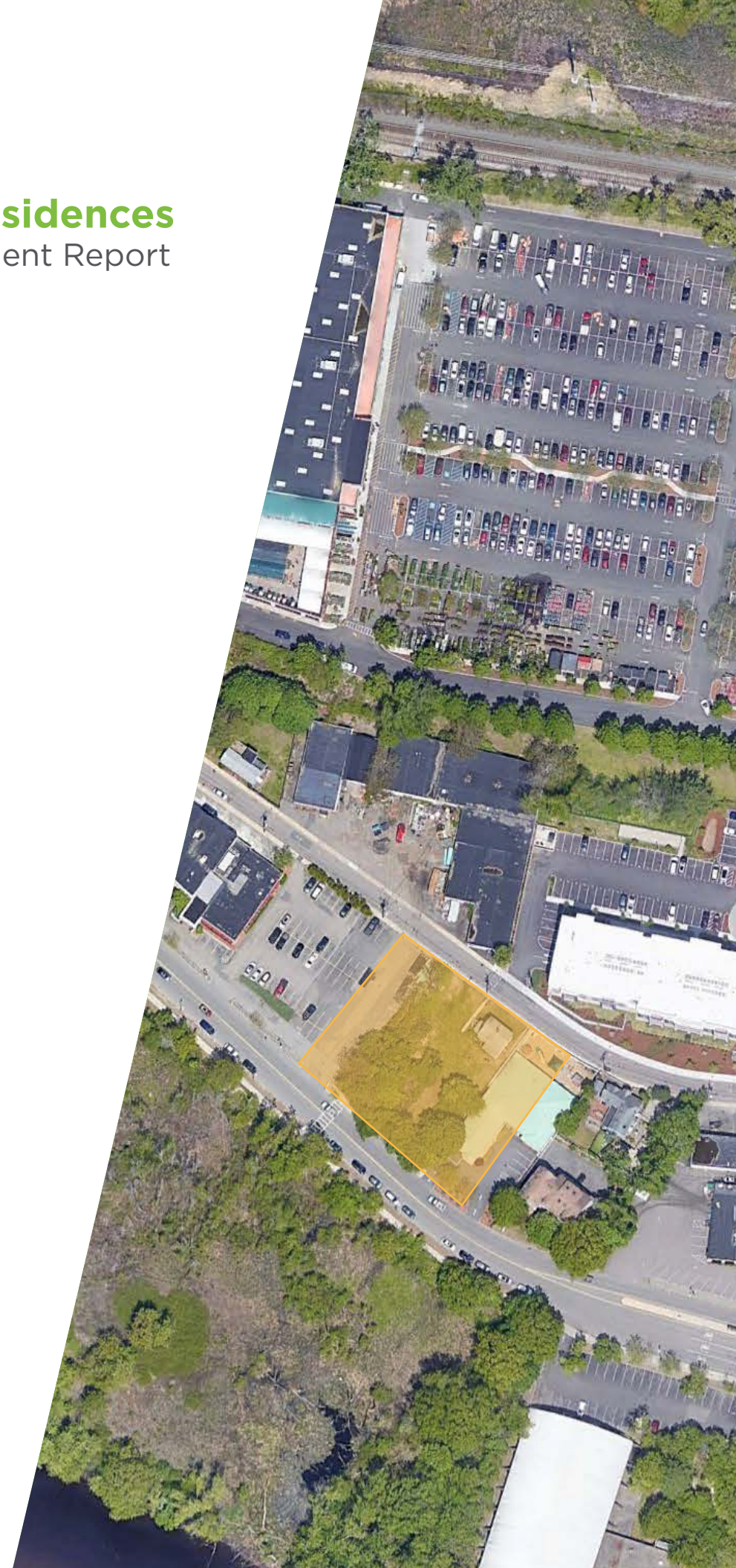
West Roxbury Residences

Stormwater Management Report

Prepared for
WBA Townhomes, LLC

Prepared by
Howard Stein Hudson

January 20, 2021



HOWARD STEIN HUDSON

Engineers + Planners

Table of Contents

List of Tables

Appendices

Introduction

This Stormwater Management Report describes the existing drainage conditions and proposed stormwater best management practices (BMPs) designed to treat and control runoff for the Gardner Street Residences (the "Project").

The Project site is a 0.6± acre site located in West Roxbury, Massachusetts. The Project site is bounded by Gardner Street to the north, residential buildings to the east and west, and Charles Park Road to the south. The site's surfaces consist of impervious pavement, impervious roofs, and pervious grassy areas.

The Project will result in an increase in impervious areas of approximately 9,380 square feet (sf). The Project will consist of redeveloping a site in the West Roxbury Neighborhood of Boston. A single-family house and paved parking areas at 178 Gardner Street will be demolished and 18 townhomes will be constructed on the site. The new drainage system consists of a variety of BMPs. Proposed drainage is shown on the attached plans and is discussed in this report.

Existing Conditions

Pre- and post-construction hydrology were analyzed with HydroCAD v 10.0, model using TR-20 methodology. The rainfall data was obtained from the NOAA Atlas 14 Precipitation Frequency Data Server. The result of this analysis shows that the proposed development will not increase the overall peak discharge rates from existing conditions for the 2, 10, and 100-year storm events analyzed.

Soils at the site are mapped as Urban land. The Natural Resource Conservation Service (NRCS) does not have Hydrologic Soil Group (HSG) data within the project site. Based on on-site geotechnical information, HSG B is assigned to the 178 Gardner Street site as a basis for the design. The NRCS soil map is included in **Appendix A**.

The runoff from the site ultimately discharges to Cow Island Pond. The hydrology calculations analyze one design point.

Hydrology

Pre-construction Hydrology

Stormwater runoff from the existing paved parking areas and grass areas at 178 Gardner Street is collected in catch basins on Charles Park Road and ultimately discharges into Cow Island Pond. Roof runoff from the existing residential home on the property is collected in a catch basin on Gardner Street and ultimately discharges into Cow Island Pond.

Post-construction Hydrology

The single-family house and associated paved areas will be demolished and removed, to allow for the construction of 18 townhomes. The proposed drainage improvements consist of one infiltration system and one detention system that will control peak flows on-site and will overflow in the municipal drainage in Charles Park Road.

Stormwater Management Standards

Standard 1: No New Untreated Discharges

The Massachusetts Stormwater Handbook requires that the project demonstrates that there are no new untreated discharges and that new discharges will not cause erosion or scour to downstream wetlands.

Runoff from the impervious area will be treated and filtered through low impact development techniques such as deep sump catch basins, water quality units, and infiltration chambers.

Standard 2: Post-Development Peak Discharge Rates Not to Exceed Pre-Development Peak Discharge Rates

The proposed stormwater management system is designed so that the post-development peak discharge rates will not exceed the off-site pre-development peak discharge rates. The peak discharge rates from the 2, 10, and 100-year storm events were analyzed with the result summarized in **Table 1**.

Table 1. Pre- vs. Post-Development Peak Discharge Rates

Design Point	Pre-Development Rate (cfs)	Post-Development Rate (cfs)
2-Year Storm Event		
178 Gardner – Cow Island Pond	1.76	1.47
10-Year Storm Event		
178 Gardner – Cow Island Pond	2.74	2.10
100-Year Storm Event		
178 Gardner – Cow Island Pond	4.49	4.42

Standard 3: Minimize or Eliminate Loss of Annual Recharge to Groundwater

The project is a redevelopment and is required to meet Standard 3 to the maximum extent practicable. The stormwater infiltration practices for the development include underground chambers. The proposed stormwater management system exceeds the required recharge volume as determined by the Massachusetts Stormwater Handbook.

Underlaying soils are mapped as Urban Land by the Natural Resource Conservation Service (NRCS). Hydrologic Soil Group B is assigned based on two borings performed as part of a geotechnical study conducted on-site. The maps and boring logs are included in **Appendix A**.

Recharge Volume Target calculations are provided in **Appendix C** and are summarized in **Table 2.**

Table 2. Recharge Volume Target

Inches of Runoff x Total Impervious Area / 12 = Recharge Volume Target [cf]			
Hydrologic Group	**Inches of Runoff**	**Impervious Area 178 Garden**	**Recharge Volume Target**
A	0.60 in		
B	0.35 in	19,975 SF	582 CF
C	0.25 in		
D	0.10 in		
Recharge Volume Target			582 CF

The volume of recharge provided for post-development conditions was calculated based on the "Static" method as follows. Stormwater stored below the lowest outlet of an infiltration system is available for recharge into the aquifer via exfiltration (Calculations included in **Appendix C**).

178 Gardner Street:

- Storage volume below outlet elevation Infiltration S-m = 1,100 CF

  Total Recharge Volume Provided = 1,100 CF > 582 CF (recharge volume target)

BMPs on-site provide sufficient groundwater recharge to meet the requirements of Standard 3. Calculations show that during a 100-year storm event the infiltration structure will completely dewater in the following time frame:

- 178 Gardner Infiltration S-m dewaters within **46 hours**

Drawdown will happen faster than the maximum 72-hour window prescribed by the Stormwater Regulations. Drawdown calculations are included in **Appendix D**.

Standard 4: Stormwater Management System to Remove 80% of Average Annual Load of Total Suspended Solids (TSS)

The Massachusetts Stormwater Handbook requires that: "Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS)." If the site discharges runoff into a critical area Zone I or II, the runoff would also have to be pre-treated to a level where 44% of the TSS have been removed prior to reaching the infiltration structure.

The Site is not discharging into a critical area. The project site features two treatment trains:

At 178 Gardner Street, the roof runoff generated by the townhomes reaches the infiltration system via downspouts that are connected to collector pipes flowing into the Infiltration System. The roof runoff will not contain TSS and will not need to be treated prior to reaching the infiltration structure.

The runoff generated by the paved areas will be collected in two Water Quality Units (WQU) connected to the detention system. The WQUs will provide pre-treatment to a level where 44% of the TSS will be removed prior to reaching the detention system. Both the detention and the infiltration system are furnished with Outflow Control Structures (OCS) that regulate the outflow and discharge into the existing drainage system in Charles Park Road via a 12" pipe.

The required Water Quality Volume (WQV), the volume of water requiring 80% TSS removal, is calculated as follows:

The required water quality volume equals 0.5 inch of runoff times the total impervious area of the post-development site. The analysis is conducted based on 0.5-inch runoff over the proposed impervious surfaces based on the absence of a critical areas downstream from the site.

- Impervious at 178 Gardner Street =19,975 SF

WQV Required (80% TSS Removal):

- WQV at 178 Gardner Street = 0.5 in x 19,975 SF ÷ 12 in. =832 CF

TSS calculations for the treatment train described included in **Appendix D**.

Standard 5: Land Uses with Higher Potential Pollutant Loads

The development is not considered a land use that produces higher potential pollutant loads.

Standard 6: Stormwater Discharges to Critical Areas

This standard is not applicable. The stormwater discharges are not located within or near a critical area.

Standard 7: Redevelopment Projects

The Project Site has been previously developed. The site located at 178 Gardner Street consists of a paved parking area, a residential house, and grass areas. However, the proposed project meets or exceeds each of the applicable stormwater management standards.

Standard 8: Control Construction-Related Impacts

The project will install erosion and sediment controls prior to any major earthwork activity.

Sheet entitled “Site Preparation Plan” included in the project plans shows the location and BMPs that will be used during the construction process to protect neighboring properties and receiving drainage structures.

Standard 9: Long-Term Operation and Maintenance Plan

See **Appendix D** for the operation and maintenance requirements to be implemented for the stormwater management systems.

Standard 10: No Illicit Discharges

Illicit discharges will be prohibited from entering the stormwater management system serving the site. A signed Illicit Discharge Compliance Statement is provided in **Appendix F**.

Appendix A:
Soil Information

Soil Map—Norfolk and Suffolk Counties, Massachusetts
(178 Gardner Street, W. Roxbury)

Map Scale: 1:710 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 10 20 40 60

Feet
0 30 60 120 180

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 16, Jun 11, 2020

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

Date(s) aerial images were photographed: Sep 11, 2019—Oct 5, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
5	Saco silt loam, 0 to 3 percent slopes	0.3	12.3%
602	Urban land, 0 to 15 percent slopes	2.0	87.7%
Totals for Area of Interest		**2.3**	**100.0%**

Norfolk and Suffolk Counties, Massachusetts

5—Saco silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: vkxt
Elevation: 20 to 260 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

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

Description of Saco

Setting

Landform: Alluvial flats
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Soft coarse-silty alluvium

Typical profile

H1 - 0 to 26 inches: silt loam
H2 - 26 to 58 inches: silt loam
H3 - 58 to 60 inches: stratified coarse sand to loamy fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 40 to 80 inches to strongly contrasting textural stratification
Drainage class: Very poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Available water capacity: Very high (about 13.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: B/D
Ecological site: F144AY016MA - Very Wet Low Floodplain
Hydric soil rating: Yes

Minor Components

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

Swansea
Percent of map unit: 4 percent
Landform: Bogs
Hydric soil rating: Yes

Rippowam
Percent of map unit: 4 percent
Landform: Alluvial flats
Hydric soil rating: Yes

Scarboro
Percent of map unit: 2 percent
Landform: Terraces
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 16, Jun 11, 2020

Norfolk and Suffolk Counties, Massachusetts

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

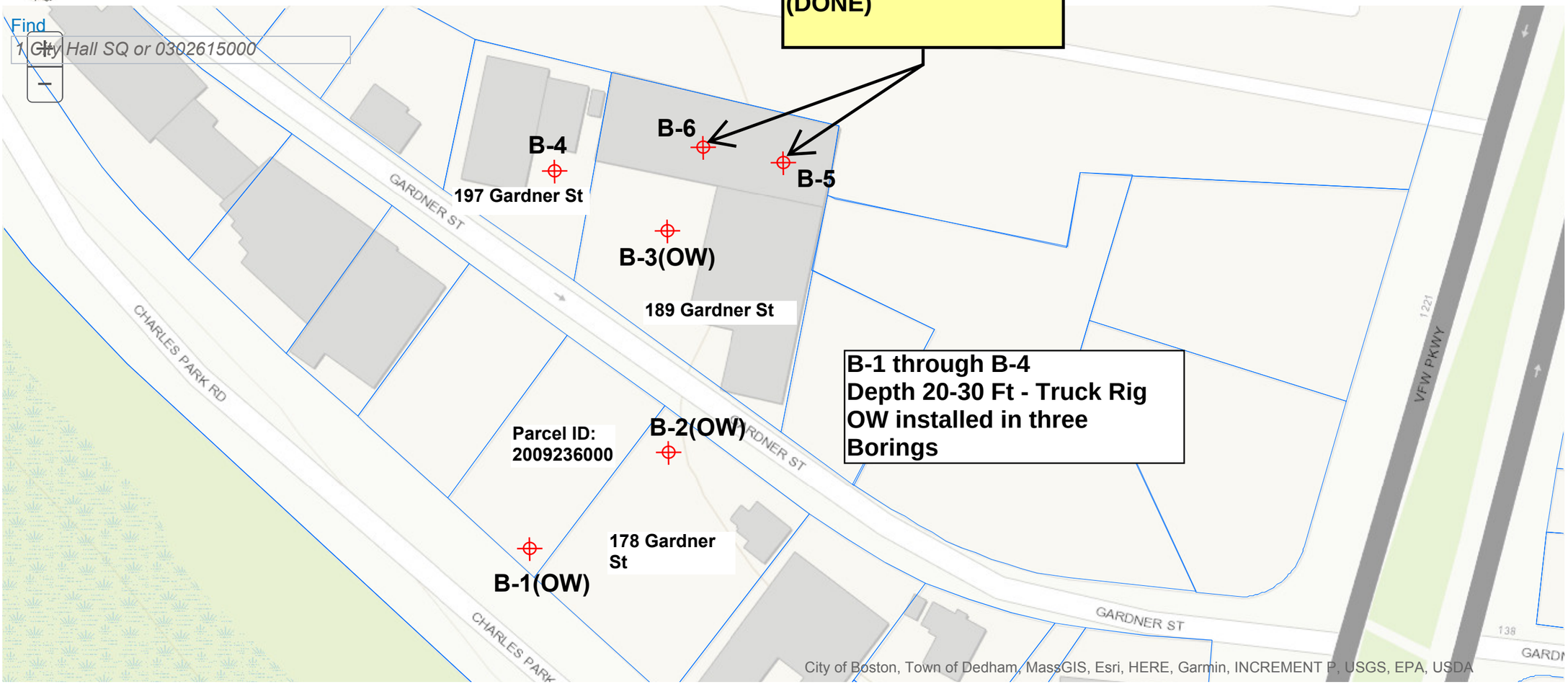
Rock outcrops

Percent of map unit: 1 percent
Hydric soil rating: Unranked

Data Source Information

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 16, Jun 11, 2020

Boston Tax Parcel Viewer



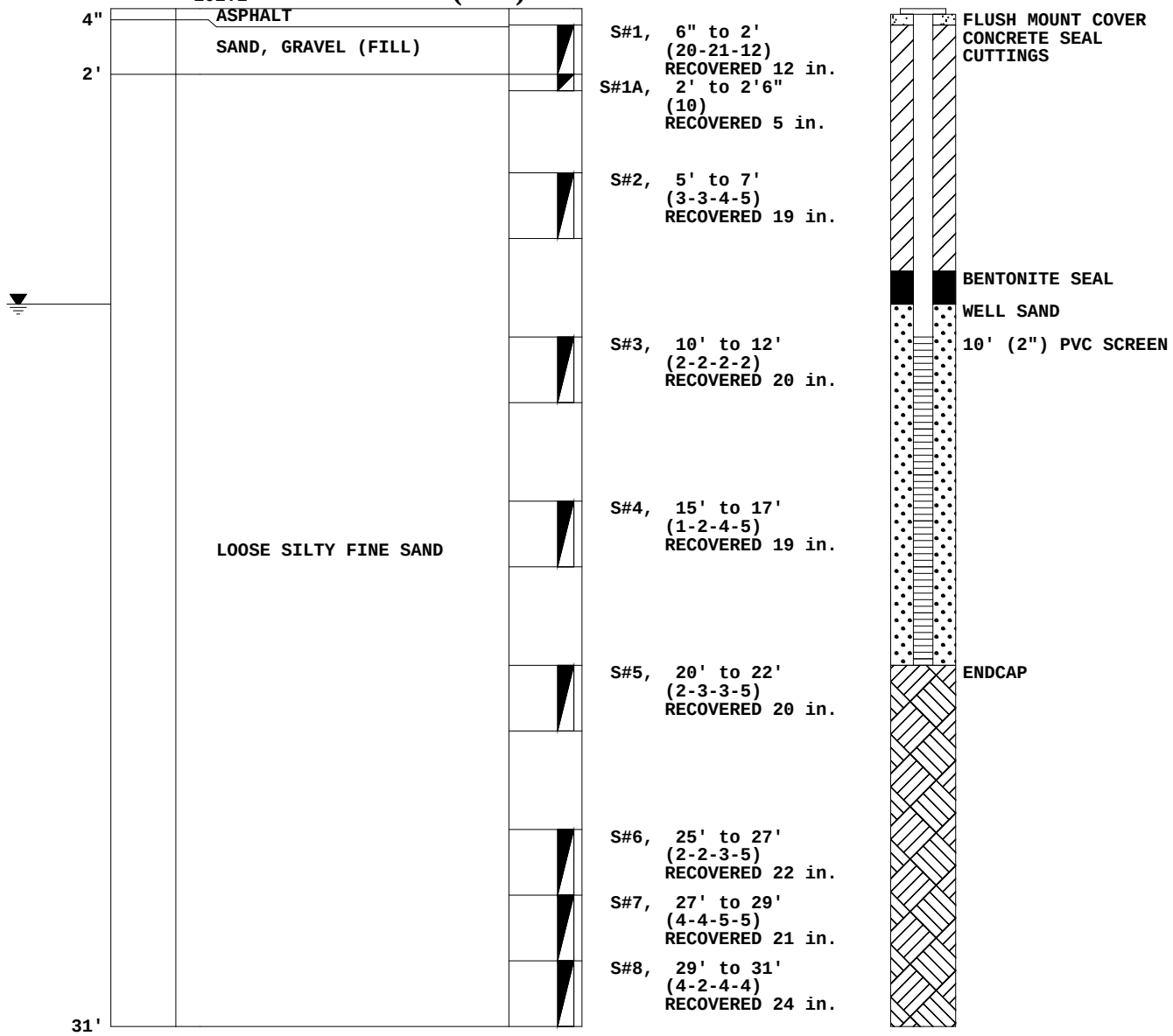
CARR-DEE CORP.

