF
Pretreatment Volume**	154	CF

*Calculated as 1" of runoff over the total catchment impervious area.

**Calculated as 10% of 1" of runoff over contributing catchment impervious area.

Note: Sediment forebay treats the WQV of entire catchment area.

Basin Details		
Bottom of Basin Footprint	697	SF
Outlet Control Elevation	221.00	ft
Bottom of Basin Elevation	220.00	ft
Bottom of Media Elevation	218.00	ft
Catchment Impervious Area	18,515	SF

Provided		
Biofiltration Media Depth (30% Voids)	24	in
Gravel Base Depth (40% Voids)	8	in
Pretreatment Volume	157	CF

Min. Requirement Met?

Yes

Yes

Yes

Ponding Volume	947	CF
Media Storage Volume	604	CF
Total WQV Provided	1,551	CF

Provided WQV > Required WQV; therefore, the water quality goal has been met.



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CLIENT: Medway, MA
PROJECT: Medway Middle School Green Stormwater Infrastructure
DESIGNED BY: CDJ DATE: 8/20/2024
CHECKED BY: CNQ DATE: 8/26/2024
PROJECT NO. 0234166.09 SHEET NO. 3 of 5

WQV and Basin Sizing

RGM 103: Bioretention Basin

Minimum Requirements		
Biofiltration Media Depth	24	in
Gravel Base Depth	8	in
Required Basin WQV*	4,081	CF
Pretreatment Volume**	408	CF

*Calculated as 1" of runoff over the total catchment impervious area.

**Calculated as 10% of 1" of runoff over contributing catchment impervious area.

Note: Two sediment forebays used to treat the WQV of entire catchment area. See table below.

Basin Details		
Bottom of Basin Footprint	714	SF
Outlet Control Elevation	217.50	ft
Bottom of Basin Elevation	216.00	ft
Bottom of Media Elevation	214.00	ft
Catchment Impervious Area	48,968	SF

Sediment Forebay Pretreatment				
Forebay	Contributing IA	Required Volume	Provided Volume	Total Volume Provided
6P	10,484	87	129	692
7P	38,484	321	563	

Provided		
Biofiltration Media Depth	24	in
Gravel Base Depth	8	in
Pretreatment Volume	692	CF

Min. Requirement Met?

Yes

Yes

Yes

Ponding Volume 1,748 CF
Media Storage Volume 619 CF
Total WQV Provided 2,367 CF

Provided WQV < Required WQV. The water quality goal has been met to the maximum extent practicable given the existing site constraints for this redevelopment project.



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CLIENT: Medway, MA
PROJECT: Medway Middle School Green Stormwater Infrastructure
DESIGNED BY: CDJ DATE: 8/20/2024
CHECKED BY: CNQ DATE: 8/26/2024
PROJECT NO. 0234166.09 SHEET NO. 4 of 5

WQV and Basin Sizing

ISM 101: Infiltration Chamber System

Minimum Requirements		
Required Chamber WQV*	27,107	CF

*Calculated as 1" of runoff over the total catchment impervious area.

Note: Pretreatment provided by hydrodynamic separators and isolator rows prior to infiltration.

Chamber Details			
Top of Stone Elevation		215.00	ft
Top of Chamber Elevation		214.00	ft
Bottom of Chamber Elevation		209.00	ft
Bottom of Stone Elevation		208.25	ft
Outlet Control Invert Elevation		214.00	ft
Catchment Impervious Area		7.47	ac

Chamber System Provided		
4 Rows with 25 Chambers Each		
Total Volume (includes voids in chambers and stone)	28222	CF

Total WQV Provided 25,632 CF

Note: WQV provided is the portion of the chamber system volume below the outlet control invert elevation.

Provided WQV < Required WQV. The water quality goal has been met to the maximum extent practicable given the existing site constraints for this redevelopment project.



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CLIENT:	Medway, MA		
PROJECT:	Medway Middle School Green Stormwater Infrastructure		
DESIGNED BY:	CDJ	DATE:	10/9/2024
CHECKED BY:	CNQ	DATE:	10/16/2024
PROJECT NO.	0234166.09	SHEET NO.	5 of 5

WQV and Basin Sizing

ISM 102: Infiltration Chamber System

Minimum Requirements		
Required Chamber WQV*	670	CF

*Calculated as 1" of runoff over the total catchment impervious area.

Note: Pretreatment provided by a hydrodynamic separator prior to infiltration.

Chamber Details		
Top of Stone Elevation	215.00	ft
Top of Chamber Elevation	214.00	ft
Bottom of Chamber Elevation	209.00	ft
Bottom of Stone Elevation	208.25	ft
Outlet Control Invert Elevation	214.00	ft
Catchment Impervious Area	0.19	ac

Chamber System Provided		
1 Row with 2 Chambers		
Total Volume (includes voids in chambers and stone)	835	CF

Total WQV Provided **749** **CF**

Note: WQV provided is the portion of the chamber system volume below the outlet control invert elevation.

Provided WQV > Required WQV; therefore, the water quality goal has been met.

Original BATT Exports (Prior to Adjustment to Account for Treatment Train)

State	MASSACHUSETTS
Municipality	MEDWAY
Permit Type	MS4
Permit Number	
Major Watershed	CHARLES
TP Load Reduction Target	N/A
TN Load Reduction Target	N/A
TSS Load Reduction Target	N/A

Table 1. Project Summary Credit for MEDWAY, MASSACHUSETTS

Project Type	Removed Phosphorus Load (lb/yr)	Removed Nitrogen Load (lb/yr)	Removed Sediment Load (lb/yr)
Structural	18.3	162.5	4849.7
Non-Structural	0	0	0
Land Use Conversion	0	0	0
Total	18.3	162.5	4849.7

Table 2. Structural Project Summary for MEDWAY, MASSACHUSETTS

Project ID	BMP Type	BMP Storage Capacity (ft ³)	Phosphorus BMP Efficiency (%)	Nitrogen BMP Efficiency (%)	Sediment BMP Efficiency (%)	Removed Phosphorus Load (lb/yr)	Removed Nitrogen Load (lb/yr)	Removed Sediment Load (lb/yr)	Impervious Area Treated (ac)	Runoff Depth (in.)
ISM 101 includes RGM 101 Area	INFILTRATION TRENCH	25632	97.02	99.51	100	14.74	130.41	3789.45	7.467	0.71
RGM 101	ENHANCED BIOFILTRATION	2036	76.468	75.41	99.059	0.651	5.126	338.709	0.481	>1.0
RGM 102	INFILTRATION BASIN	1551	96.9	99.94	100	0.76	6.67	167.06	0.43	0.94
RGM 103	INFILTRATION BASIN	2367	88.97	95.54	98.66	1.78	16.29	426.90	1.13	0.58
ISM 102	INFILTRATION TRENCH	749	93.93	98.48	100	0.418	4.019	127.60	0.185	>0.80

TREATMENT TRAIN CALCULATIONS – WOODARD & CURRAN

Treatment Train:

Catchment area for RGM 101 is treated by an enhanced biofiltration basin and is then treated by an infiltration chamber system (ISM 101).