37 LINDEN STREET MEDFORD, MA 02155-0001 Telephone (781) 391-4500

To: MCPHAIL ASSOC., LLC, 2269 MASS. AVE., CAMBRIDGE, MA Date: 6-22-2018 Job No.: 2018-110

Location: 178, 189, 197 GARDNER STREET, WEST ROXBURY, MA Scale: 1 in.= 5 ft.

BORING 1(OW)



WATER LEVEL 9'
SIZE OF CASING: NW, LENGTH: 5'0"
DRILLER: G. SMITH, INSPECTOR: C. CONNORS
DATE STARTED & COMPLETED: 6-22-2018

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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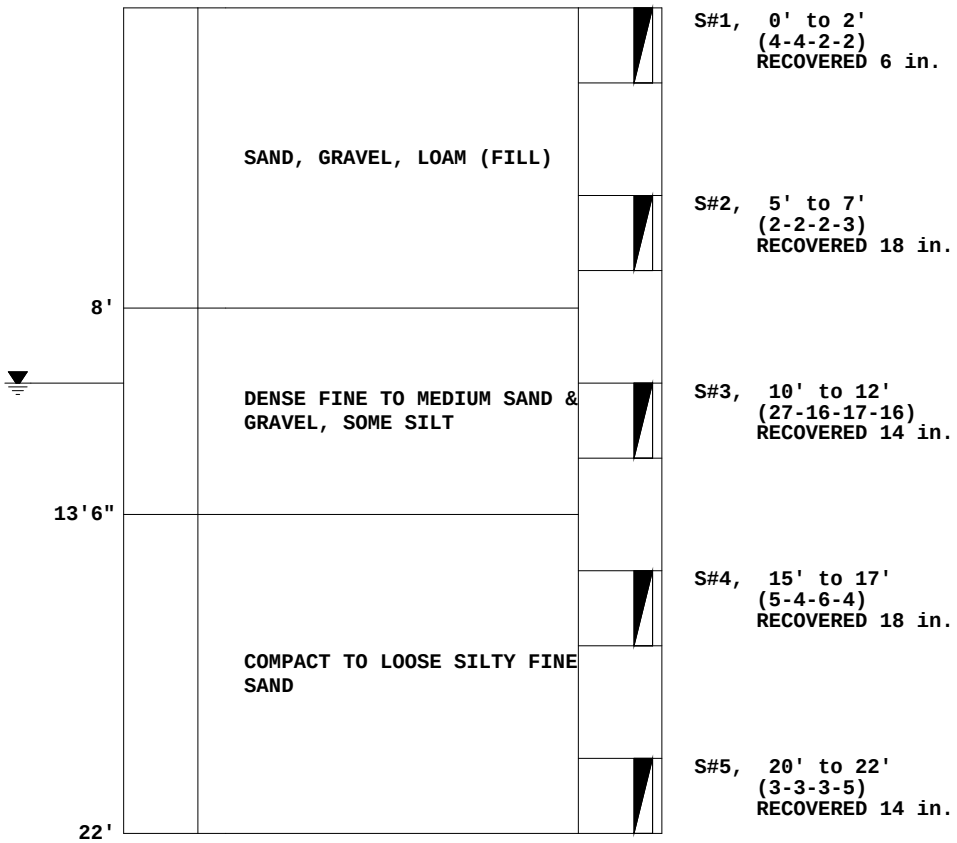
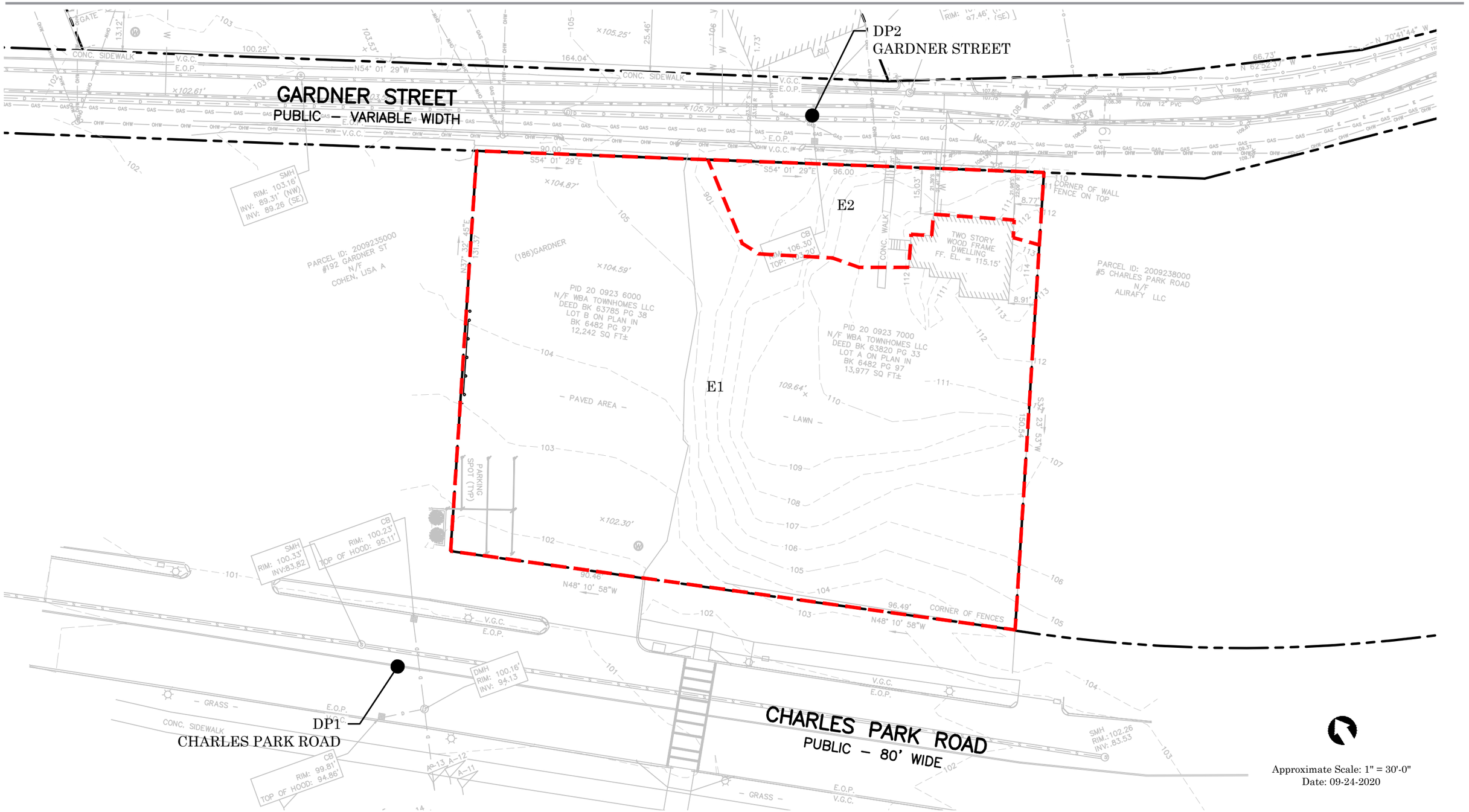


WATER LEVEL 10'
SIZE OF CASING: NW, LENGTH: 10'0"
DRILLER: G. SMITH, INSPECTOR: C. CONNORS
DATE STARTED & COMPLETED: 6-22-2018

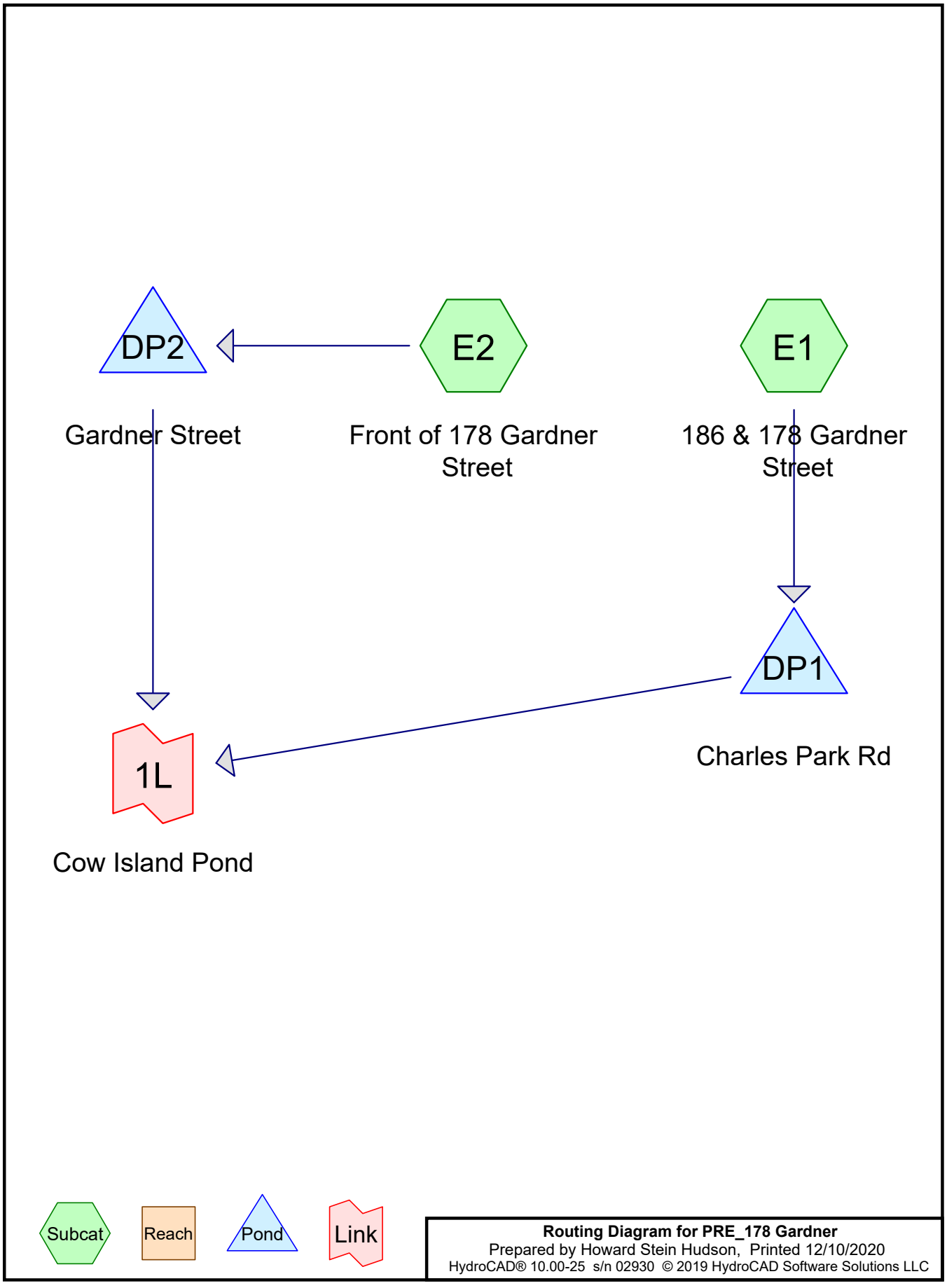
All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

Appendix B:
Stormwater Calculations

Figure 1. ***PRE-DEVELOPEMENT HYDROLOGY***



Approximate Scale: 1" = 30'-0"
Date: 09-24-2020



Routing Diagram for PRE_178 Gardner
Prepared by Howard Stein Hudson, Printed 12/10/2020

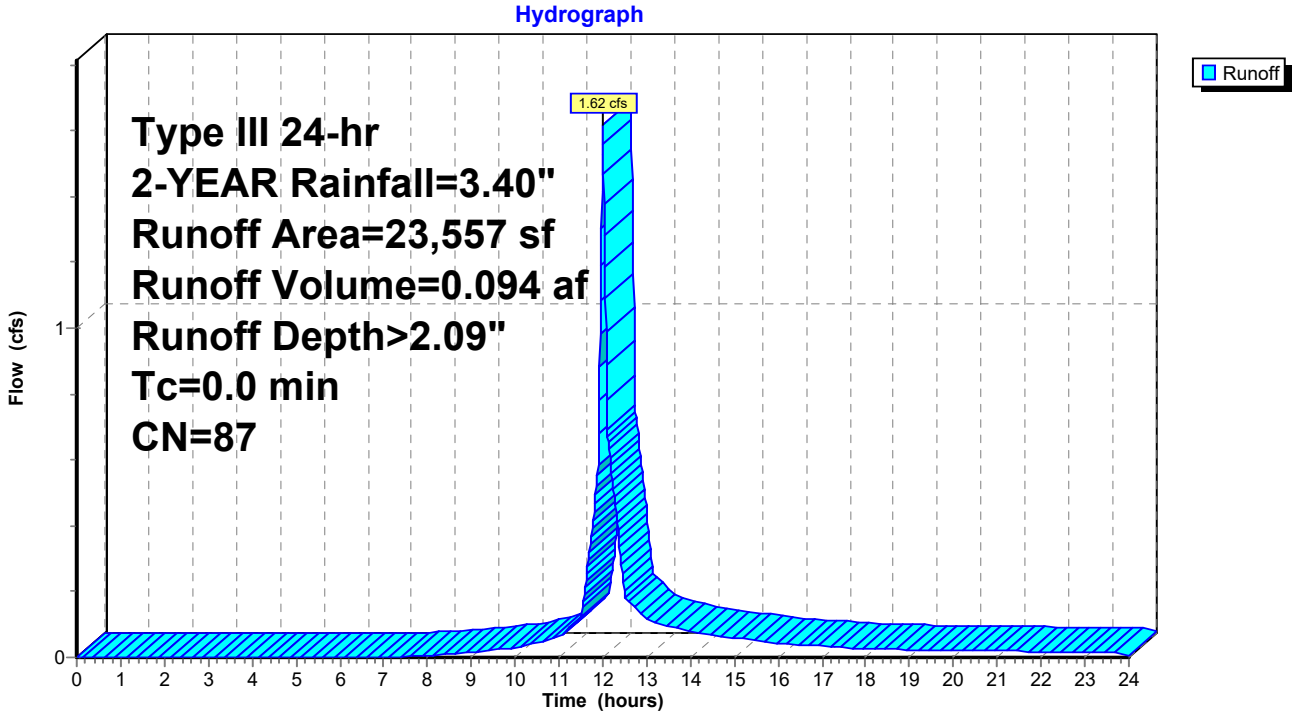
Summary for Subcatchment E1: 186 & 178 Gardner Street

Runoff = 1.62 cfs @ 12.00 hrs, Volume= 0.094 af, Depth> 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YEAR Rainfall=3.40"

Area (sf)	CN	Description
9,766	98	Paved parking, HSG C
715	98	Unconnected roofs, HSG C
13,076	79	50-75% Grass cover, Fair, HSG C
23,557	87	Weighted Average
13,076		55.51% Pervious Area
10,481		44.49% Impervious Area
715		6.82% Unconnected

Subcatchment E1: 186 & 178 Gardner Street



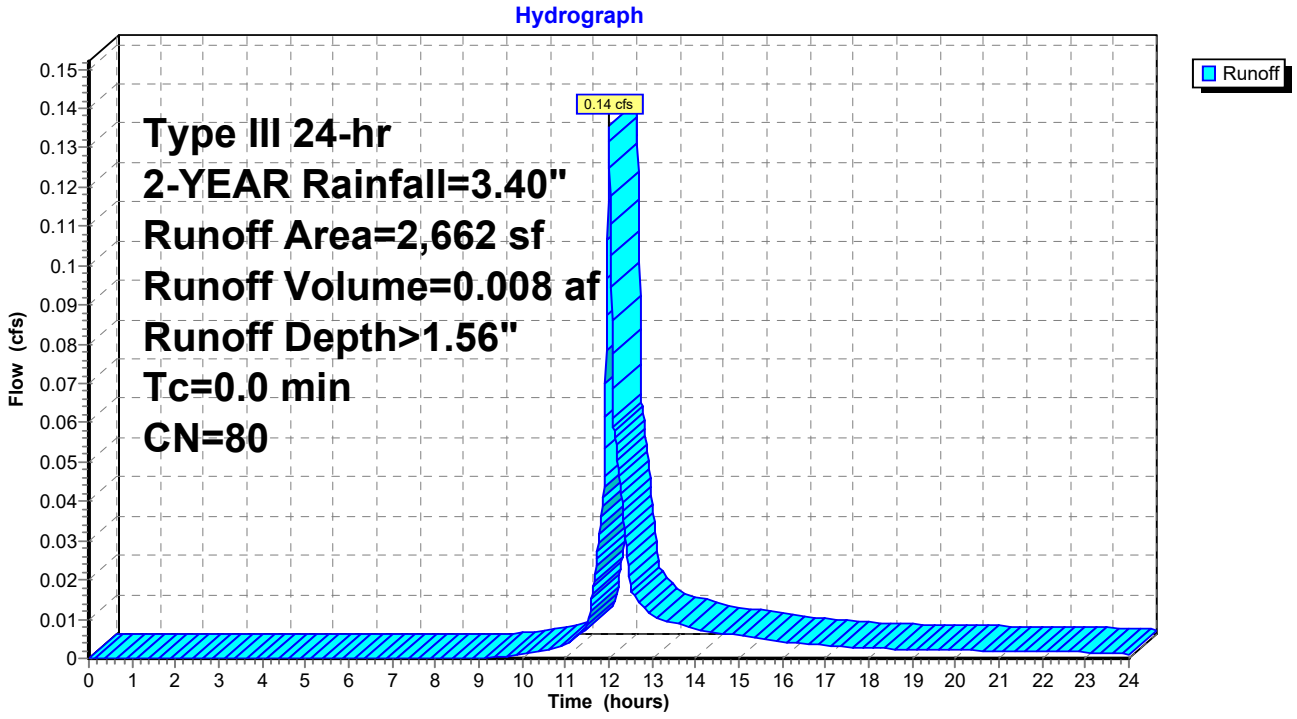
Summary for Subcatchment E2: Front of 178 Gardner Street

Runoff = 0.14 cfs @ 12.00 hrs, Volume= 0.008 af, Depth> 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YEAR Rainfall=3.40"

Area (sf)	CN	Description
114	98	Paved parking, HSG C
2,548	79	50-75% Grass cover, Fair, HSG C
2,662	80	Weighted Average
2,548		95.72% Pervious Area
114		4.28% Impervious Area

Subcatchment E2: Front of 178 Gardner Street

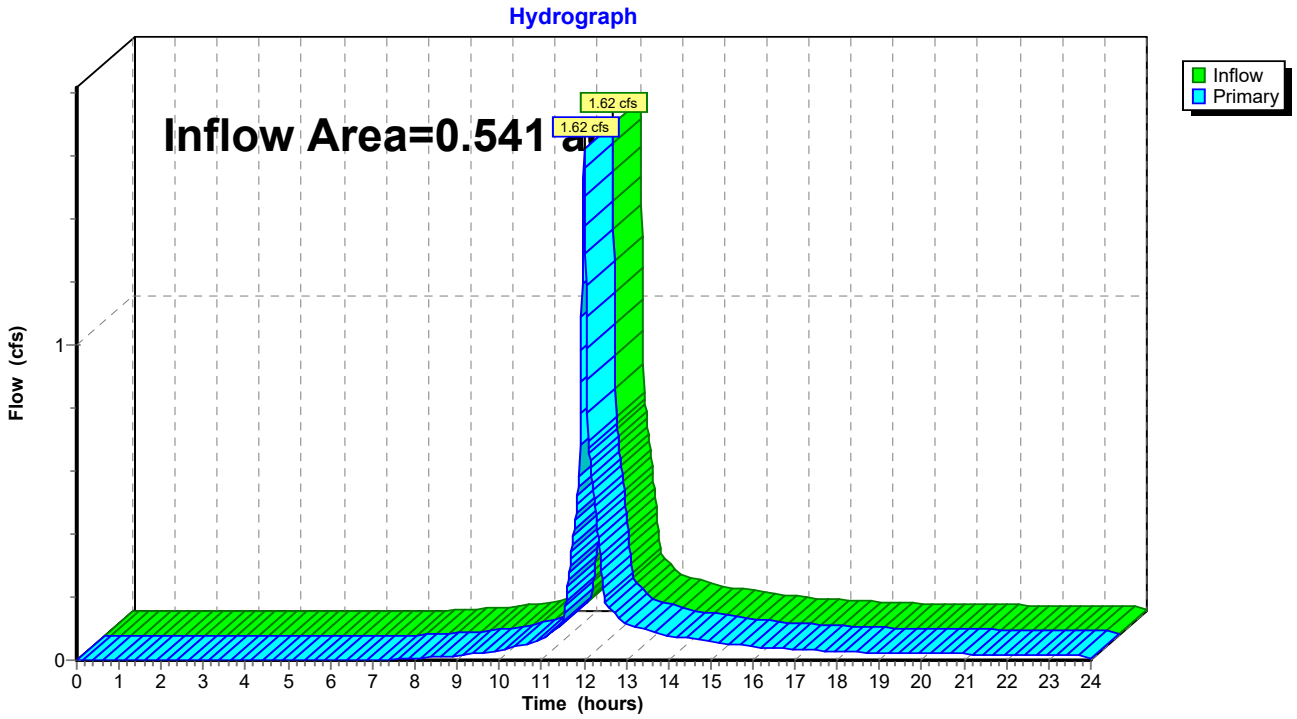


Summary for Pond DP1: Charles Park Rd

Inflow Area = 0.541 ac, 44.49% Impervious, Inflow Depth > 2.09" for 2-YEAR event
Inflow = 1.62 cfs @ 12.00 hrs, Volume= 0.094 af
Primary = 1.62 cfs @ 12.00 hrs, Volume= 0.094 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond DP1: Charles Park Rd

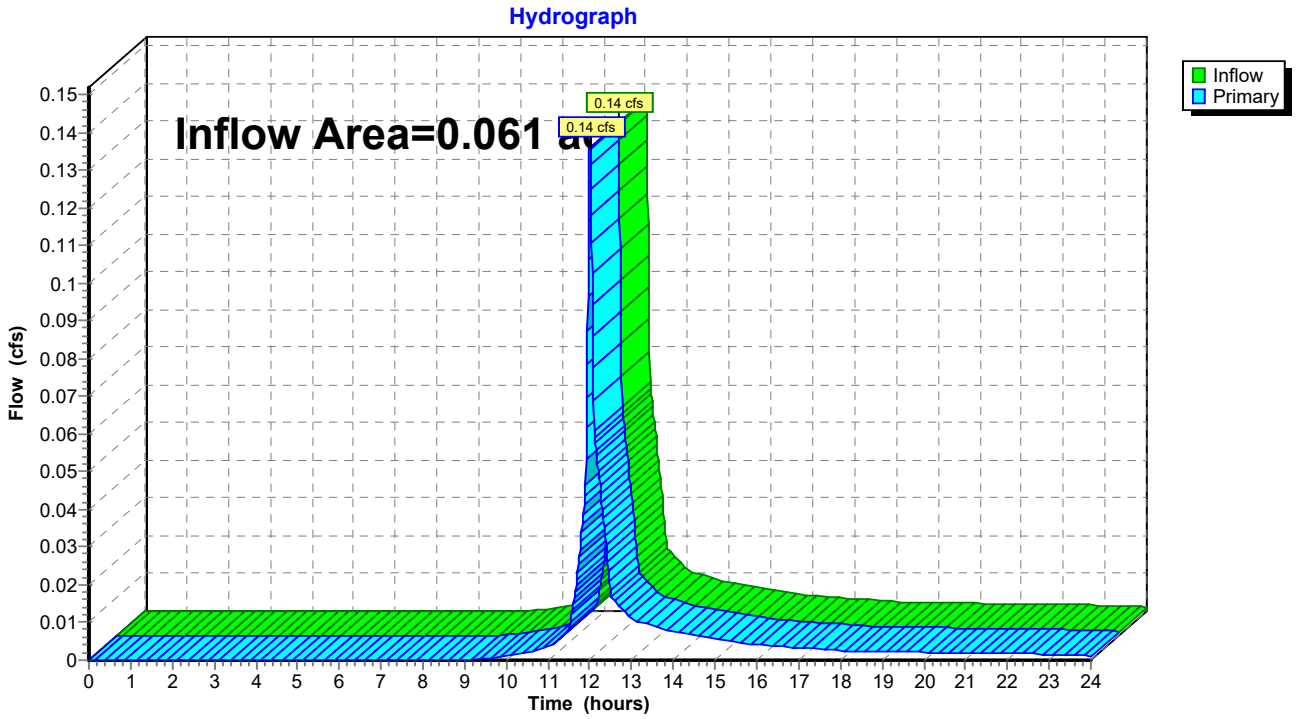


Summary for Pond DP2: Gardner Street

Inflow Area = 0.061 ac, 4.28% Impervious, Inflow Depth > 1.56" for 2-YEAR event
Inflow = 0.14 cfs @ 12.00 hrs, Volume= 0.008 af
Primary = 0.14 cfs @ 12.00 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond DP2: Gardner Street

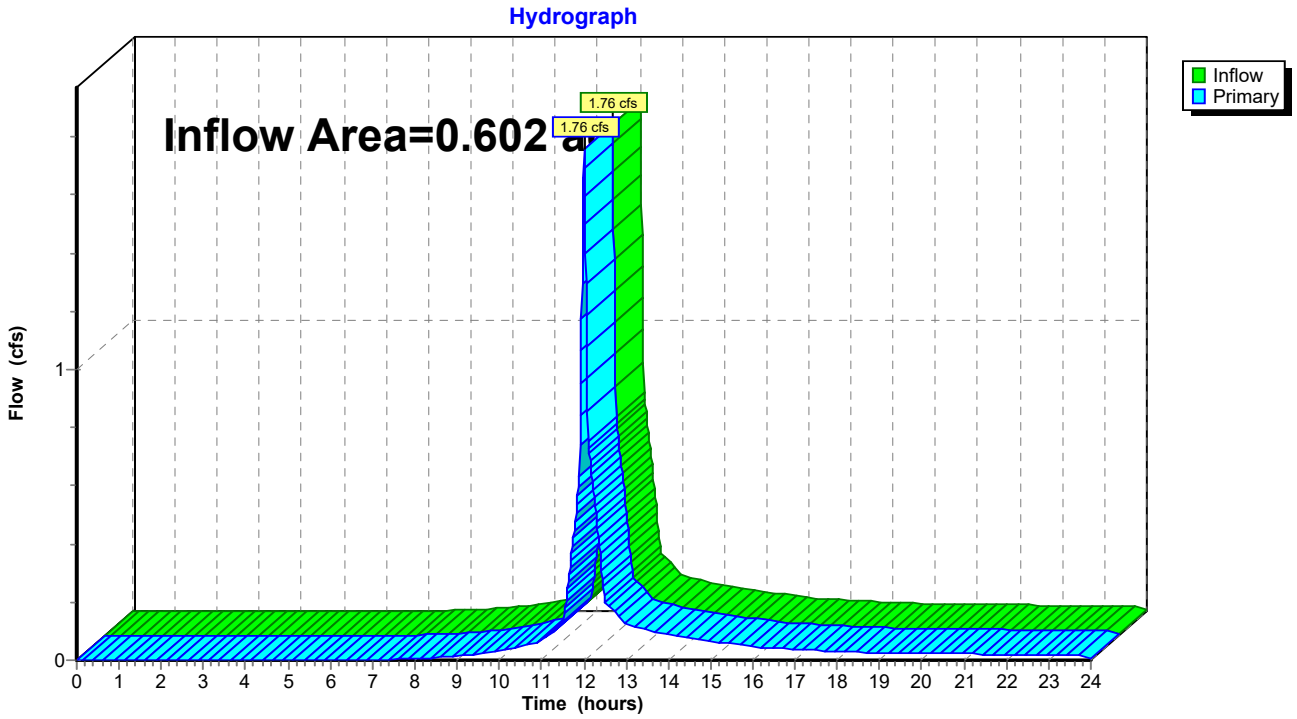


Summary for Link 1L: Cow Island Pond

Inflow Area = 0.602 ac, 40.41% Impervious, Inflow Depth > 2.04" for 2-YEAR event
Inflow = 1.76 cfs @ 12.00 hrs, Volume= 0.102 af
Primary = 1.76 cfs @ 12.00 hrs, Volume= 0.102 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 1L: Cow Island Pond



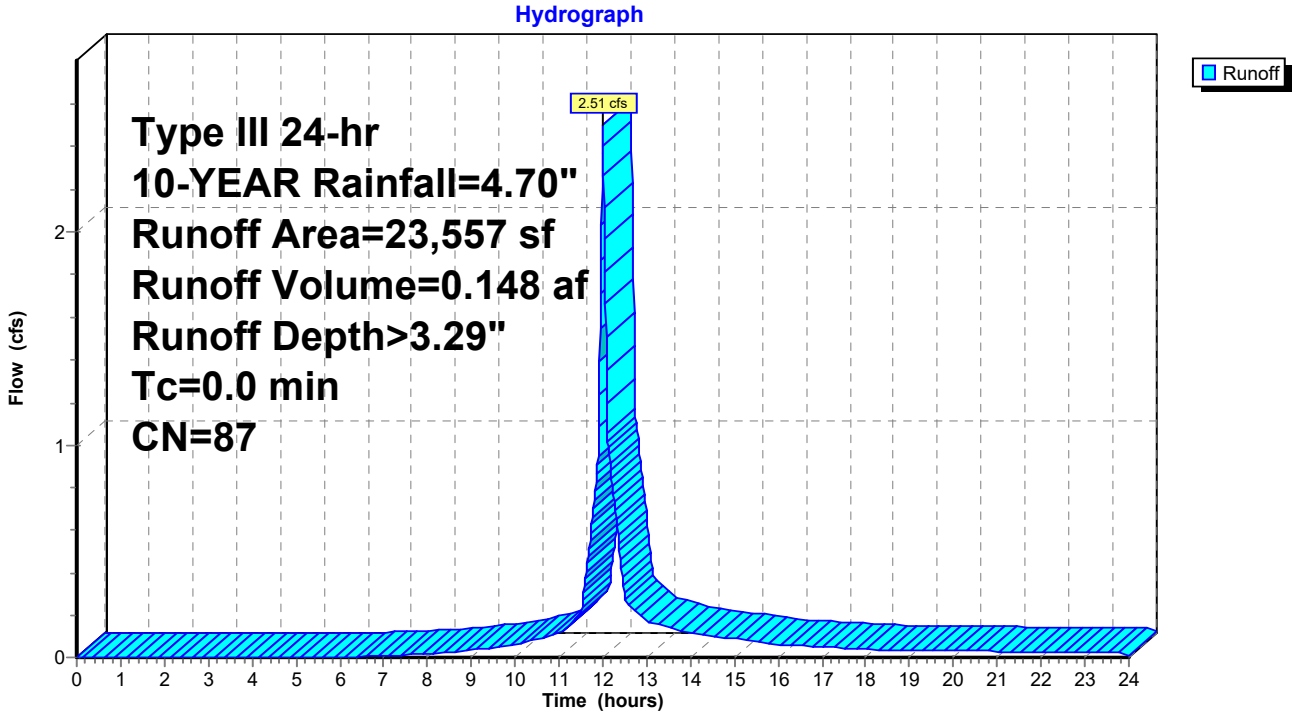
Summary for Subcatchment E1: 186 & 178 Gardner Street

Runoff = 2.51 cfs @ 12.00 hrs, Volume= 0.148 af, Depth> 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YEAR Rainfall=4.70"

Area (sf)	CN	Description
9,766	98	Paved parking, HSG C
715	98	Unconnected roofs, HSG C
13,076	79	50-75% Grass cover, Fair, HSG C
23,557	87	Weighted Average
13,076		55.51% Pervious Area
10,481		44.49% Impervious Area
715		6.82% Unconnected

Subcatchment E1: 186 & 178 Gardner Street



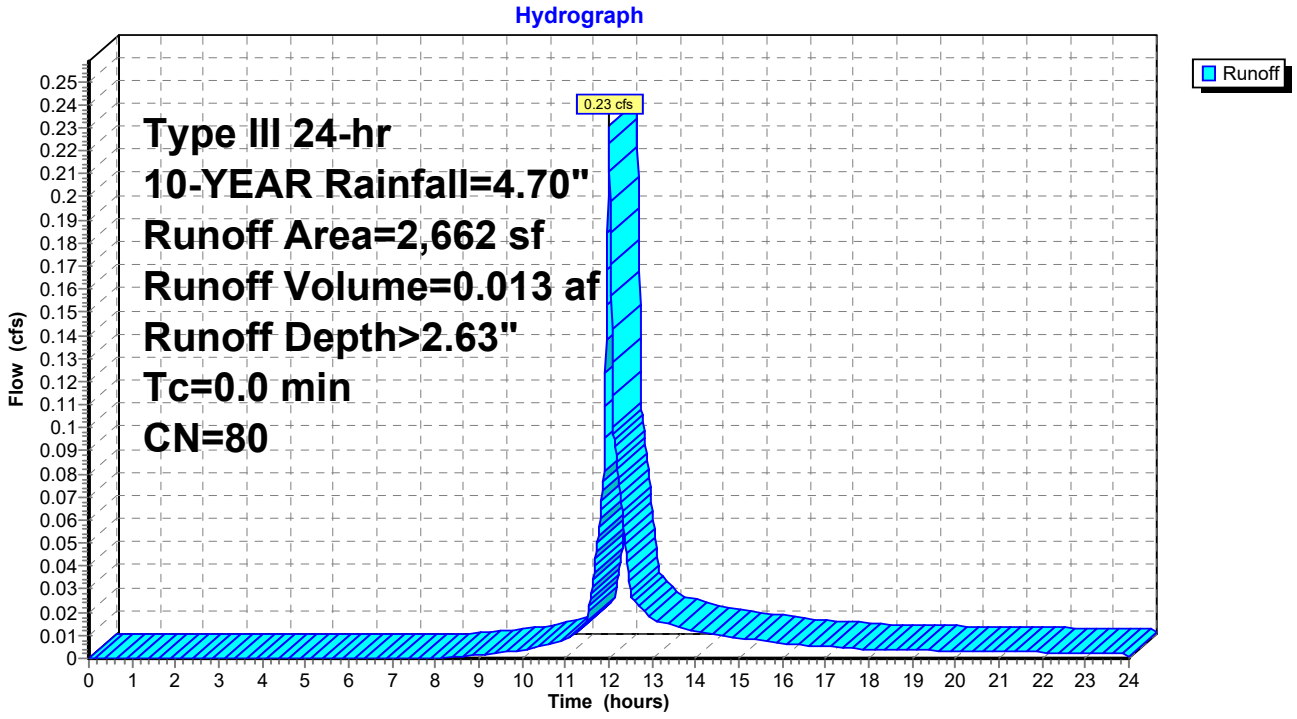
Summary for Subcatchment E2: Front of 178 Gardner Street