The starting loads for the chamber system to be treated in the infiltration chamber exports are currently double counting the treated loads from the RGM 101 catchment area. The amount removed in the enhanced biofiltration system is required to be subtracted from the chamber starting loads.

$$Starting\ Load_{\frac{lb}{yr}}^{chamber} = \left(\frac{Amount\ Removed_{\frac{lb}{yr}}}{Removal\ Efficiency} \right)_{Chambers} - \left(Amount\ Removed_{\frac{lb}{yr}} \right)_{Biofilt}$$

$$Updated\ Load\ Removed_{\frac{lb}{yr}}^{chamber} = \left(Starting\ Load_{\frac{lb}{yr}} \right)_{Chambers} * (Removal\ Efficiency)_{Chamber}$$

Pollutant	Amount Removed (Chamber)(lb/yr)	Removal Efficiency (Chamber) (%)	Amount Removed (Biofiltration)(lb/yr)	Chamber Starting Load (lb/yr)	Updated Load Removed (lb/yr)
TP	14.74	97.02	0.651	14.542	14.108
TN	130.41	99.51	5.126	125.926	125.309
TSS	3789.45	100.00	338.709	3450.741	3450.741

Manually updated BATT Exports to reflect treatment train load removals

State	MASSACHUSETTS
Municipality	MEDWAY
Permit Type	MS4
Permit Number	
Major Watershed	CHARLES
TP Load Reduction Target	N/A
TN Load Reduction Target	N/A
TSS Load Reduction Target	N/A

Table 1. Project Summary Credit for MEDWAY, MASSACHUSETTS

Project Type	Removed Phosphorus Load (lb/yr)	Removed Nitrogen Load (lb/yr)	Removed Sediment Load (lb/yr)
Structural	17.7	157.4	4511.0
Non-Structural	0	0	0
Land Use Conversion	0	0	0
Total	17.7	157.4	4511.0

Table 2. Structural Project Summary for MEDWAY, MASSACHUSETTS

Project ID	BMP Type	BMP Storage Capacity (ft³)	Phosphorus BMP Efficiency (%)	Nitrogen BMP Efficiency (%)	Sediment BMP Efficiency (%)	Removed Phosphorus Load (lb/yr)	Removed Nitrogen Load (lb/yr)	Removed Sediment Load (lb/yr)	Impervious Area Treated (ac)	Runoff Depth (in.)
ISM 101 includes RGM 101 Area	INFILTRATION TRENCH	25632	97.02	99.51	100	14.108	125.309	3450.741	7.467	0.71
RGM 101	ENHANCED BIOFILTRATION	2036	76.468	75.41	99.059	0.651	5.126	338.709	0.481	>1.0
RGM 102	INFILTRATION BASIN	1551	96.9	99.94	100	0.76	6.67	167.06	0.43	0.94
RGM 103	INFILTRATION BASIN	2367	88.97	95.54	98.66	1.78	16.29	426.9	1.13	0.58
ISM 102	INFILTRATION TRENCH	749	93.93	98.48	100	0.418	4.019	127.60	0.185	>0.80

SCM does not infiltrate.

V

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: 45 Holliston St, Medway, MA

TSS Removal Calculation Worksheet	B	C	D	E	F
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
	Sediment Forebay	0.25	1.00	0.25	0.75
	RGM 101 Bioretention Area	0.90	0.75	0.68	0.08
		0.00	0.08	0.00	0.08
		0.00	0.08	0.00	0.08
		0.00	0.08	0.00	0.08

Total TSS Removal =

93%

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

Project: Medway Middle School Green
Prepared By: Stormwater Infrastructure
Collin Johansson
Date: 8/6/2024

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

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

25% TSS removal provided prior to infiltration. Infiltration occurs outside of Zone II area, but additional pretreatment recommended (street sweeping of catchment area).

v

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

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.

Location: 45 Holliston St, Medway, MA

TSS Removal Calculation Worksheet	B	C	D	E	F
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
	Sediment Forebay	0.25	1.00	0.25	0.75
	RGM 102 Bioretention Area	0.90	0.75	0.68	0.08
		0.00	0.08	0.00	0.08
		0.00	0.08	0.00	0.08
		0.00	0.08	0.00	0.08

Total TSS Removal =

93%

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

Project: Medway Middle School Green
Prepared By: Stormwater Infrastructure
Collin Johansson
Date: 8/6/2024

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

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

44% TSS removal provided prior to infiltration. Infiltration occurs within Zone II area. Additional pretreatment recommended (street sweeping of catchment area).

v

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

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.

Location: 45 Holliston St, Medway, MA

TSS Removal Calculation Worksheet	B	C	D	E	F
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
	(Rain Guardian Turret) Proprietary Treatment Practice	0.25	1.00	0.25	0.75
	Sediment Forebay	0.25	0.75	0.25	0.56
	RGM 103 Bioretention Area	0.90	0.56	0.50	0.06
		0.00	0.06	0.00	0.06
		0.00	0.06	0.00	0.06

Total TSS Removal =

94%

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

Project: Medway Middle School Green
Prepared By: Stormwater Infrastructure
Collin Johansson
Date: 8/6/2024

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

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

44% TSS removal provided prior to infiltration. Infiltration occurs within Zone II area. Additional pretreatment recommended (street sweeping of catchment area).

v

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

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.

Location: 45 Holliston St, Medway, MA

TSS Removal Calculation Worksheet	B	C	D	E	F
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
	(HDS) Proprietary Treatment Practice	0.80	1.00	0.80	0.20
	(ISM 101) Subsurface Infiltration Structure	0.80	0.20	0.16	0.04
		0.00	0.04	0.00	0.04
		0.00	0.04	0.00	0.04
		0.00	0.04	0.00	0.04

Total TSS Removal =

96%

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

Project: Medway Middle School Green
Prepared By: Stormwater Infrastructure
Collin Johansson
Date: 8/6/2024

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

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

44% TSS removal provided prior to infiltration. Infiltration occurs within Zone II area. Additional pretreatment recommended (street sweeping of catchment area).

v

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

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.

Location: 45 Holliston St, Medway, MA

TSS Removal Calculation Worksheet	B	C	D	E	F
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
	(HDS) Proprietary Treatment Practice	0.80	1.00	0.80	0.20
	(ISM 102) Subsurface Infiltration Structure	0.80	0.20	0.16	0.04
		0.00	0.04	0.00	0.04
		0.00	0.04	0.00	0.04
		0.00	0.04	0.00	0.04

Total TSS Removal =

96%

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

Project: Medway Middle School Green
Stormwater Infrastructure
Prepared By: Collin Johansson
Date: 8/6/2024

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

Non-automated TSS Calculation Sheet
must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection



40 Shattuck Road, Suite 110
Andover, MA 01810
Tel: 978.557.8150 Fax: 978.557.7948

CLIENT: Medway, MA
PROJECT: Medway Middle School Green Stormwater Infrastructure
DESIGNED BY: CDJ DATE: 8/8/2024
CHECKED BY: CNQ DATE: 8/8/2024
PROJECT NO. 0234166.09 SHEET NO. 1 of 2

Stormwater Treatment Calculations - Riprap Apron Sizing

Per the Federal Highway Administration - Hydraulic Engineering Circular No. 14, Third Edition - Hydraulic Design of Energy Dissipators for Culverts and Channels

$$d_{50} = 0.2D \left(\frac{Q}{\sqrt{g}D^{2.5}} \right)^{4/3} \left(\frac{D}{T_w} \right)$$

L and d = see riprap class and apron dimension table

$$W_1 = 3D$$

$$W_2 = 3D + \frac{2}{3}L$$

d_{50} = median stone diameter (ft)

D = pipe diameter or channel width (ft)

Q = discharge from pipe during 10-year storm event (cfs)

g = acceleration due to gravity (32.2 ft/s²)

T_w = tailwater depth (ft)

d = depth of apron

W_1 = width of apron at outlet (ft)

W_2 = width of apron downstream

L = length of apron (ft)

Riprap Classes and Apron Dimensions

Riprap Class	d_{50} (in)	Apron Length, L (ft)	Apron Depth, d (ft)
1	5	4D	3.5 d_{50}
2	6	4D	3.3 d_{50}
3	10	5D	2.4 d_{50}
4	14	6D	2.2 d_{50}
5	20	7D	2.0 d_{50}
6	22	8D	2.0 d_{50}

Massachusetts Erosion and Sediment Control Guidelines

1. Riprap apron must have a minimum width of 5 feet.
2. Riprap apron must have a minimum length of 10 feet.
3. d_{50} must be at least 9 inches.

Riprap Apron Design Calculations - Based on 10-year Storm Event

Input				Output						
Outlet	D (ft)	Q (cfs)	T_w (ft)	d_{50} (ft)*	d_{50} (in)*	Riprap Class	L (ft)*	d (ft)	W_1 (ft)*	W_2 (ft)*
Sediment Forebay (1P) Curb Cut	2	2.56	0.8	0.75	9	3	10	2	6.0	12.7
Sediment Forebay (6P) Turrets**	2	0.70	0.8	0.75	9	3	10	2	6.0	12.7
Sediment Forebay (7P) Turrets**	2	2.48	0.8	0.75	9	3	10	2	6.0	12.7
Subcatchment 6C Turret	2	2.69	0.8	0.75	9	3	10	2	6.0	12.7

*If necessary, value increased to the minimum allowable value required by the Massachusetts Stormwater Handbook

**Sediment forebay serviced by two rain guardian turrets, each assumed to convey half the inflow. The flow displayed (Q) is half the inflow estimated in HydroCAD.

Note: Sediment forebay (1P) is serviced by two curb cut inlets, but it is modeled as one inlet as one services the majority of the contributing watershed.



40 Shattuck Road, Suite 110
Andover, MA 01810
Tel: 978.557.8150 Fax: 978.557.7948

CLIENT:	Medway, MA		
PROJECT:	Medway Middle School Green Stormwater Infrastructure		
DESIGNED BY:	CDJ	DATE:	8/8/2024
CHECKED BY:	CNQ	DATE:	8/8/2024
PROJECT NO.	0234166.09	SHEET NO.	2 of 2

Stormwater Treatment Calculations - Riprap Spillway Sizing

Spillway Location	Velocity (fps)*	NCSA No.	Average Rip Rap Size (inches)
Sediment Forebay (4P)	0.97	R-1	0.75
Sediment Forebay (6P)	0.40	R-1	0.75
Sediment Forebay (7P)	0.46	R-1	0.75
Rain Garden (RGM103) (8P)	0.73	R-1	0.75

*All velocities are based on the 10-year storm modeled in HydroCAD.

Applicable Standards: Various federal agencies, the U.S. Corps of Engineers and the U.S. Soil Conservation Service in particular, have "Guide Specifications" to aid their local or regional offices in setting actual Job Specification requirements. ASTM is endeavoring to develop a specification for stone for erosion control.

Various state and local govern-

ment—transportation agencies, highways, water conservation, environmental etc.—may have specifications covering use of stone for erosion and sediment control. Use of stone from "an approved source" (as identified by some state highway or transportation department, federal agency, conservation agency, etc.) is recommended.

4. TECHNICAL DATA

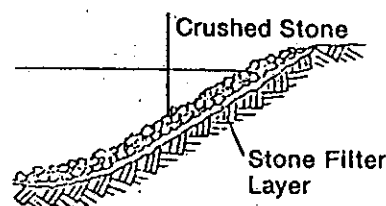
The sizes suggested in the following tables depend on both the technical and engineering factors involved in the final decision for each product and on which crushed stone products are generally available in that geographic location.

Specific information for five areas of application, A-E follow.

A. Banks of Creeks, Streams and Rivers

Factors Involved:

1. There is little if any erosion if water velocity is less than 1.5 ft./sec
2. Erosion protection stone must extend from top of bank to deepest part of the stream.
3. Protection must extend upstream and downstream from the main problem area.
4. Riprap can be used on slopes of 1 1/2 horizontal to 1 vertical or flatter. Stone-filled wire baskets i.e. Gabions should be used on slopes steeper than 1 1/2 to 1. (See "Gabions under item 5 on page 4.)



ELEVATION VIEW

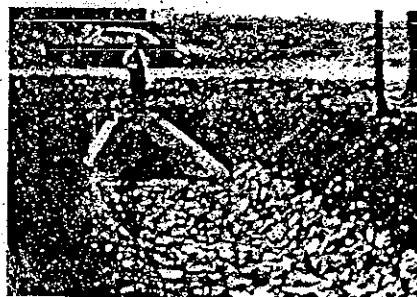
Flow Velocity (ft./sec.)	GRADED RIPRAP STONE Size Inches (sq. openings)				Corresponding Size of Filter Stone NCSA No.
	NCSA No.	Max.	Ave.	Min.	
2.5	R-1	1 1/2	3/4	No. 8	FS-1
4.5	R-2	3	1 1/2	1	FS-1
6.5	R-3	6	3	2	FS-1
9.0	R-4	12	6	3	FS-2
11.5	R-5	18	9	5	FS-2
13.0	R-6	24	12	7	FS-3
14.5	R-7	30	15	12	FS-3

B. DRAINAGE FACILITIES

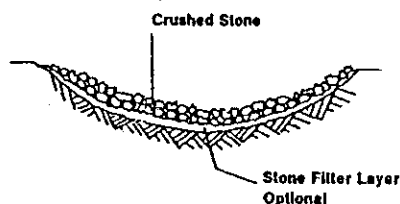
• Ditches—

Factors Involved:

1. Estimate the flow velocity, depth of the channel and ditch slope or gradient.
2. At same water velocity, a deep ditch requires more protection than a wider, shallower ditch.
3. V-shaped ditches have lower capacity than wide channels and they erode more easily.