Runoff = 0.23 cfs @ 12.00 hrs, Volume= 0.013 af, Depth> 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YEAR Rainfall=4.70"

Area (sf)	CN	Description
114	98	Paved parking, HSG C
2,548	79	50-75% Grass cover, Fair, HSG C
2,662	80	Weighted Average
2,548		95.72% Pervious Area
114		4.28% Impervious Area

Subcatchment E2: Front of 178 Gardner Street

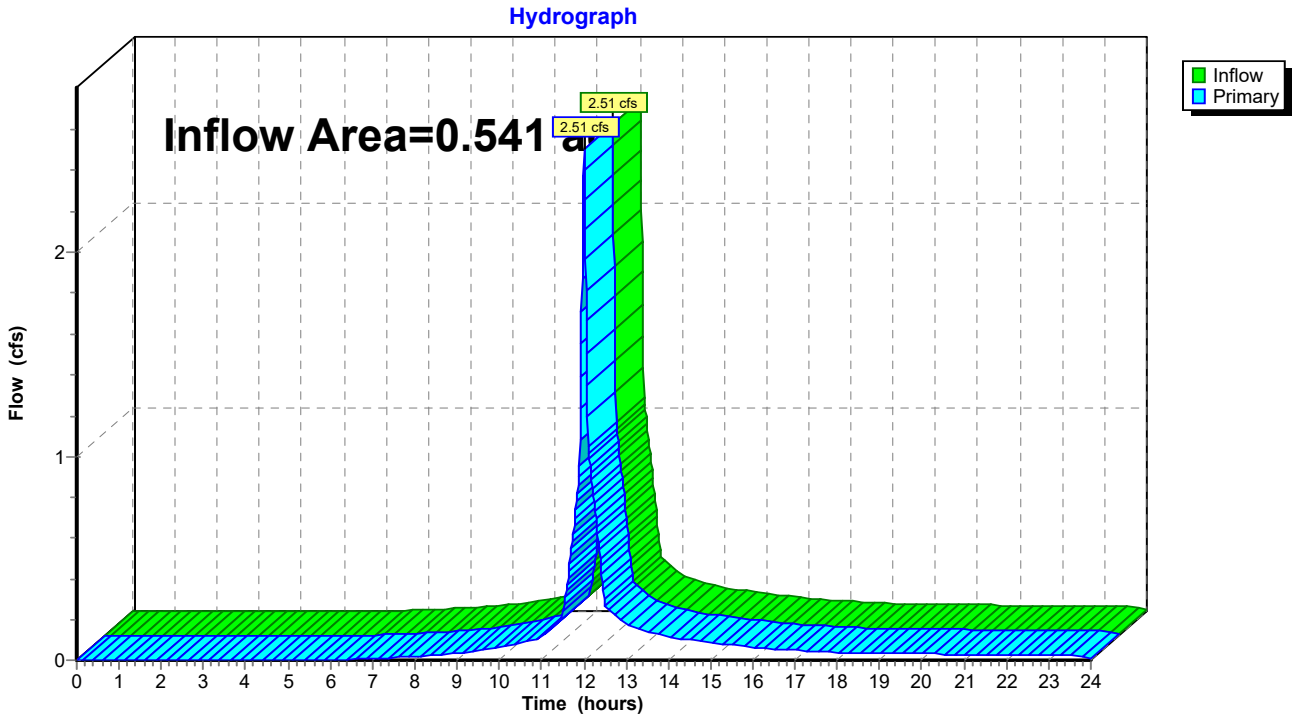


Summary for Pond DP1: Charles Park Rd

Inflow Area = 0.541 ac, 44.49% Impervious, Inflow Depth > 3.29" for 10-YEAR event
Inflow = 2.51 cfs @ 12.00 hrs, Volume= 0.148 af
Primary = 2.51 cfs @ 12.00 hrs, Volume= 0.148 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond DP1: Charles Park Rd

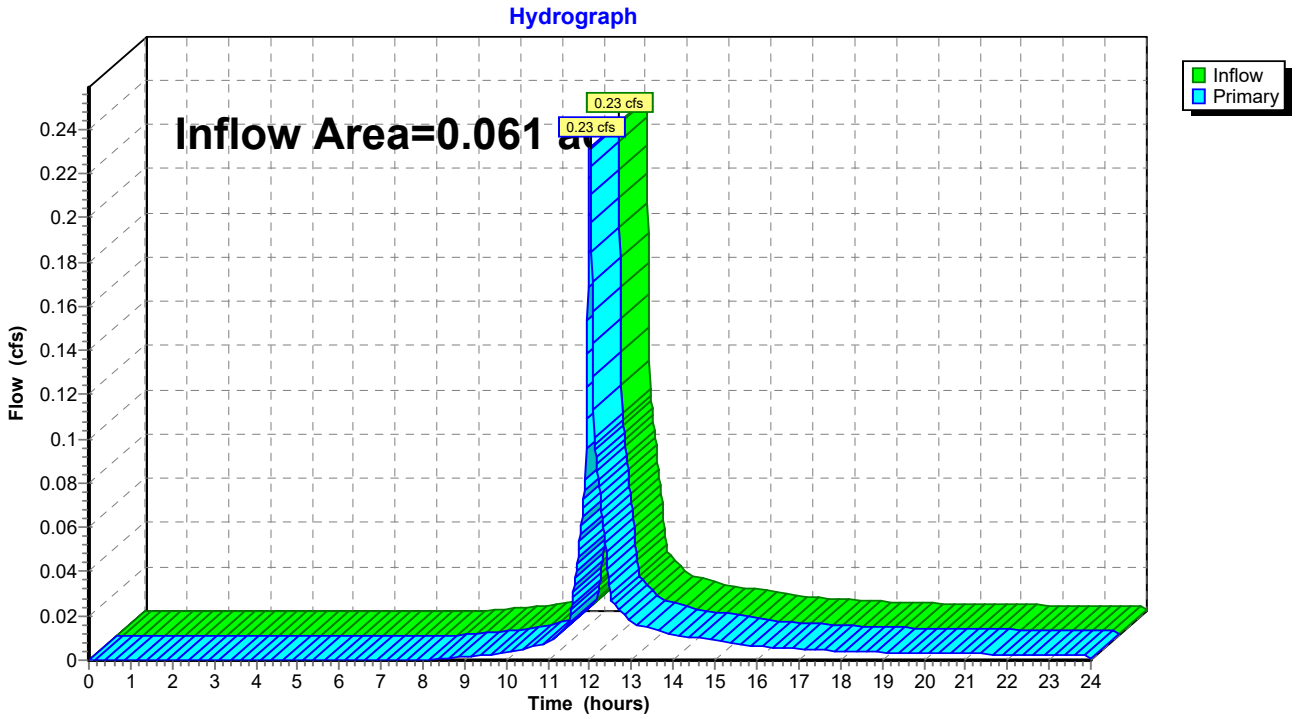


Summary for Pond DP2: Gardner Street

Inflow Area = 0.061 ac, 4.28% Impervious, Inflow Depth > 2.63" for 10-YEAR event
Inflow = 0.23 cfs @ 12.00 hrs, Volume= 0.013 af
Primary = 0.23 cfs @ 12.00 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond DP2: Gardner Street

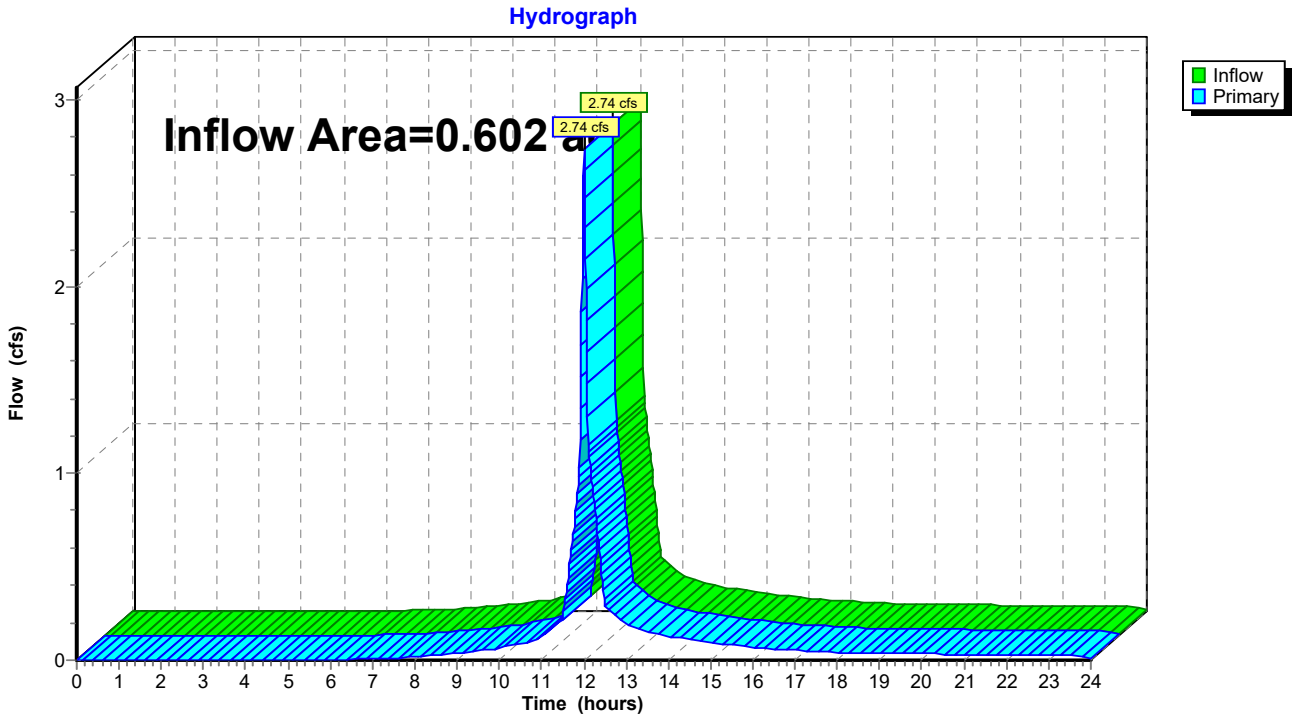


Summary for Link 1L: Cow Island Pond

Inflow Area = 0.602 ac, 40.41% Impervious, Inflow Depth > 3.22" for 10-YEAR event
Inflow = 2.74 cfs @ 12.00 hrs, Volume= 0.161 af
Primary = 2.74 cfs @ 12.00 hrs, Volume= 0.161 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 1L: Cow Island Pond



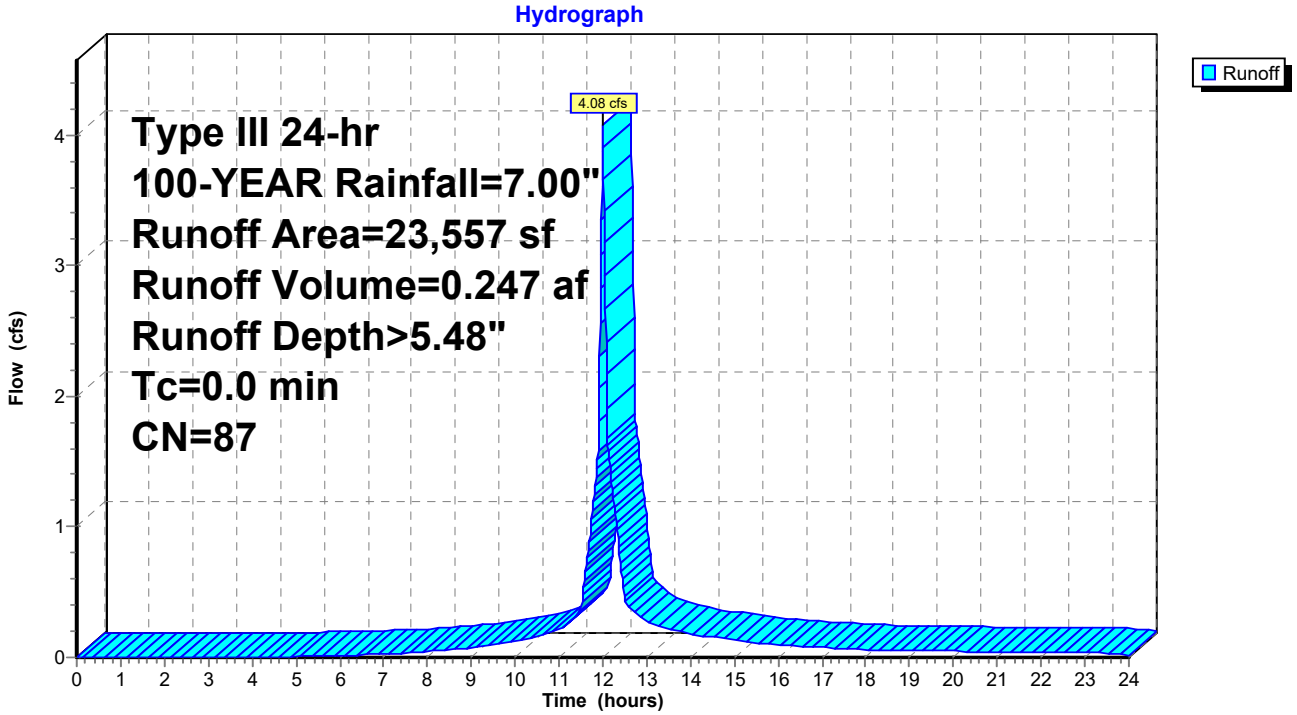
Summary for Subcatchment E1: 186 & 178 Gardner Street

Runoff = 4.08 cfs @ 12.00 hrs, Volume= 0.247 af, Depth> 5.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YEAR Rainfall=7.00"

Area (sf)	CN	Description
9,766	98	Paved parking, HSG C
715	98	Unconnected roofs, HSG C
13,076	79	50-75% Grass cover, Fair, HSG C
23,557	87	Weighted Average
13,076		55.51% Pervious Area
10,481		44.49% Impervious Area
715		6.82% Unconnected

Subcatchment E1: 186 & 178 Gardner Street



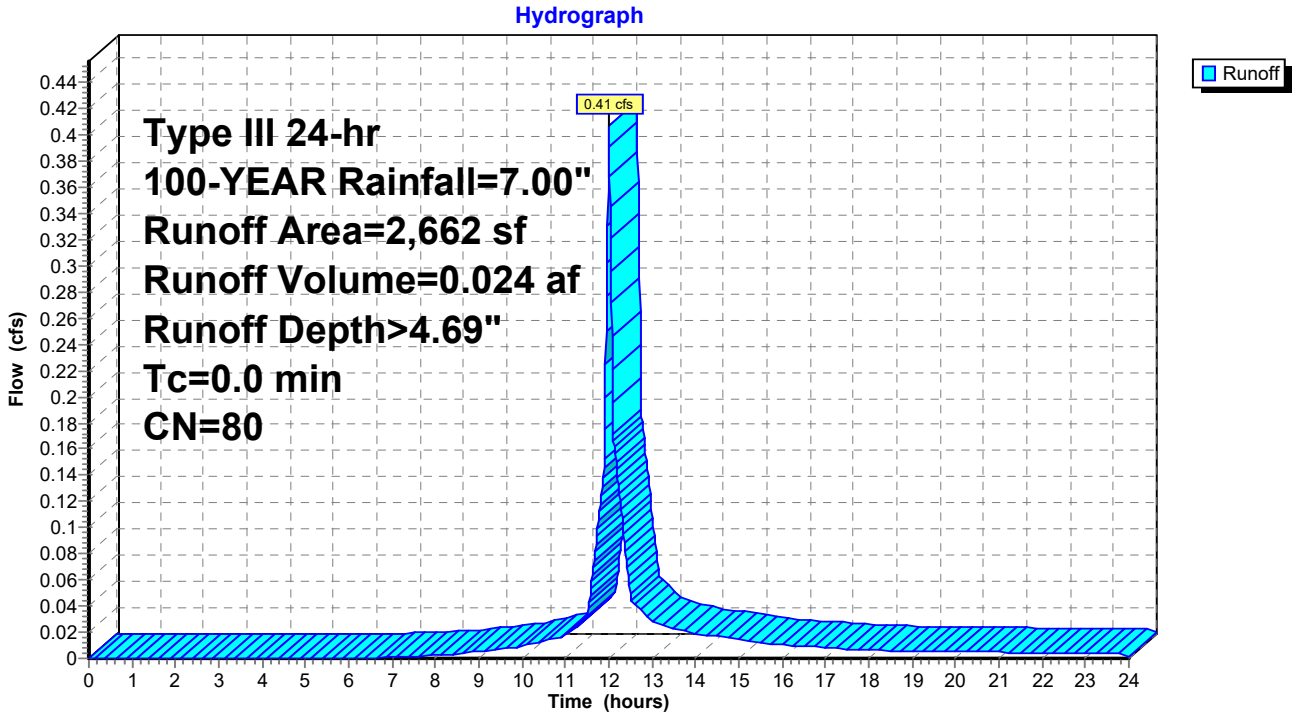
Summary for Subcatchment E2: Front of 178 Gardner Street

Runoff = 0.41 cfs @ 12.00 hrs, Volume= 0.024 af, Depth> 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YEAR Rainfall=7.00"

Area (sf)	CN	Description
114	98	Paved parking, HSG C
2,548	79	50-75% Grass cover, Fair, HSG C
2,662	80	Weighted Average
2,548		95.72% Pervious Area
114		4.28% Impervious Area