Flow Velocity (ft./sec.)	GRADED RIPRAP STONE Size Inches (sq. openings)				Corresponding Size of Filter Stone NCSA No.
	NCSA No.	Max.	Avg.	Min.	
4.5	R-2	3	1 1/2	1	FS-1
6.5	R-3	6	3	2	FS-2
9.0	R-4	12	6	3	FS-2

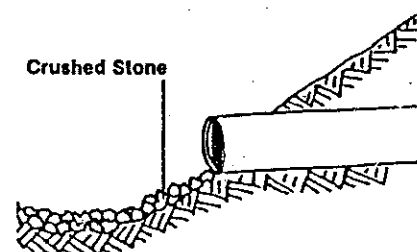


Scouring Basin Full Flow Velocity (ft./sec.)	GRADED RIPRAP STONE Size Inches (sq. openings)			
	NCSA No.	Max.	Avg.	Min.
5.5	R-3	6	3	2
6.5	R-4	12	6	3
9.1	R-5	18	9	5

• Pipe Outlets—

Factors Involved:

1. Estimate flow rate and tail water depth and know culvert size.
2. A stone filter layer is generally not required as some siltation between stone particles is anticipated.



SCOURING

2024.08.07 Proposed

NRCC 24-hr D 10-Year Rainfall=6.04"

Prepared by Woodard & Curran, Inc

Printed 8/8/2024

HydroCAD® 10.20-2g s/n 01204 © 2022 HydroCAD Software Solutions LLC

Page 1

Summary for Subcatchment 6C: Eastern Portion of Gravel Lot and Paved Lot

Runoff = 2.69 cfs @ 12.13 hrs, Volume= 0.234 af, Depth= 5.68"

Routed to Reach 1R : Grass Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs

NRCC 24-hr D 10-Year Rainfall=6.04"

Area (sf)	CN	Description
20,797	98	Paved parking, HSG D
586	74	>75% Grass cover, Good, HSG C
16	80	>75% Grass cover, Good, HSG D
79	82	Woods/grass comb., Fair, HSG D
21,478	97	Weighted Average
681		3.17% Pervious Area
20,797		96.83% Impervious Area

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

Summary for Pond 1P: Sediment Forebay

Inflow Area = 0.601 ac, 55.08% Impervious, Inflow Depth = 4.56" for 10-Year event

Inflow = 2.56 cfs @ 12.17 hrs, Volume= 0.228 af

Outflow = 2.53 cfs @ 12.17 hrs, Volume= 0.224 af, Atten= 1%, Lag= 0.2 min

Primary = 2.53 cfs @ 12.17 hrs, Volume= 0.224 af

Routed to Pond 2P : RGM101

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 224.52' @ 12.19 hrs Surf.Area= 246 sf Storage= 231 cf

Flood Elev= 224.75' Surf.Area= 277 sf Storage= 292 cf

Plug-Flow detention time= 19.7 min calculated for 0.224 af (98% of inflow)

Center-of-Mass det. time= 9.0 min (820.2 - 811.2)

Volume	Invert	Avail.Storage	Storage Description
#1	223.00'	292 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
223.00	66	0	0
224.00	177	122	122
224.75	277	170	292

Device	Routing	Invert	Outlet Devices
#1	Primary	224.25'	10.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Primary OutFlow Max=2.53 cfs @ 12.17 hrs HW=224.51' TW=224.47' (Dynamic Tailwater)

↑ **1=Sharp-Crested Rectangular Weir** (Weir Controls 2.53 cfs @ 0.96 fps)

Summary for Pond 4P: Sediment Forebay

Inflow Area = 0.509 ac, 83.46% Impervious, Inflow Depth = 5.34" for 10-Year event
 Inflow = 2.72 cfs @ 12.13 hrs, Volume= 0.226 af
 Outflow = 2.69 cfs @ 12.13 hrs, Volume= 0.223 af, Atten= 1%, Lag= 0.3 min
 Primary = 2.69 cfs @ 12.13 hrs, Volume= 0.223 af
 Routed to Pond 5P : RGM102

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 221.31' @ 12.14 hrs Surf.Area= 300 sf Storage= 240 cf

Flood Elev= 222.00' Surf.Area= 444 sf Storage= 497 cf

Plug-Flow detention time= 20.8 min calculated for 0.223 af (98% of inflow)

Center-of-Mass det. time= 10.4 min (785.4 - 775.0)

Volume	Invert	Avail.Storage	Storage Description
#1	220.00'	497 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
220.00	79	0	0
221.00	235	157	157
222.00	444	340	497

Device	Routing	Invert	Outlet Devices
#1	Primary	221.00'	8.0' long + 3.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.69 cfs @ 12.13 hrs HW=221.31' TW=221.21' (Dynamic Tailwater)

↑ **1=Broad-Crested Rectangular Weir** (Weir Controls 2.69 cfs @ 0.97 fps)

Summary for Pond 6P: Sediment Forebay (NW)

Inflow Area = 0.257 ac, 93.56% Impervious, Inflow Depth = 5.68" for 10-Year event

Inflow = 1.40 cfs @ 12.13 hrs, Volume= 0.122 af

Outflow = 1.37 cfs @ 12.14 hrs, Volume= 0.119 af, Atten= 3%, Lag= 0.5 min

Primary = 1.37 cfs @ 12.14 hrs, Volume= 0.119 af

Routed to Pond 8P : RGM103

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 217.86' @ 12.15 hrs Surf.Area= 260 sf Storage= 205 cf

Flood Elev= 218.00' Surf.Area= 297 sf Storage= 245 cf

Plug-Flow detention time= 32.5 min calculated for 0.119 af (98% of inflow)

Center-of-Mass det. time= 16.5 min (771.8 - 755.2)

Volume	Invert	Avail.Storage	Storage Description
#1	216.00'	245 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
216.00	16	0	0
217.00	105	61	61
217.50	168	68	129
218.00	297	116	245

Device	Routing	Invert	Outlet Devices
#1	Primary	217.50'	8.5' long + 3.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.35 cfs @ 12.14 hrs HW=217.85' TW=217.85' (Dynamic Tailwater)

↑1=**Broad-Crested Rectangular Weir**(Weir Controls 1.35 cfs @ 0.40 fps)

Summary for Pond 7P: Sediment Forebay (Center)

Inflow Area = 0.905 ac, 97.58% Impervious, Inflow Depth = 5.74" for 10-Year event

Inflow = 4.95 cfs @ 12.13 hrs, Volume= 0.433 af

Outflow = 4.84 cfs @ 12.14 hrs, Volume= 0.420 af, Atten= 2%, Lag= 0.4 min

Primary = 4.84 cfs @ 12.14 hrs, Volume= 0.420 af

Routed to Pond 8P : RGM103

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3

Peak Elev= 217.86' @ 12.15 hrs Surf.Area= 773 sf Storage= 811 cf

Flood Elev= 218.00' Surf.Area= 838 sf Storage= 924 cf

Plug-Flow detention time= 39.5 min calculated for 0.420 af (97% of inflow)

Center-of-Mass det. time= 19.9 min (771.8 - 751.9)

Volume	Invert	Avail.Storage	Storage Description
#1	216.00'	924 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
216.00	180	0	0
217.00	429	305	305
217.50	605	259	563
218.00	838	361	924

Device	Routing	Invert	Outlet Devices
#1	Primary	217.50'	25.0' long + 12.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=4.80 cfs @ 12.14 hrs HW=217.86' TW=217.85' (Dynamic Tailwater)↑1=**Broad-Crested Rectangular Weir**(Weir Controls 4.80 cfs @ 0.46 fps)

Summary for Pond 8P: RGM103

Inflow Area = 1.163 ac, 96.69% Impervious, Inflow Depth = 5.56" for 10-Year event
 Inflow = 6.21 cfs @ 12.14 hrs, Volume= 0.539 af
 Outflow = 6.08 cfs @ 12.15 hrs, Volume= 0.539 af, Atten= 2%, Lag= 0.8 min
 Discarded = 0.05 cfs @ 12.15 hrs, Volume= 0.103 af
 Primary = 5.29 cfs @ 12.15 hrs, Volume= 0.430 af
 Routed to Link 3L : Max Flow - EX 12" SE
 Secondary = 0.74 cfs @ 12.15 hrs, Volume= 0.006 af
 Routed to Link 3L : Max Flow - EX 12" SE

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.005 hrs / 3
 Peak Elev= 217.85' @ 12.15 hrs Surf.Area= 1,927 sf Storage= 2,368 cf
 Flood Elev= 218.00' Surf.Area= 2,056 sf Storage= 2,670 cf

Plug-Flow detention time= 117.9 min calculated for 0.539 af (100% of inflow)
 Center-of-Mass det. time= 117.9 min (889.8 - 771.8)

Volume	Invert	Avail.Storage	Storage Description
#1	216.00'	2,670 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
216.00	714	0	0
217.00	1,311	1,013	1,013
217.50	1,631	736	1,748
218.00	2,056	922	2,670

Device	Routing	Invert	Outlet Devices
#1	Primary	213.50'	18.000" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.50' / 213.00' S= 0.0250 ' / Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	217.50'	30.000" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	216.00'	1.020 in/hr Exfiltration over Horizontal area Phase-In= 0.01'
#4	Secondary	217.75'	10.0' long + 3.0 ' SideZ x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.05 cfs @ 12.15 hrs HW=217.85' (Free Discharge)
 ↑ **3=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=5.29 cfs @ 12.15 hrs HW=217.85' TW=0.00' (Dynamic Tailwater)
 ↑ **1=Culvert** (Passes 5.29 cfs of 16.14 cfs potential flow)
 ↑ **2=Orifice/Grate** (Weir Controls 5.29 cfs @ 1.93 fps)

Secondary OutFlow Max=0.74 cfs @ 12.15 hrs HW=217.85' TW=0.00' (Dynamic Tailwater)
 ↑ **4=Broad-Crested Rectangular Weir** (Weir Controls 0.74 cfs @ 0.73 fps)

APPENDIX E: GROUNDWATER VISTAS ANALYSIS

Groundwater Vistas MODFLOW Results

August 2024

Input

Model Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)		SP	Infiltration Volume CF	Corrected for Timing CF	Application Rate ft/hr
0	0	0	208.25	0	0	0		1	0	0	0
2	0.3	21	208.26	0.29	0.29	0		2	2088	2088.0	0.3071
4	1.08	1,892	208.98	0.48	0.48	0		3	3456	3456.0	0.5082
6	1.97	8,877	210.25	0.68	0.68	0		4	4896	4896.0	0.7200
8	3.38	21,591	212.82	1.09	1.09	0		5	7848	7848.0	1.1541
10	2.49	27,583	214.75	2.44	1.41	1.04		6	10152	10152.0	1.4929
12	6.27	28,222	217.2	6.02	1.8	4.23		7	12960	12960.0	1.9059
14	2.65	27,830	214.85	2.73	1.42	1.31		8	10224	10224.0	1.5035
16	2.4	27,560	214.74	2.42	1.4	1.01		9	10080	10080.0	1.4824
18	2.28	27,454	214.7	2.3	1.4	0.9		10	10080	10080.0	1.4824
20	2.23	27,393	214.68	2.24	1.39	0.84		11	10008	10008.0	1.4718
22	2.18	27,351	214.66	2.19	1.39	0.8		12	10008	10008.0	1.4718
24	2.12	27,290	214.64	2.13	1.39	0.74		13	10008	10008.0	1.4718
26	0	20,249	212.51	1.04	1.04	0		14	7488	7488.0	1.1012
28	0	13,574	211.13	0.82	0.82	0		15	5904	5904.0	0.8682
30	0	8,246	210.13	0.66	0.66	0		16	4752	4752.0	0.6988
32	0	3,937	209.35	0.54	0.54	0		17	3888	3888.0	0.5718
34	0	511	208.45	0.39	0.39	0		18	2808	2808.0	0.4129
36	0	0	208.25	0	0	0		19	0	0	0
38	0	0	208.25	0	0	0		20	0	0	0
40	0	0	208.25	0	0	0		21	0	0	0
42	0	0	208.25	0	0	0		22	0	0	0
44	0	0	208.25	0	0	0		23	0	0	0
46	0	0	208.25	0	0	0		24	0	0	0
48	0	0	208.25	0	0	0		25	0	0	
50	0	0	208.25	0	0	0		26	0	0	
52	0	0	208.25	0	0	0		27	0	0	
54	0	0	208.25	0	0	0		28	0	0	
56	0	0	208.25	0	0	0		29	0	0	
58	0	0	208.25	0	0	0		30	0	0	
60	0	0	208.25	0	0	0		31	0	0	
62	0	0	208.25	0	0	0		32	0	0	
64	0	0	208.25	0	0	0		33	0	0	
66	0	0	208.25	0	0	0		34	0	0	
68	0	0	208.25	0	0	0		35	0	0	
70	0	0	208.25	0	0	0		36	0	0	
72	0	0	208.25	0	0	0		37	0	0	