Subcatchment E2: Front of 178 Gardner Street

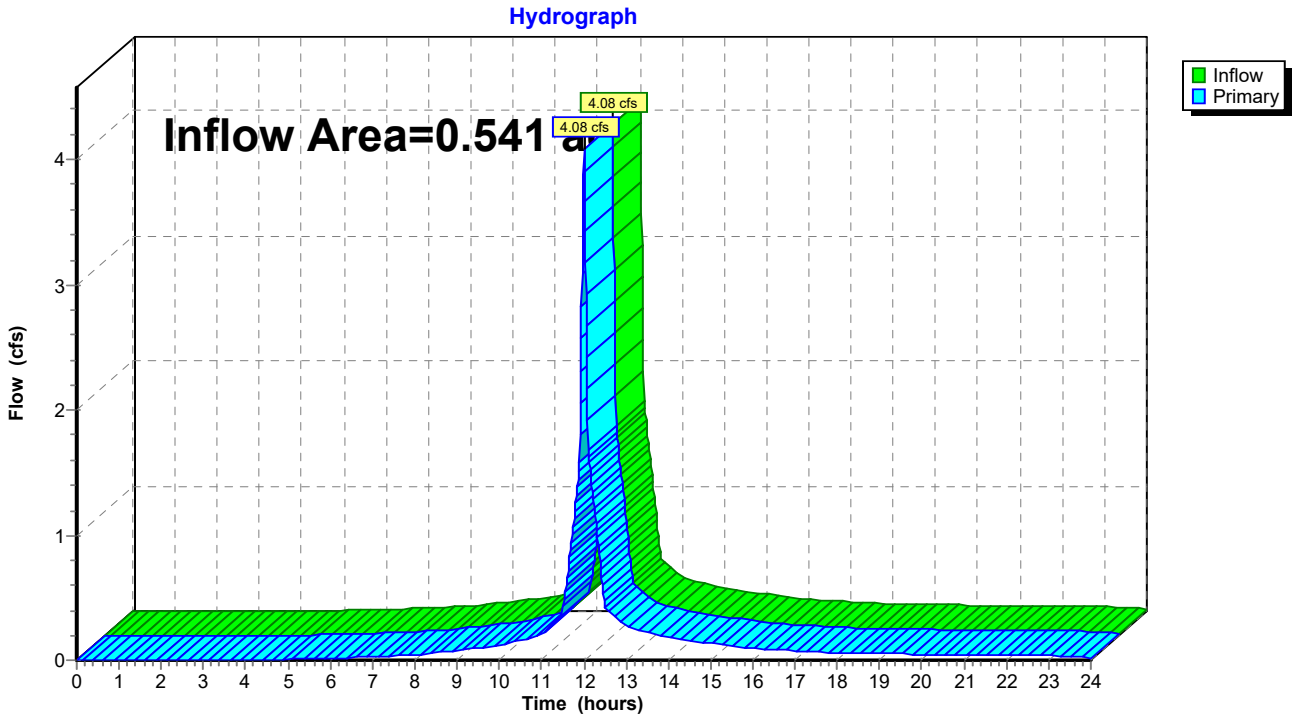


Summary for Pond DP1: Charles Park Rd

Inflow Area = 0.541 ac, 44.49% Impervious, Inflow Depth > 5.48" for 100-YEAR event
Inflow = 4.08 cfs @ 12.00 hrs, Volume= 0.247 af
Primary = 4.08 cfs @ 12.00 hrs, Volume= 0.247 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond DP1: Charles Park Rd

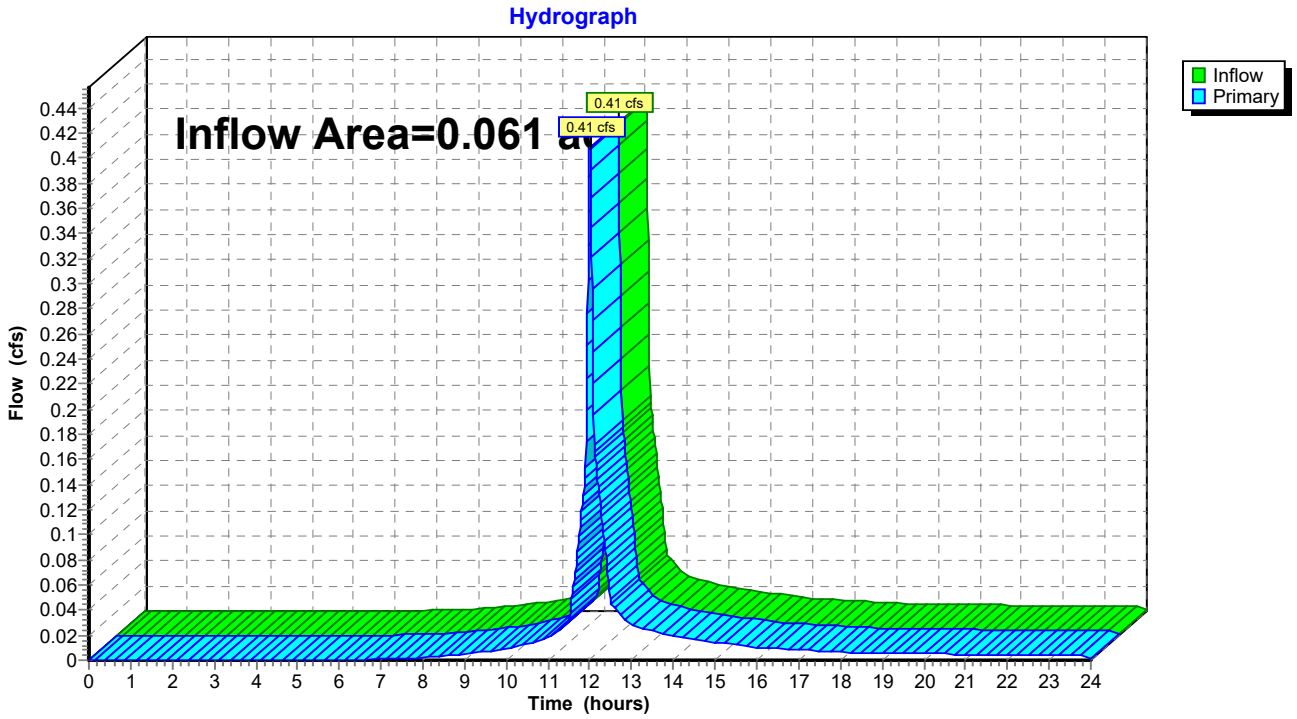


Summary for Pond DP2: Gardner Street

Inflow Area = 0.061 ac, 4.28% Impervious, Inflow Depth > 4.69" for 100-YEAR event
Inflow = 0.41 cfs @ 12.00 hrs, Volume= 0.024 af
Primary = 0.41 cfs @ 12.00 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Pond DP2: Gardner Street



Summary for Link 1L: Cow Island Pond

Inflow Area = 0.602 ac, 40.41% Impervious, Inflow Depth > 5.40" for 100-YEAR event
Inflow = 4.49 cfs @ 12.00 hrs, Volume= 0.271 af
Primary = 4.49 cfs @ 12.00 hrs, Volume= 0.271 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 1L: Cow Island Pond

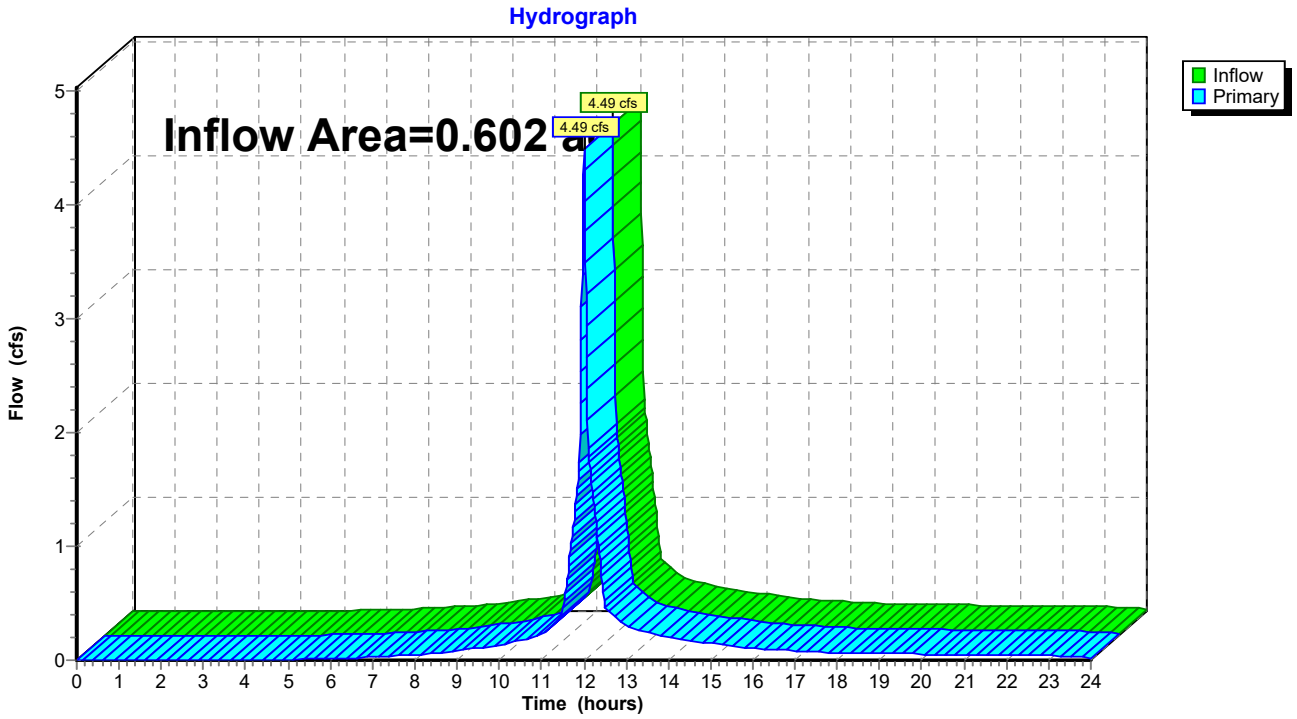
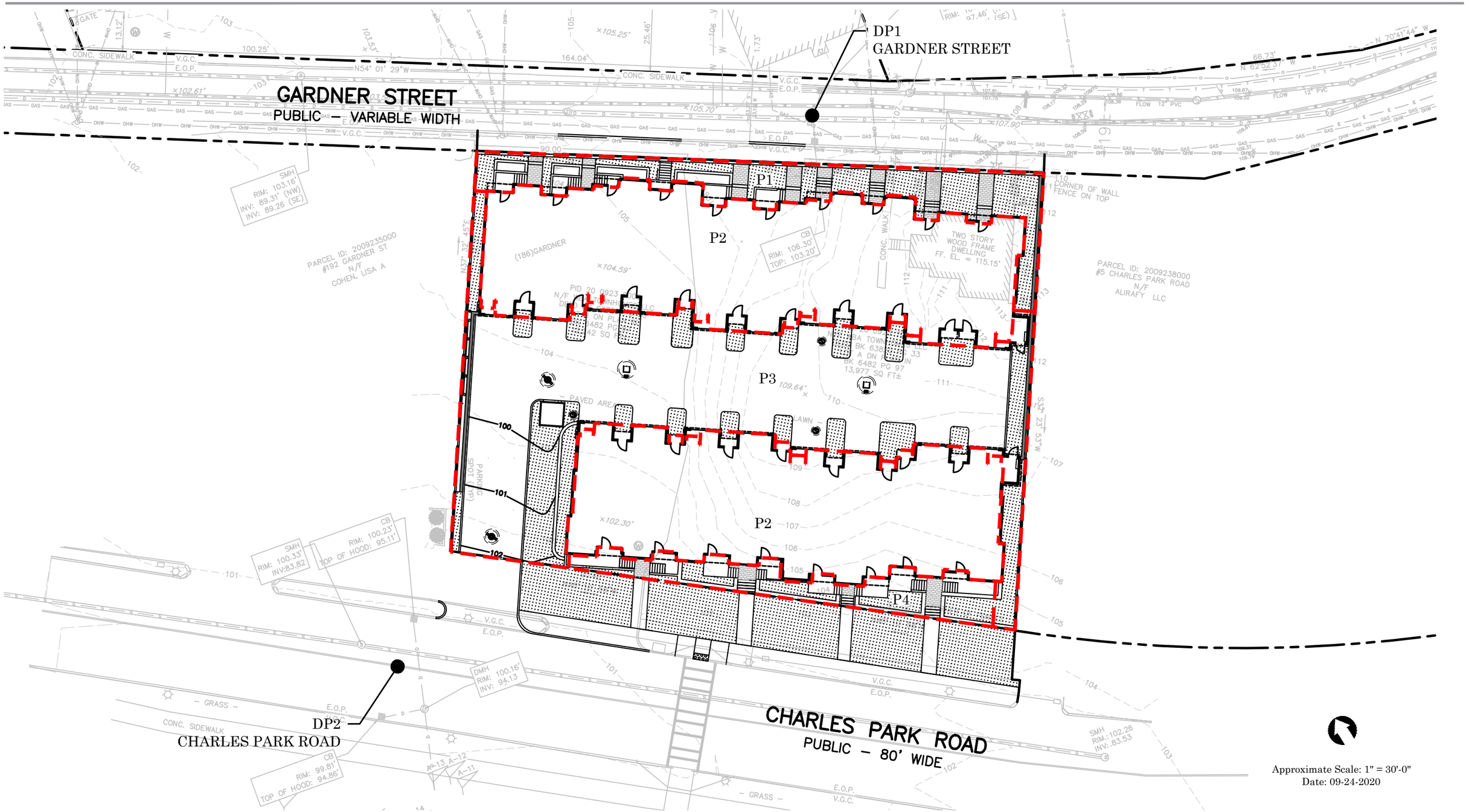
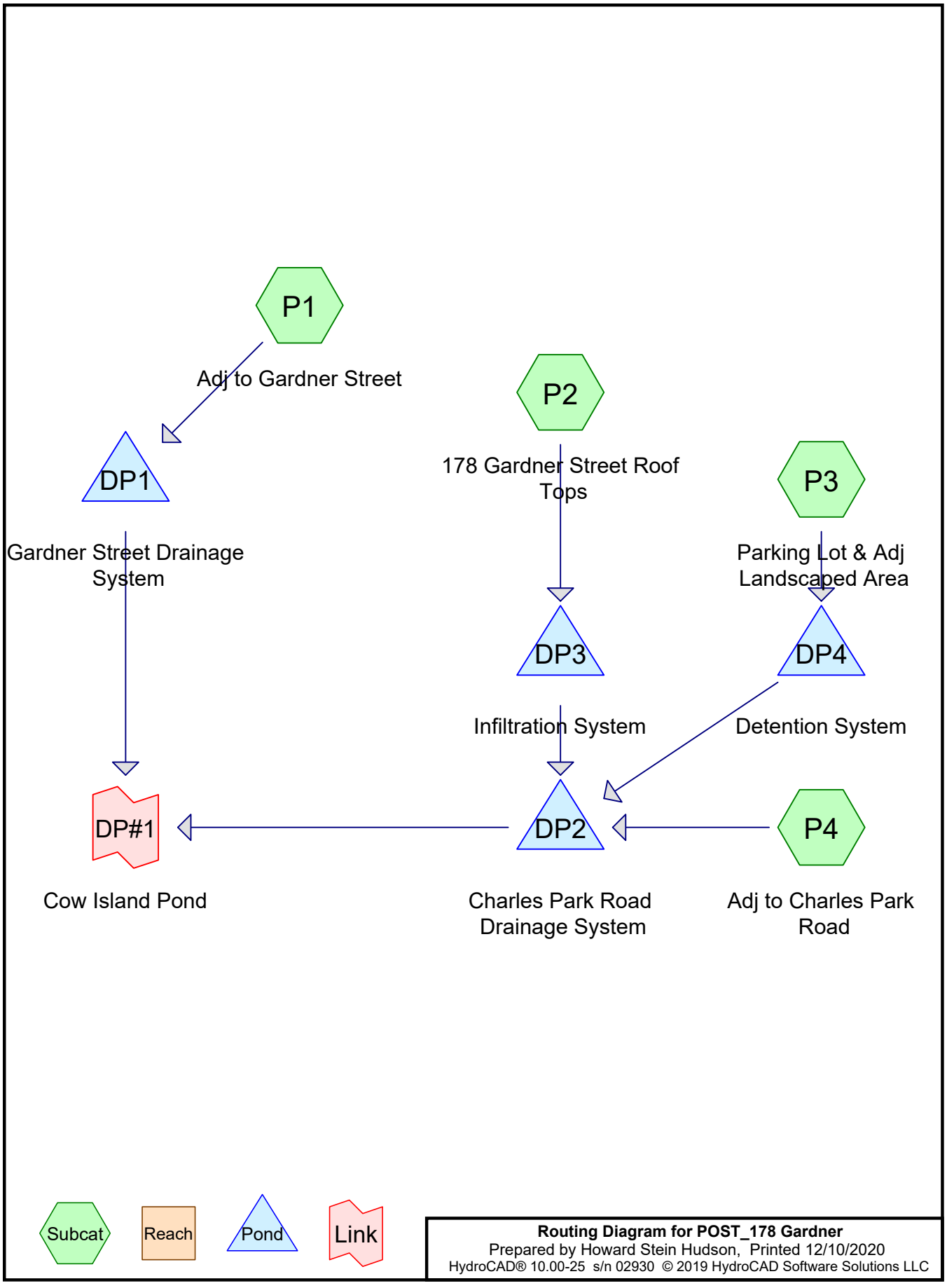


Figure 2. ***POST-DEVELOPEMENT HYDROLOGY***



Approximate Scale: 1" = 30'-0"
Date: 09-24-2020



Routing Diagram for POST_178 Gardner
Prepared by Howard Stein Hudson, Printed 12/10/2020