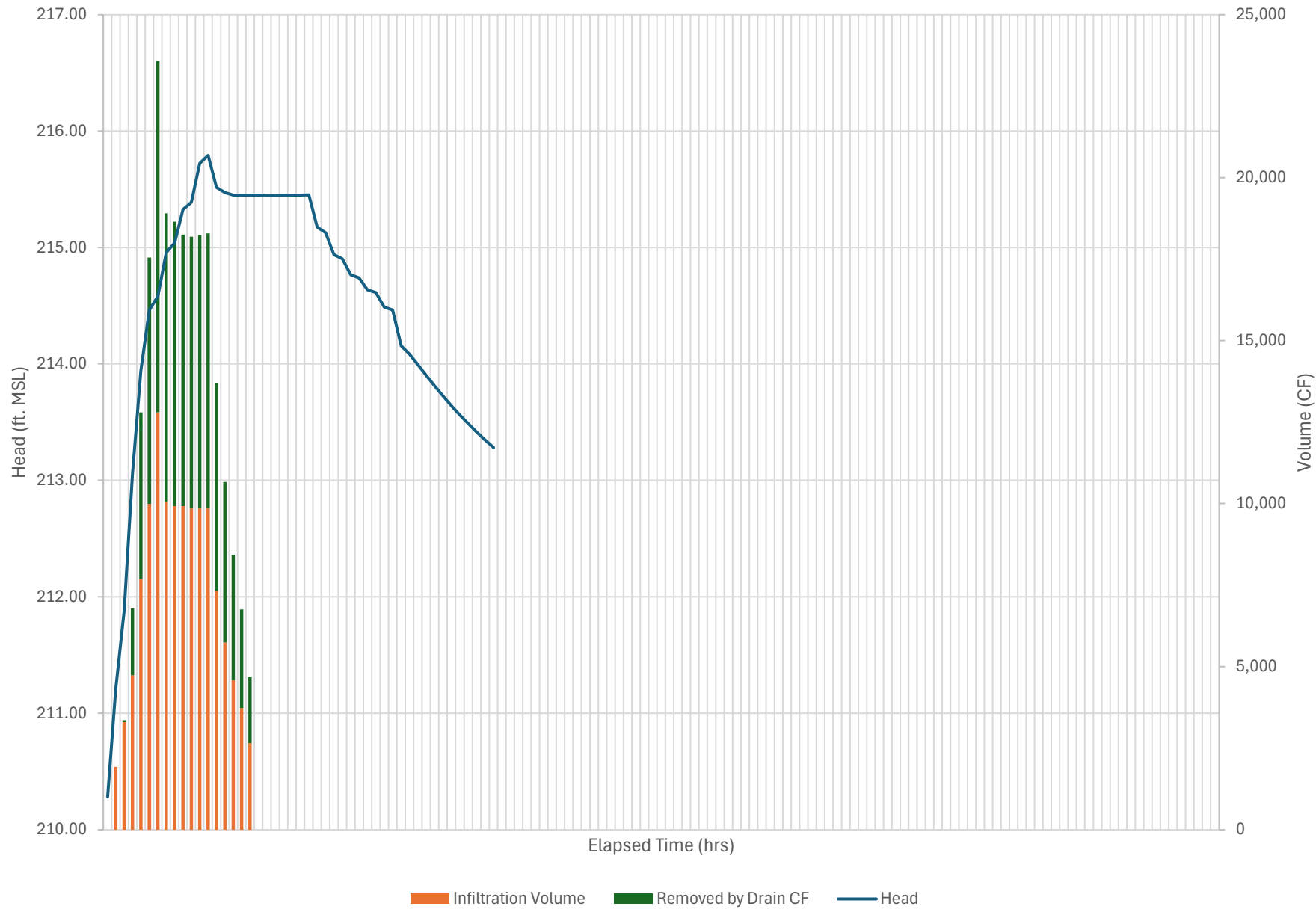
Groundwater Vistas MODFLOW Results

August 2024

Output

Time	Time since runoff begins (hrs)	Head	Removed by Drain CF	Infiltration Volume	Time		Time since runoff begins (hrs)	Head	Removed by Drain CF	Infiltration Volume	Time		Time since runoff begins (hrs)	Head	Removed by Drain CF	Infiltration Volume
8760	0	210.28	0	0	8807		47	213.22	0	0	8854		94	211.93	0	0
8761	1	211.21	0	1928	8808		48	213.16	0	0	8855		95	211.92	0	0
8762	2	211.87	63	3296	8809		49	213.11	0	0	8856		96	211.91	0	0
8763	3	213.06	2044	4736	8810		50	213.05	0	0	8857		97	211.90	0	0
8764	4	213.94	5109	7688	8811		51	213.00	0	0	8858		98	211.89	0	0
8765	5	214.46	7553	9992	8812		52	212.95	0	0	8859		99	211.88	0	0
8766	6	214.58	10774	12800	8813		53	212.91	0	0	8860		100	211.87	0	0
8767	7	214.96	8841	10064	8814		54	212.86	0	0	8861		101	211.86	0	0
8768	8	215.04	8729	9920	8815		55	212.82	0	0	8862		102	211.84	0	0
8769	9	215.32	8332	9920	8816		56	212.78	0	0	8863		103	211.83	0	0
8770	10	215.39	8340	9848	8817		57	212.74	0	0	8864		104	211.83	0	0
8771	11	215.72	8393	9848	8818		58	212.70	0	0	8865		105	211.82	0	0
8772	12	215.79	8441	9848	8819		59	212.66	0	0	8866		106	211.81	0	0
8773	13	215.51	6370	7328	8820		60	212.63	0	0	8867		107	211.80	0	0
8774	14	215.47	4919	5744	8821		61	212.60	0	0	8868		108	211.79	0	0
8775	15	215.45	3841	4592	8822		62	212.56	0	0	8869		109	211.78	0	0
8776	16	215.45	3022	3728	8823		63	212.53	0	0	8870		110	211.77	0	0
8777	17	215.45	2041	2648	8824		64	212.50	0	0	8871		111	211.76	0	0
8778	18	215.45	0	0	8825		65	212.47	0	0	8872		112	211.76	0	0
8779	19	215.44	0	0	8826		66	212.45	0	0	8873		113	211.75	0	0
8780	20	215.45	0	0	8827		67	212.42	0	0	8874		114	211.74	0	0
8781	21	215.45	0	0	8828		68	212.39	0	0	8875		115	211.73	0	0
8782	22	215.45	0	0	8829		69	212.37	0	0	8876		116	211.73	0	0
8783	23	215.45	0	0	8830		70	212.34	0	0	8877		117	211.72	0	0
8784	24	215.45	0	0	8831		71	212.32	0	0	8878		118	211.71	0	0
8785	25	215.17	0	0	8832		72	212.30	0	0	8879		119	211.71	0	0
8786	26	215.13	0	0	8833		73	212.27	0	0	8880		120	211.70	0	0
8787	27	214.94	0	0	8834		74	212.25	0	0	8881		121	211.69	0	0
8788	28	214.90	0	0	8835		75	212.23	0	0	8882		122	211.68	0	0
8789	29	214.77	0	0	8836		76	212.21	0	0	8883		123	211.68	0	0
8790	30	214.74	0	0	8837		77	212.19	0	0	8884		124	211.67	0	0
8791	31	214.64	0	0	8838		78	212.17	0	0	8885		125	211.67	0	0
8792	32	214.61	0	0	8839		79	212.15	0	0	8886		126	211.66	0	0
8793	33	214.49	0	0	8840		80	212.14	0	0	8887		127	211.66	0	0
8794	34	214.46	0	0	8841		81	212.12	0	0	8888		128	211.65	0	0
8795	35	214.16	0	0	8842		82	212.10	0	0	8889		129	211.64	0	0
8796	36	214.08	0	0	8843		83	212.09	0	0	8890		130	211.64	0	0
8797	37	213.99	0	0	8844		84	212.07	0	0	8891		131	211.63	0	0
8798	38	213.90	0	0	8845		85	212.06	0	0	8892		132	211.63	0	0
8799	39	213.81	0	0	8846		86	212.04	0	0						
8800	40	213.72	0	0	8847		87	212.03	0	0						
8801	41	213.64	0	0	8848		88	212.01	0	0						
8802	42	213.56	0	0	8849		89	212.00	0	0						
8803	43	213.49	0	0	8850		90	211.98	0	0						
8804	44	213.41	0	0	8851		91	211.97	0	0						
8805	45	213.35	0	0	8852		92	211.96	0	0						
8806	46	213.28	0	0	8853		93	211.95	0	0						

Groundwater Elevation, Infiltration Volume, and Drain Volume



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.

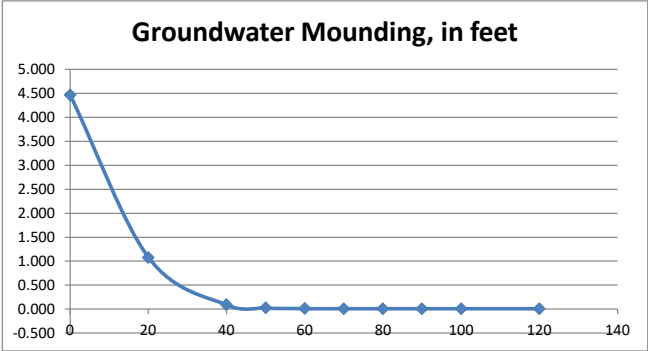
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on 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)

Input Values		use consistent units (e.g. feet & days or inches & hours)		Conversion Table		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).
				inch/hour	feet/day	
2.0400	R	Recharge (infiltration) rate (feet/day)		0.67	1.33	
0.200	Sy	Specific yield, Sy (dimensionless, between 0 and 1)				
1.32	K	Horizontal hydraulic conductivity, Kh (feet/day)*		2.00	4.00	
10.500	x	1/2 length of basin (x direction, in feet)				
5.500	y	1/2 width of basin (y direction, in feet)		hours	days	
1.725	t	duration of infiltration period (days)		36	1.50	
15.000	hi(0)	initial thickness of saturated zone (feet)				
19.468	h(max)	maximum thickness of saturated zone (beneath center of basin at end of infiltration period)				
4.468	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
4.468	0
1.076	20
0.088	40
0.023	50
0.009	60
0.006	70
0.006	80
0.006	90
0.006	100
0.006	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.

APPENDIX F: OPERATION AND MAINTENANCE PLAN



STORMWATER MANAGEMENT SYSTEM OPERATIONS & MAINTENANCE PLAN

Medway Middle
School

250 Royall Street
Canton, MA 02021
800.446.5518

woodardcurran.com

0234166.09

**Town of
Medway, MA**

January 2025

STORMWATER MANAGEMENT SYSTEM OPERATIONS & MAINTENANCE PLAN

This Stormwater Management System Operations & Maintenance Plan (the Plan) outlines measures that are essential for maintaining an effective stormwater management system at the Medway Middle School at 45 Holliston Street, Medway, MA 02053.

Periodic and scheduled inspections and maintenance measures are recommended to prevent deficiencies and for proper performance of the stormwater management system. Failure to implement these measures can reduce the hydraulic capacity and the pollutant removal efficiency of stormwater measures, resulting in a poor quality of stormwater runoff discharging from the Site.

RESPONSIBLE PARTY & ESTIMATED ANNUAL BUDGET

The parties responsible for implementing this Plan and identifying the source of necessary funds are as follows:

*Town of Medway DPW
45B Holliston Street, Door 9
Medway, MA 02053*

*Main Contact: Peter Pelletier
Telephone: 508-533-3275
ppelletier@townofmedway.org*

GOOD HOUSEKEEPING

The Site will be maintained as clean and orderly. Routine inspections of the Site for debris and sediment accumulations shall be performed. Debris and sediment shall be disposed of in accordance with local and State requirements.

STREET SWEEPING

The sweeping of access driveways that have accumulated significant amounts of pollutants (construction project area sediment, trash, debris) shall be done as necessary, at a minimum of once per quarter. Disposal of collected sweeping materials shall be done in a manner consistent with State law and/or regulations.

INSPECTIONS & MAINTENANCE MEASURES

Stormwater management at the Medway Middle School is provided by a closed conduit drainage system, Rain Guardian Turrets, hydrodynamic separators, grassed conveyance swales, sediment forebays, an enhanced biofiltration system, two bioretention basins, and an infiltration chamber system, as illustrated on the project design drawings. Routine inspections and maintenance of the stormwater management system shall be performed in accordance with this Operation & Maintenance Plan. These measures are recommended to prevent deficiencies within the system that may result in poor quality of stormwater runoff.

A sample Inspection Form is attached and is recommended for use during inspections of the stormwater management system. The form includes a table that outlines specific inspection and maintenance measures, in addition to the following information that can be recorded by the inspector during the inspection.

Completed Inspections Forms shall be kept at the Department of Public Works office to document compliance with this Operation & Maintenance Plan.

LANDSCAPE MANAGEMENT

Lawn and landscaped areas shall be inspected for patches of dead vegetation and erosion. If these conditions are observed, affected areas shall be stabilized and replanted with vegetation to prevent sediment from entering the stormwater management system.

The following measures shall be followed to minimize the potential for stormwater runoff pollution due to overwatering, dead vegetation and erosion, direct disposal of lawn clippings, and over-application of materials such as fertilizers and pesticides.

Lawn Mowing

The following mowing practices are recommended:

- Maintain sharp mower blades.
- Typically, avoid cutting grass shorter than 2 to 3 inches in height, to minimize weed growth. Grass can be cut lower in the spring and fall to stimulate root growth but should not be cut shorter than 1½ inches.
- Do not dispose of grass clippings within the stormwater management system.
- Employ practices to minimize the potential for grass clippings to enter the stormwater management system.

Fertilizers & Pesticides

Use of pesticides and fertilizers should be minimized to the extent practicable. Application of these materials may degrade the quality of stormwater runoff and should therefore be applied cautiously. In addition, fertilizers and pesticides shall not be applied prior to rain events. These materials should be stored under cover to prevent their exposure to stormwater.

STORMWATER MANAGEMENT SYSTEM INSPECTION FORM

*Town of Medway, Massachusetts
Medway Middle School
45B Holliston Street
Medway, MA 02053*

Name of Inspector: _____

Date/Time: _____

Weather: _____

Date of Last Inspection: _____

Items Inspected (refer to Operation & Maintenance Measure Tables and provide additional sheets if necessary):

Comments & Corrective Actions Taken (provide additional sheets if necessary):

Closed Conduit Drainage Systems	
Objective: Preserve the hydraulic capacity of the closed conduit drainage systems, including maintenance of the area drains and outlet control structures.	
Frequency	Measure
INSPECTION:	
Ongoing/As Needed ¹	Inspect drainage structure grates and covers for damage. Repair as necessary. Covers and grates shall not be welded to the frame so that the structure can be inspected and maintained.
MAINTENANCE:	
Ongoing/As Needed ¹	- Avoid placement of snow on top of drainage structure grates and covers. - Remove sediment from bottom of drainage structures whenever the depth of sediment is greater than or equal to half the sump depth. Dispose of sediment in accordance with all applicable regulations. - Remove obstructions that may impede flow through grates, including trash, debris, and accumulated grass clippings and leaves. Dispose of material in accordance with all applicable regulations. - Inspect drainage piping for structural deficiency and debris accumulation. Repair piping as required. Dispose material in accordance with all applicable regulations.
Annually	Remove sediment from bottom of drainage structures when using 1/2 sump depth with sediment. Dispose of sediment in accordance with all applicable regulations.