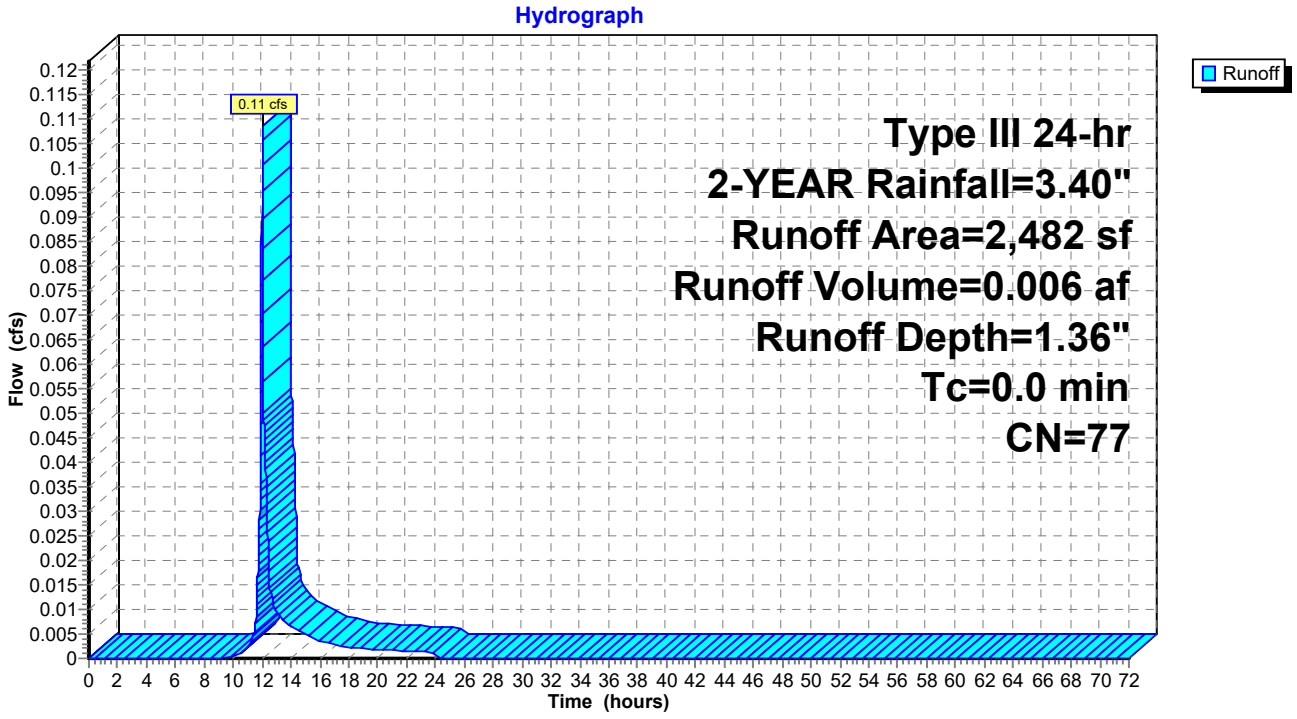
Summary for Subcatchment P1: Adj to Gardner Street

Runoff = 0.11 cfs @ 12.00 hrs, Volume= 0.006 af, Depth= 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YEAR Rainfall=3.40"

Area (sf)	CN	Description
270	98	Paved parking, HSG C
2,212	74	>75% Grass cover, Good, HSG C
2,482	77	Weighted Average
2,212		89.12% Pervious Area
270		10.88% Impervious Area

Subcatchment P1: Adj to Gardner Street



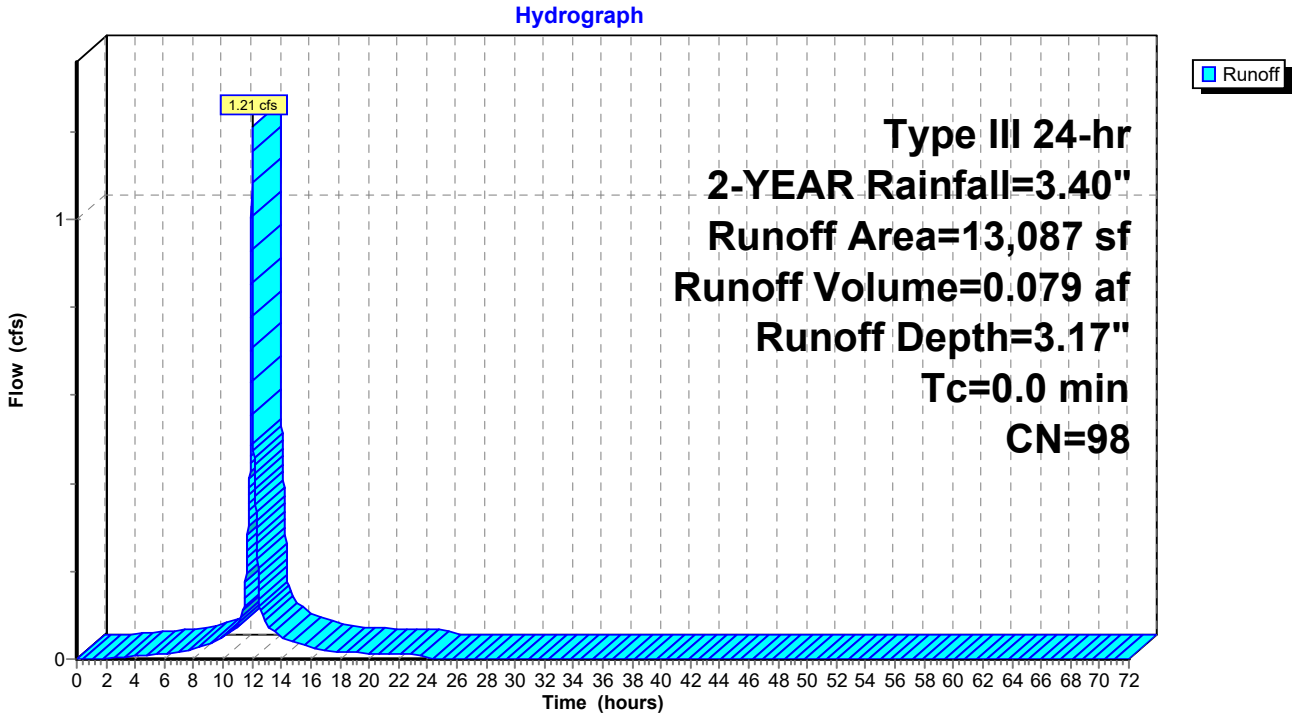
Summary for Subcatchment P2: 178 Gardner Street Roof Tops

Runoff = 1.21 cfs @ 12.00 hrs, Volume= 0.079 af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YEAR Rainfall=3.40"

Area (sf)	CN	Description
13,087	98	Paved parking, HSG C
13,087		100.00% Impervious Area

Subcatchment P2: 178 Gardner Street Roof Tops



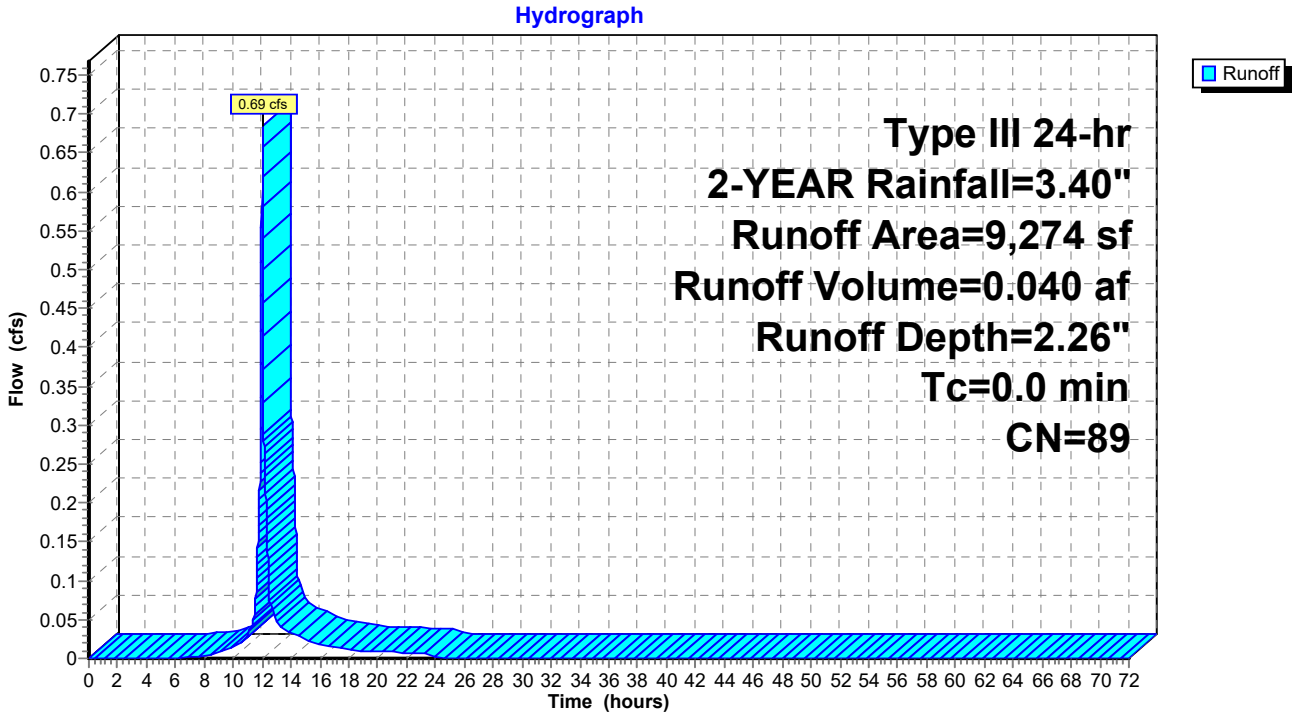
Summary for Subcatchment P3: Parking Lot & Adj Landscaped Area

Runoff = 0.69 cfs @ 12.00 hrs, Volume= 0.040 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YEAR Rainfall=3.40"

Area (sf)	CN	Description
5,944	98	Paved parking, HSG C
3,330	74	>75% Grass cover, Good, HSG C
9,274	89	Weighted Average
3,330		35.91% Pervious Area
5,944		64.09% Impervious Area

Subcatchment P3: Parking Lot & Adj Landscaped Area



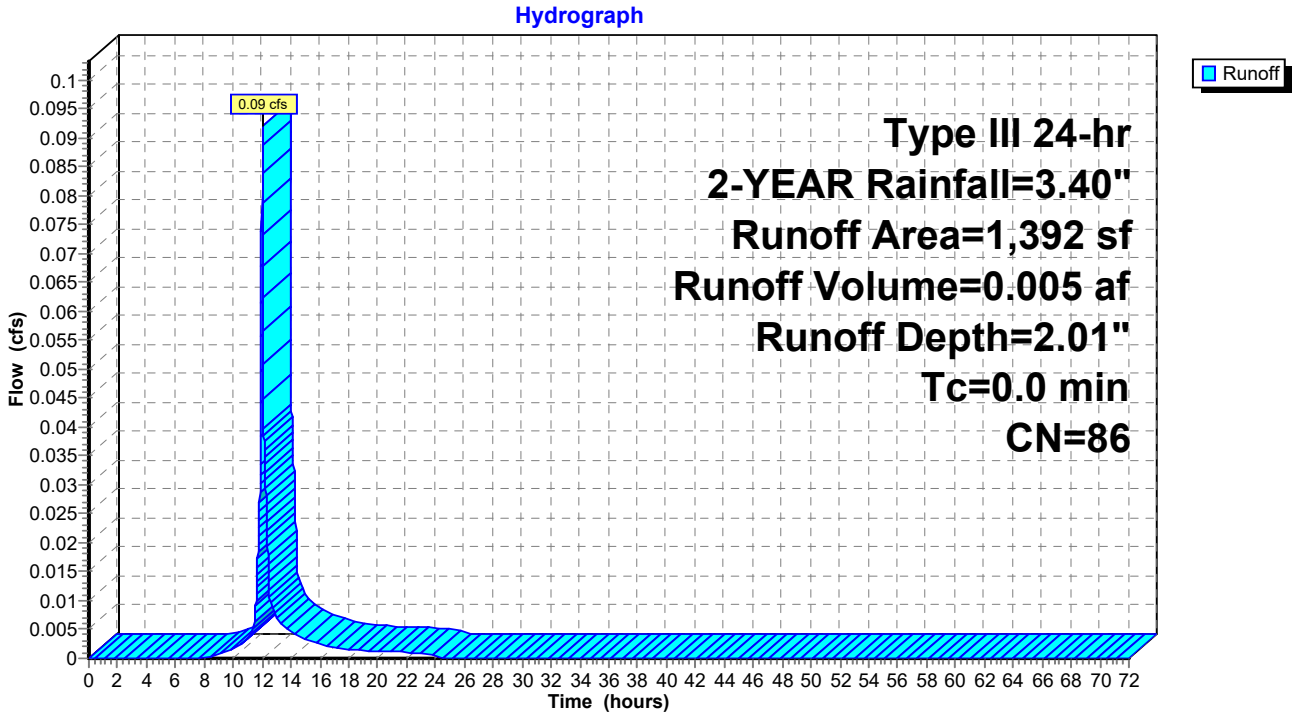
Summary for Subcatchment P4: Adj to Charles Park Road

Runoff = 0.09 cfs @ 12.00 hrs, Volume= 0.005 af, Depth= 2.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YEAR Rainfall=3.40"

Area (sf)	CN	Description
674	98	Paved parking, HSG C
718	74	>75% Grass cover, Good, HSG C
1,392	86	Weighted Average
718		51.58% Pervious Area
674		48.42% Impervious Area

Subcatchment P4: Adj to Charles Park Road

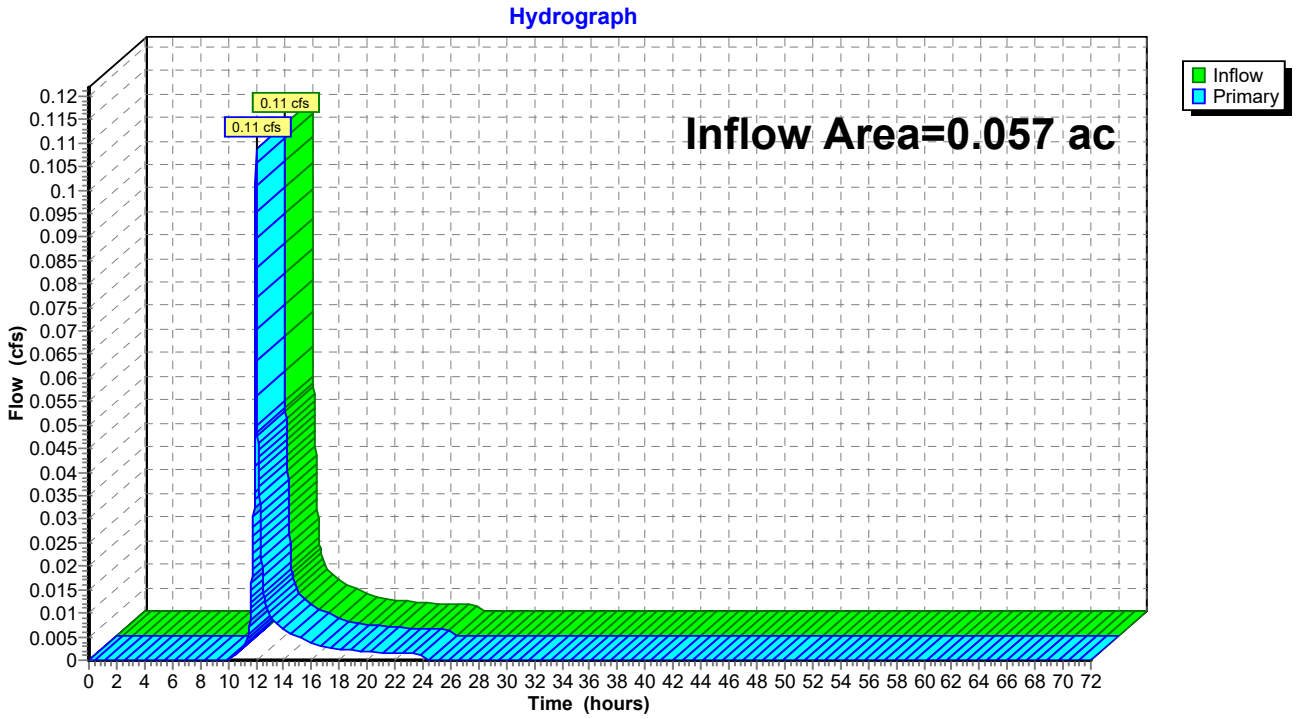


Summary for Pond DP1: Gardner Street Drainage System

Inflow Area = 0.057 ac, 10.88% Impervious, Inflow Depth = 1.36" for 2-YEAR event
Inflow = 0.11 cfs @ 12.00 hrs, Volume= 0.006 af
Primary = 0.11 cfs @ 12.00 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond DP1: Gardner Street Drainage System