¹ At a minimum, perform inspections twice a year.

Proprietary Inlet - Rain Guardian Turrets	
Objective: Maintain the hydraulic and filter capacity of the Rain Guardian Turret.	
Frequency	Measure
INSPECTION:	
Ongoing/As Needed	- Inspect and maintain in accordance with the Manufacturer's specifications attached. - Avoid placement of snow on top of Rain Guardian Turret grate or within the curb inlet. - Rain Guardian Turret grate shall be kept removable from the frame to allow for inspection and maintenance. - Inspect Rain Guardian Turret and stone apron quarterly and after every major storm event. Inspect the grate, high volume overflow, filter wall and primary outlet for structural damage.
MAINTENANCE:	
Ongoing/As Needed	- Restore/repair structural damage as necessary to original design specifications. - Remove trash and debris from the contributing drainage area and inlet grate, and stone apron. - Remove sediment and debris from the dry filter box before sediment build up obstructs 50% of the primary outlet.

	- Remove obstructions that may impede flow through the curb inlet, grate, and filter wall including trash, debris, leaves, and sediment. - Dispose of all sediment and debris in accordance with all applicable regulations.
NOTIFICATION:	
As Needed	Notify Owner of any system repairs needed and/or operational problems.

Propriety Separator Device	
Objective: Maintain the treatment efficiency of the propriety separator device.	
Frequency	Measure
INSPECTION:	
Ongoing/As Needed	- Inspect and maintain in accordance with the Manufacturer's specifications attached. - Inspect the proprietary separator device at least twice a year. - Visually inspect the proprietary separator device to confirm that there are no blockages or obstructions in the device inlet or separator screen. - Use a calibrated dipstick or tape measure to quantify the accumulation of hydrocarbons, trash and sediment in the system. - Inspect contributing drainage areas for any sediment and debris.
MAINTENANCE:	
Ongoing/As Needed	- Clean the proprietary separator device when the level of sediment inside the system has reached 75% of capacity in the isolated sump or when substantial levels of trash or hydrocarbons have accumulated. - Remove trash, debris, sediment, and lead litter from the inlet of the proprietary separator device on a monthly basis. - Remove sediment and debris from the contributing drainage area. - Dispose of sediment and waste in accordance with all applicable regulations.
NOTIFICATION:	
As Needed	Notify Owner of any system repairs needed and/or operational problems.

Subsurface Infiltration Chamber System	
Objective: Maintain the storage capacity of the infiltration chambers.	
Frequency	Measure
INSPECTION AND MAINTENANCE:	
Ongoing/As Needed ¹	Subsurface infiltration systems should be inspected and maintained in accordance with the Manufacturer's specifications attached.
NOTIFICATION:	
As Needed	Notify Owner of any system repairs needed and/or operational problems.

¹ At a minimum, an event accumulating 1 inch of rainfall in a 24-hour period.

Grass Conveyance Swale	
Objective: Maintain the conveyance and storage capacity and mitigate erosion in the swale.	
Frequency	Measure
INSPECTION:	
Ongoing/As Needed	- Inspect swales for adequate vegetation and signs of rilling and gullyng the first few months after construction and twice a year thereafter. - Inspect the swales for slope integrity, soil moisture, vegetative health, soil stability, soil compaction, soil erosion and sediment accumulation.
MAINTENANCE:	
Ongoing/As Needed	- Repair any damage, rills, or gullies as needed. - Replace dead vegetation as needed. - Mow grass as necessary and at least once per year. Grass height should not exceed 6 inches. Do not cut grass shorter than three to four inches. - Remove sediment and debris manually at least once a year. - Reseed as necessary. Use of deicers during the winter will necessitate yearly reseeding in the spring.
NOTIFICATION:	
As Needed	Notify Owner of any system repairs needed and/or operational problems.

Sediment Forebay	
Objective: Maintain the storage capacity and removal efficiency of the sediment forebay.	
Frequency	Measure
INSPECTION:	
Ongoing/As Needed	Inspect area for signs of erosion and stabilize accordingly.
After Heavy Rainfall Events ¹	Inspect for ponded water 24-hours or several days after event. If water is ponded inside the sediment forebay, it may indicate that the bottom of the forebay has failed or is clogged. To rehabilitate a failed sediment forebay for an infiltration practice, strip all rip rap and accumulated sediment from the bottom, scarify and till to induce infiltration and replace riprap. To rehabilitate a failed sediment forebay for the enhanced biofiltration system, strip all rip rap and accumulated sediment from bottom of forebay and gabion basket as needed and replace riprap and reconstruct gabion basket.
MAINTENANCE:	
Ongoing/As Needed	- Remove obstructions that may limit runoff from entering the sediment forebay including sediment, trash, debris, and leaves. - Sediment shall be cleaned out of the sediment forebay when it accumulates to a depth of more than ½ the design depth.
NOTIFICATION:	
As Needed	Notify Owner of any system repairs needed and/or operational problems.

¹ At a minimum, an event accumulating 1 inch of rainfall in a 24-hour period.

Bioretention Basin and Enhanced Biofiltration Basin	
Objective: Maintain the storage and infiltration/filtration capacity of the basin.	
Frequency	Measure
INSPECTION:	
Ongoing/As Needed	- The basin shall be inspected post-construction prior to being put into service. - Inspect vegetation on a regular basis while vegetation is being established. - Inspect contributing drainage areas for any sediment and debris. - Inspect the basin for signs of settling, erosion, seepage, tree growth, animal burrowing on the basin embankment, presence of oil or grease, damage to outlets, and inadequate erosion control measures at the inlet/outlet structures. Ensure vegetation on embankments is dense and healthy. - Observe the water level in the basin and verify that the basin is infiltrating/filtering within 72 hours.
After Heavy Rainfall Events ¹	Basin shall be inspected annually and after heavy storm events for any signs of erosion and to ensure bank stability.
MAINTENANCE:	
Ongoing/As Needed	- Replace any damaged or unhealthy plantings as necessary. - Replace or add organic material to improve performance as necessary. - Mow the embankment twice per year. Mowing and fertilizing help promote vigorous growth of plant roots to resist erosion. - Remove obstructions that may impede infiltration/filtration and flow through the outlet structures including trash, debris, grass clippings, and leaves. Remove sediment and debris from the contributing drainage areas. Dispose of materials in accordance with all applicable regulations. - All repaired areas and infrastructure shall be restored according to the original design specifications. - If sediment or debris build up occurs or the basin fails to filter/infiltrate, all obstructions and the top 6 inches of the rain garden shall be removed. Rototill the surface to a depth of 12" and restore the basin according to original design specifications.
NOTIFICATION:	
As Needed	Notify Owner of any system repairs needed and/or operational problems.

¹ At a minimum, an event accumulating 1 inch of rainfall in a 24-hour period.



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