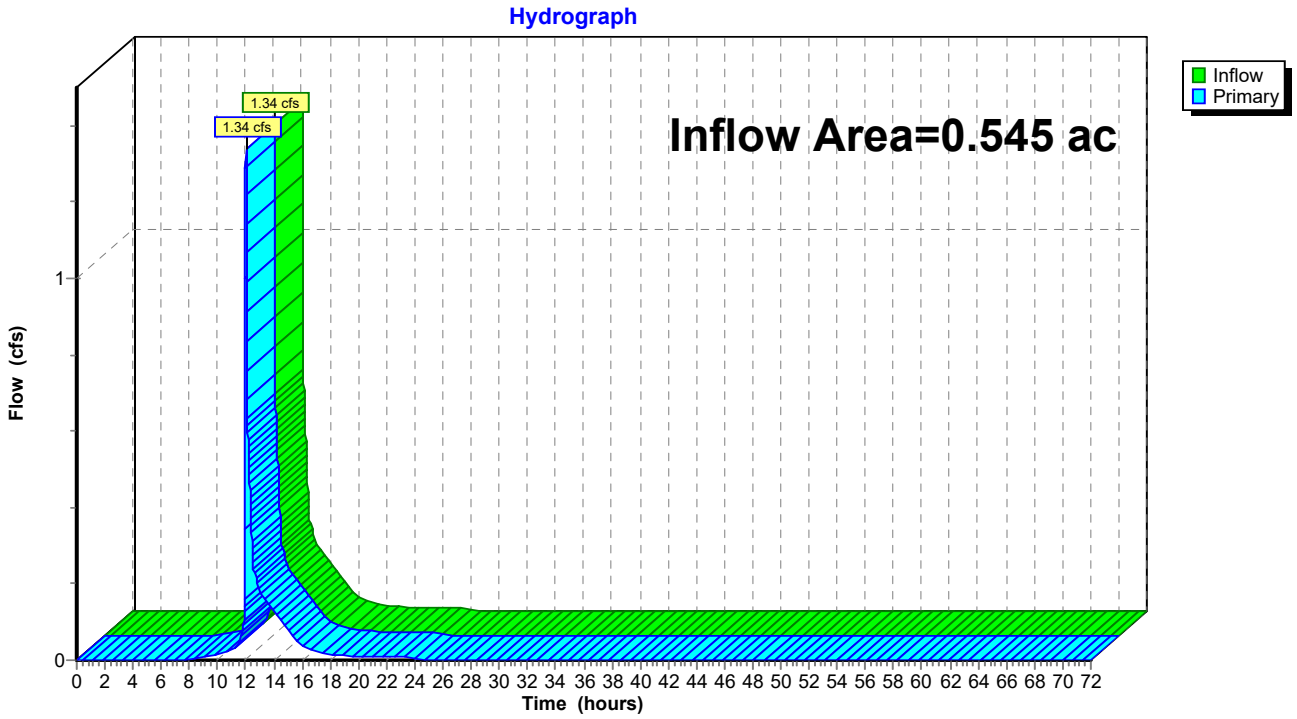


Summary for Pond DP2: Charles Park Road Drainage System

Inflow Area = 0.545 ac, 82.96% Impervious, Inflow Depth = 1.69" for 2-YEAR event
Inflow = 1.34 cfs @ 12.01 hrs, Volume= 0.077 af
Primary = 1.34 cfs @ 12.01 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond DP2: Charles Park Road Drainage System



Summary for Pond DP3: Infiltration System

Inflow Area = 0.300 ac,100.00% Impervious, Inflow Depth = 3.17" for 2-YEAR event
Inflow = 1.21 cfs @ 12.00 hrs, Volume= 0.079 af
Outflow = 1.17 cfs @ 12.01 hrs, Volume= 0.079 af, Atten= 4%, Lag= 0.6 min
Discarded = 0.01 cfs @ 6.58 hrs, Volume= 0.048 af
Primary = 1.15 cfs @ 12.01 hrs, Volume= 0.031 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 97.92' @ 12.01 hrs Surf.Area= 618 sf Storage= 1,140 cf

Plug-Flow detention time= 427.2 min calculated for 0.079 af (100% of inflow)
Center-of-Mass det. time= 427.3 min (1,176.9 - 749.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	94.37'	504 cf	**15.75'W x 39.22'L x 3.83'H Field A** 2,368 cf Overall - 689 cf Embedded = 1,679 cf x 30.0% Voids
#2A	95.20'	689 cf	**ADS_StormTech SC-740 +Cap** x 15 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 15 Chambers in 3 Rows
		1,193 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	95.20'	**12.0" Round Culvert** L= 67.7' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 95.20' / 94.25' S= 0.0140 '/' Cc= 0.900 n= 0.009 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	97.70'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	94.37'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 6.58 hrs HW=94.41' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=1.15 cfs @ 12.01 hrs HW=97.92' (Free Discharge)
└**1=Culvert** (Passes 1.15 cfs of 4.45 cfs potential flow)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 1.15 cfs @ 1.31 fps)

Pond DP3: Infiltration System - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

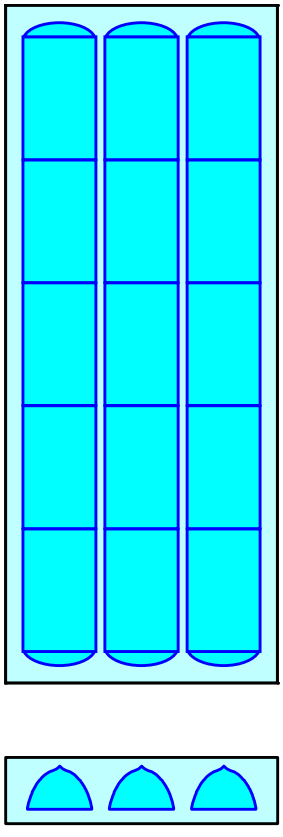
5 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 37.22' Row Length +12.0" End Stone x 2 = 39.22' Base Length
3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width
10.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.83' Field Height

15 Chambers x 45.9 cf = 689.1 cf Chamber Storage

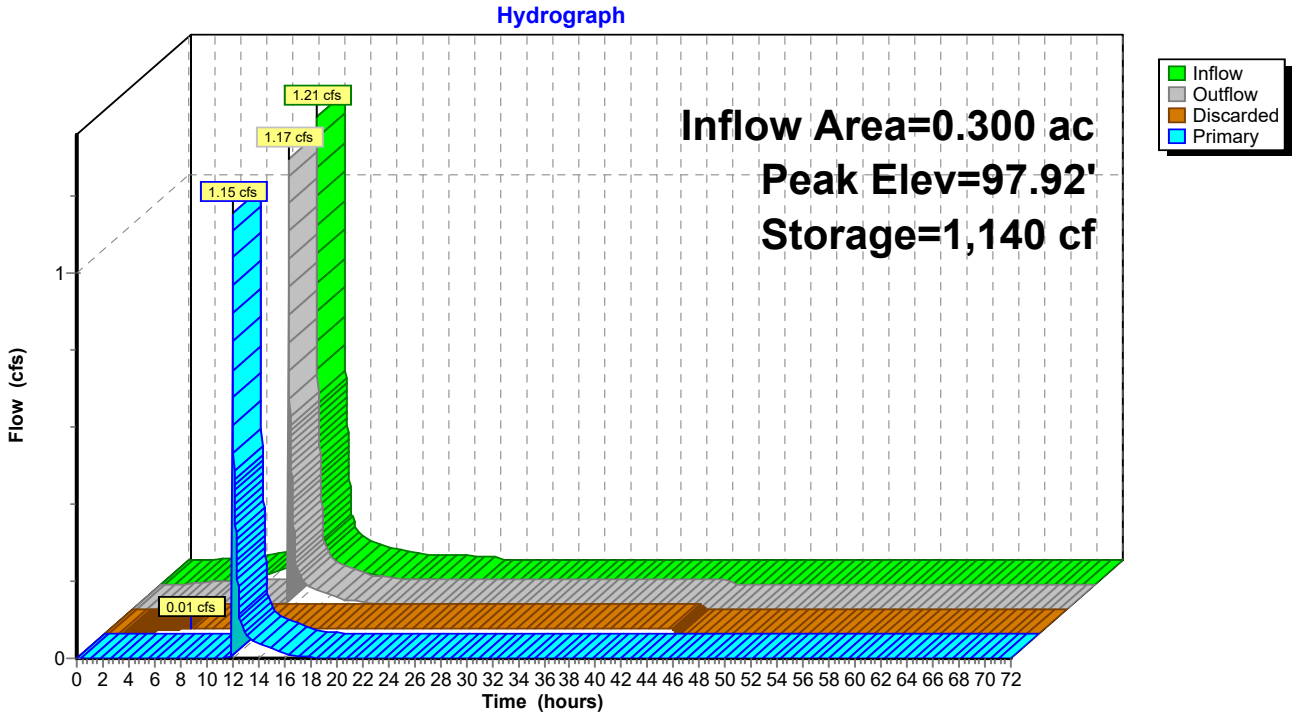
2,367.7 cf Field - 689.1 cf Chambers = 1,678.6 cf Stone x 30.0% Voids = 503.6 cf Stone Storage

Chamber Storage + Stone Storage = 1,192.7 cf = 0.027 af
Overall Storage Efficiency = 50.4%
Overall System Size = 39.22' x 15.75' x 3.83'

15 Chambers
87.7 cy Field
62.2 cy Stone



Pond DP3: Infiltration System



Summary for Pond DP4: Detention System

Inflow Area = 0.213 ac, 64.09% Impervious, Inflow Depth = 2.26" for 2-YEAR event
Inflow = 0.69 cfs @ 12.00 hrs, Volume= 0.040 af
Outflow = 0.12 cfs @ 12.42 hrs, Volume= 0.040 af, Atten= 82%, Lag= 24.9 min
Primary = 0.12 cfs @ 12.42 hrs, Volume= 0.040 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 96.29' @ 12.42 hrs Surf.Area= 719 sf Storage= 553 cf

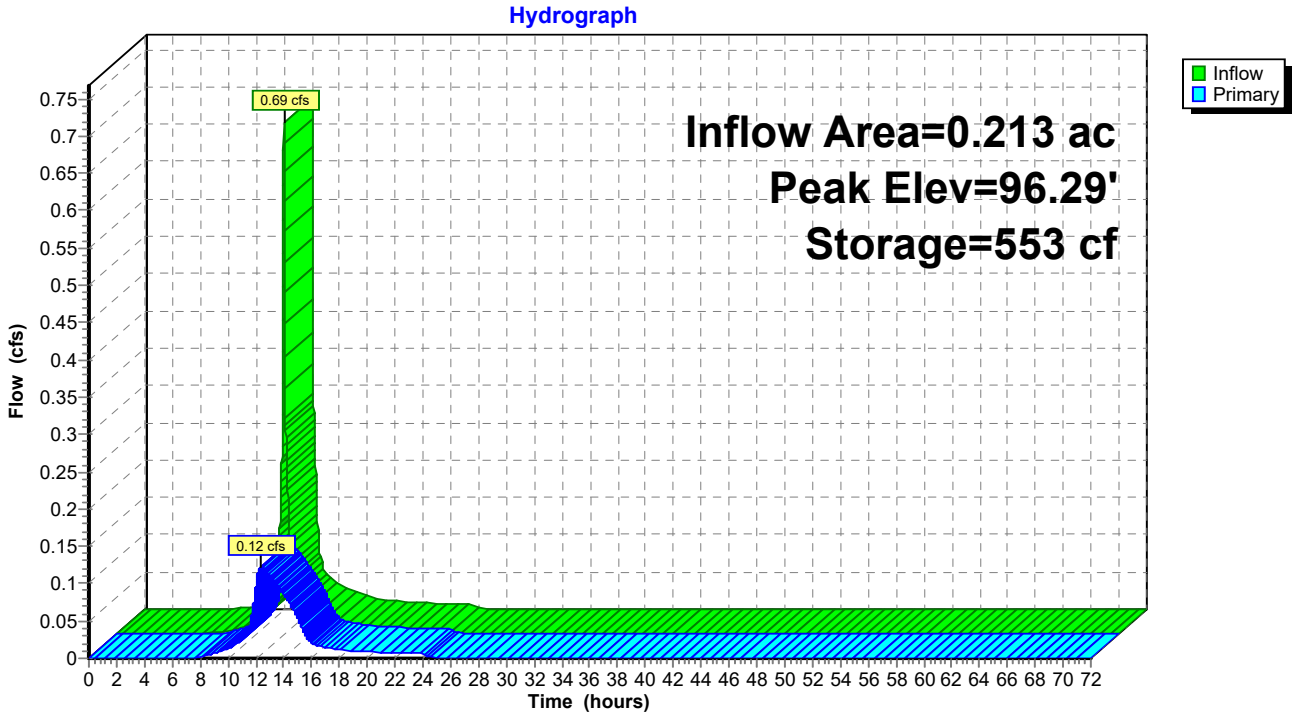
Plug-Flow detention time= 44.9 min calculated for 0.040 af (100% of inflow)
Center-of-Mass det. time= 45.0 min (848.1 - 803.1)

Volume	Invert	Avail.Storage	Storage Description
#1	94.86'	388 cf	**10.57'W x 68.00'L x 2.67'H Prismatoid** 1,919 cf Overall - 625 cf Embedded = 1,294 cf x 30.0% Voids
#2	95.19'	625 cf	**24.0" Round 24" Perforated Pipe** x 3 Inside #1 L= 66.3'
		1,013 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	94.86'	**12.0" Round Culvert** L= 126.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 94.86' / 94.25' S= 0.0048 '/' Cc= 0.900 n= 0.009 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	97.19'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	94.86'	**2.0" Vert. 2" Orifice** C= 0.600

Primary OutFlow Max=0.12 cfs @ 12.42 hrs HW=96.29' (Free Discharge)
↑└**1=Culvert** (Passes 0.12 cfs of 2.87 cfs potential flow)
↑ ├**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**3=2" Orifice** (Orifice Controls 0.12 cfs @ 5.58 fps)

Pond DP4: Detention System

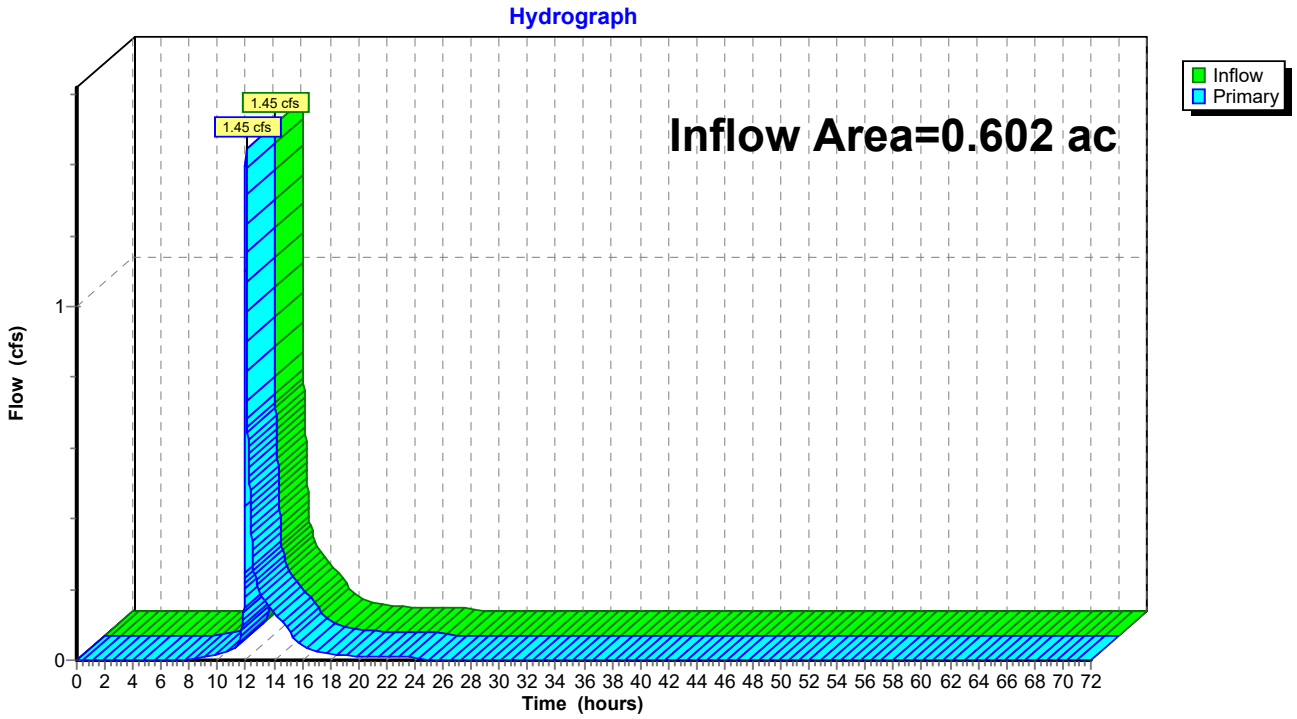


Summary for Link DP#1: Cow Island Pond

Inflow Area = 0.602 ac, 76.14% Impervious, Inflow Depth = 1.66" for 2-YEAR event
Inflow = 1.45 cfs @ 12.01 hrs, Volume= 0.083 af
Primary = 1.45 cfs @ 12.01 hrs, Volume= 0.083 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link DP#1: Cow Island Pond



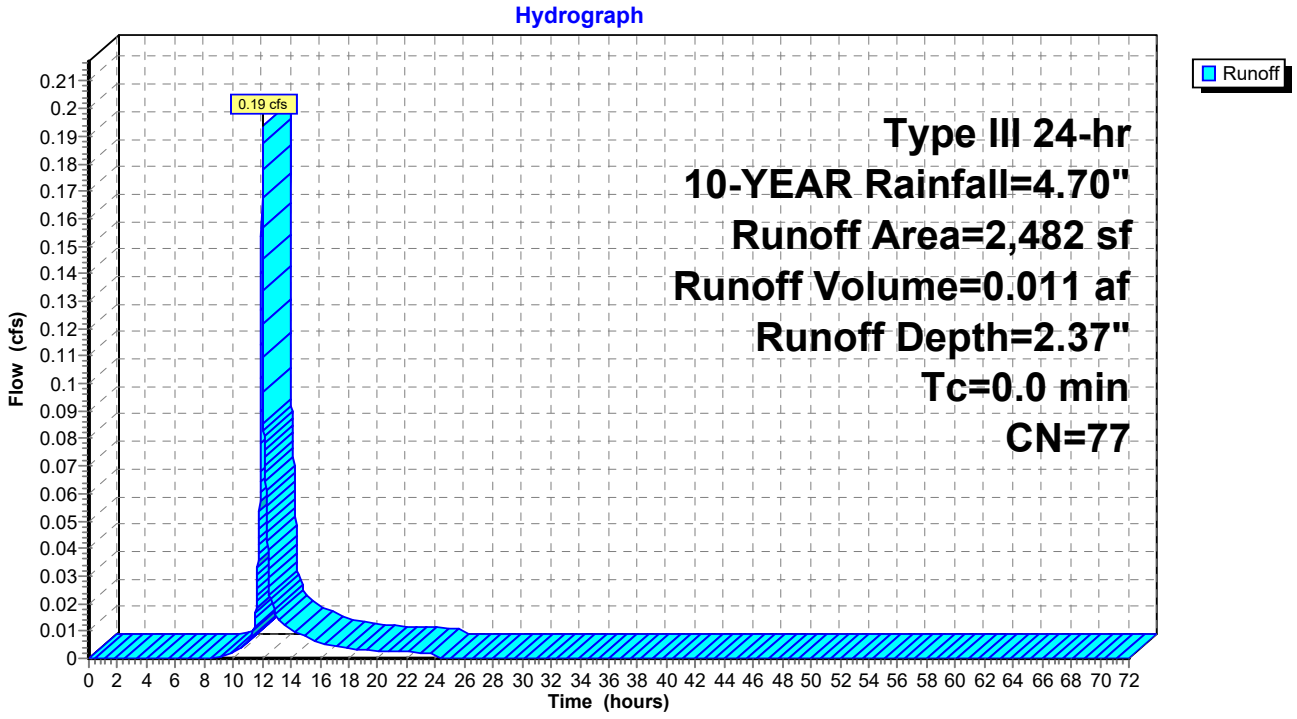
Summary for Subcatchment P1: Adj to Gardner Street

Runoff = 0.19 cfs @ 12.00 hrs, Volume= 0.011 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YEAR Rainfall=4.70"

Area (sf)	CN	Description
270	98	Paved parking, HSG C
2,212	74	>75% Grass cover, Good, HSG C
2,482	77	Weighted Average
2,212		89.12% Pervious Area
270		10.88% Impervious Area

Subcatchment P1: Adj to Gardner Street



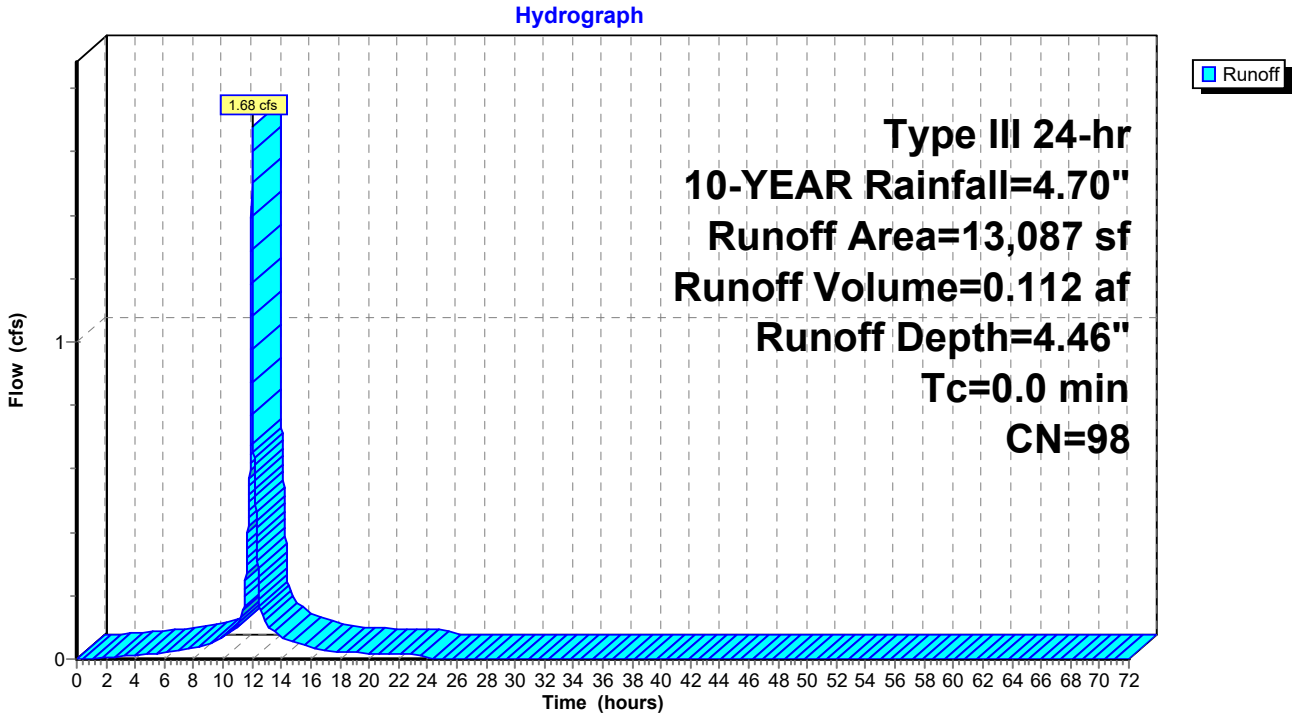
Summary for Subcatchment P2: 178 Gardner Street Roof Tops

Runoff = 1.68 cfs @ 12.00 hrs, Volume= 0.112 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YEAR Rainfall=4.70"

Area (sf)	CN	Description
13,087	98	Paved parking, HSG C
13,087		100.00% Impervious Area

Subcatchment P2: 178 Gardner Street Roof Tops



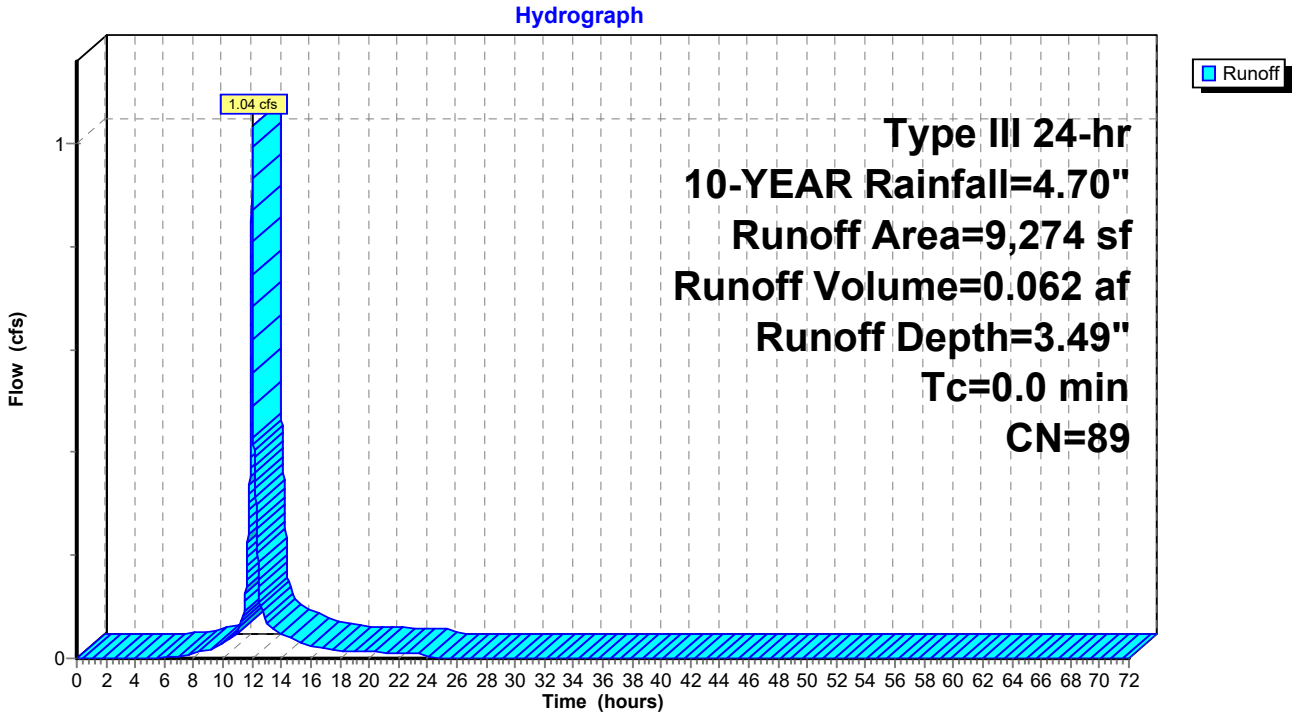
Summary for Subcatchment P3: Parking Lot & Adj Landscaped Area

Runoff = 1.04 cfs @ 12.00 hrs, Volume= 0.062 af, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YEAR Rainfall=4.70"

Area (sf)	CN	Description
5,944	98	Paved parking, HSG C
3,330	74	>75% Grass cover, Good, HSG C
9,274	89	Weighted Average
3,330		35.91% Pervious Area
5,944		64.09% Impervious Area

Subcatchment P3: Parking Lot & Adj Landscaped Area



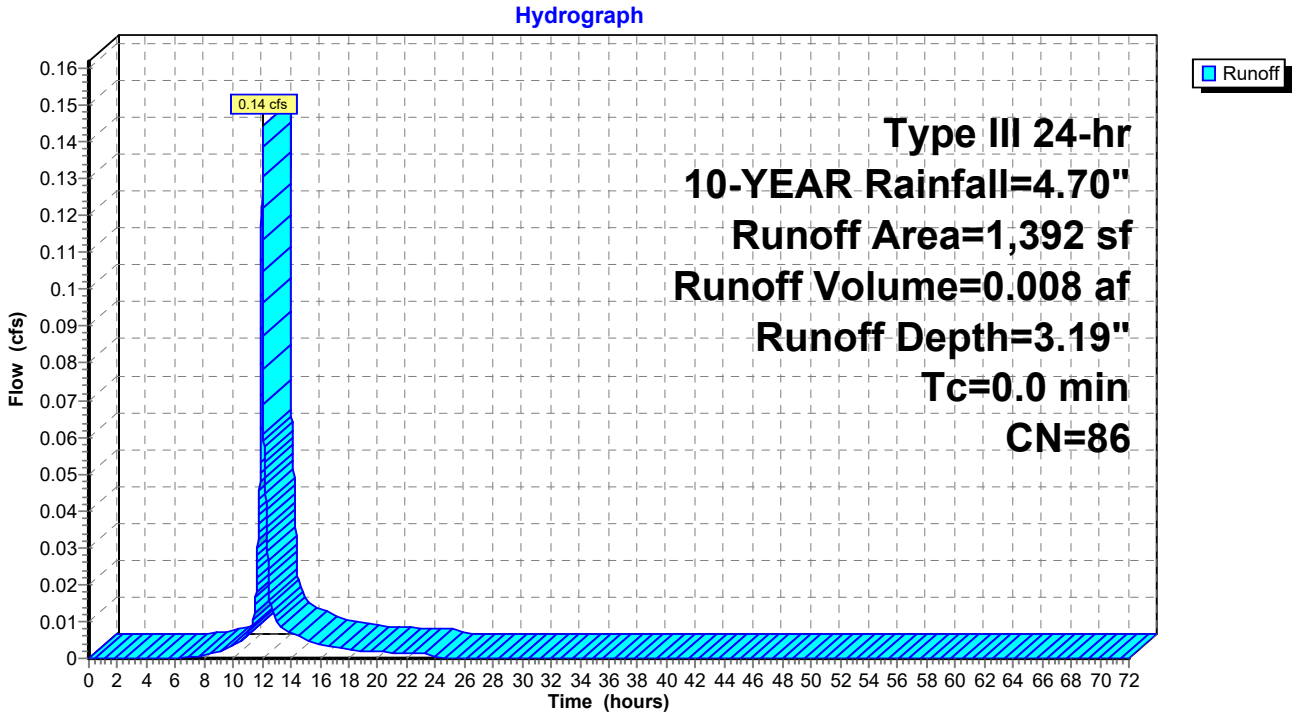
Summary for Subcatchment P4: Adj to Charles Park Road

Runoff = 0.14 cfs @ 12.00 hrs, Volume= 0.008 af, Depth= 3.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YEAR Rainfall=4.70"

Area (sf)	CN	Description
674	98	Paved parking, HSG C
718	74	>75% Grass cover, Good, HSG C
1,392	86	Weighted Average
718		51.58% Pervious Area
674		48.42% Impervious Area

Subcatchment P4: Adj to Charles Park Road

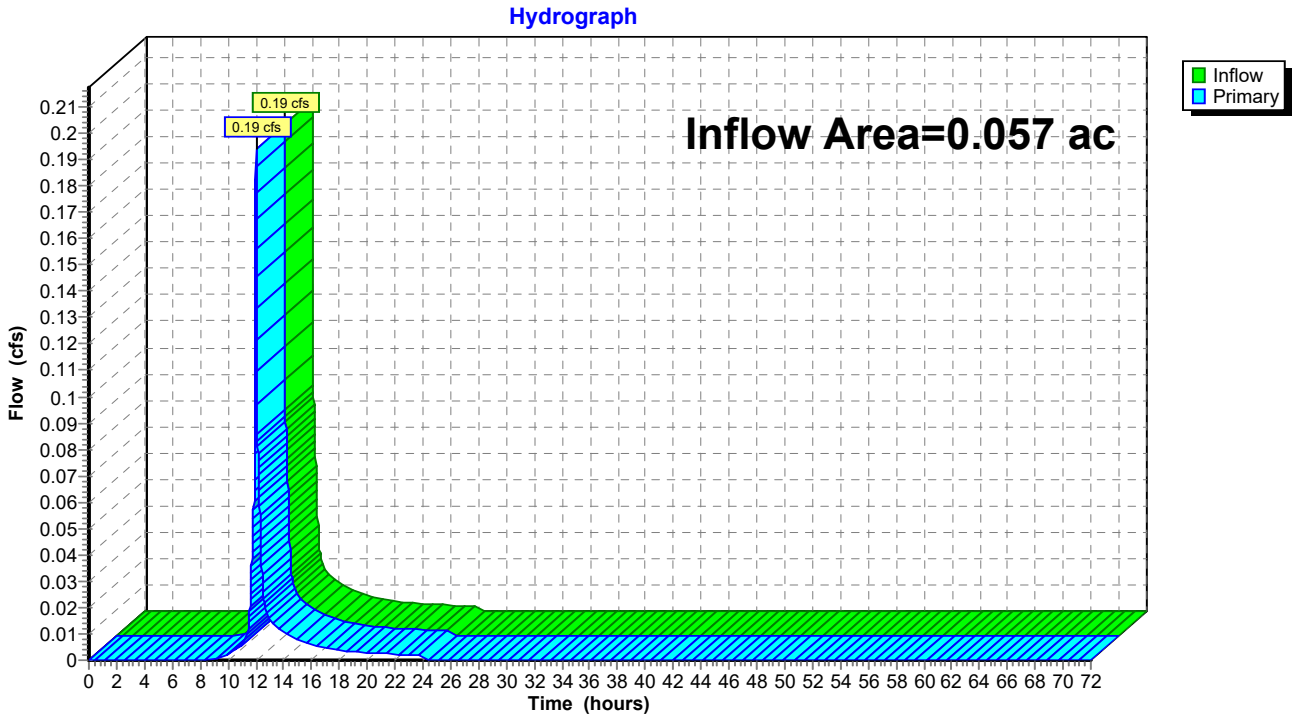


Summary for Pond DP1: Gardner Street Drainage System

Inflow Area = 0.057 ac, 10.88% Impervious, Inflow Depth = 2.37" for 10-YEAR event
Inflow = 0.19 cfs @ 12.00 hrs, Volume= 0.011 af
Primary = 0.19 cfs @ 12.00 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond DP1: Gardner Street Drainage System

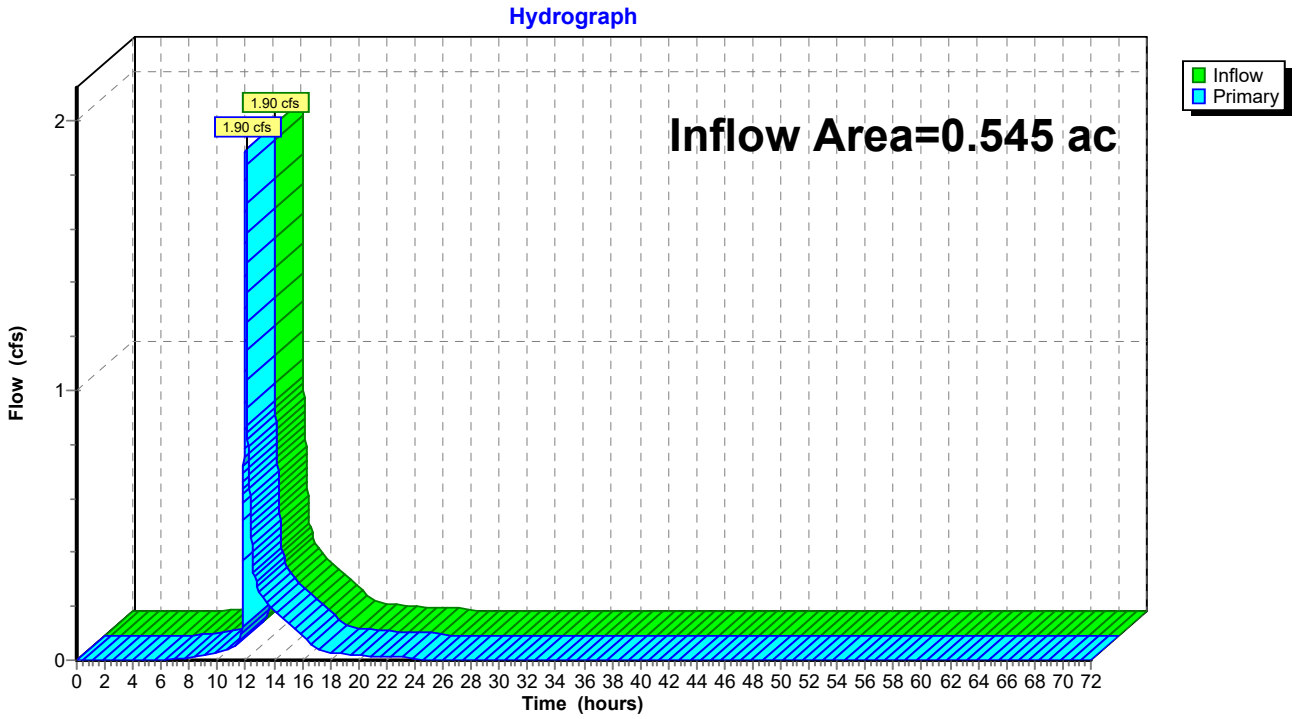


Summary for Pond DP2: Charles Park Road Drainage System

Inflow Area = 0.545 ac, 82.96% Impervious, Inflow Depth = 2.89" for 10-YEAR event
Inflow = 1.90 cfs @ 12.00 hrs, Volume= 0.131 af
Primary = 1.90 cfs @ 12.00 hrs, Volume= 0.131 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond DP2: Charles Park Road Drainage System



Summary for Pond DP3: Infiltration System

Inflow Area = 0.300 ac,100.00% Impervious, Inflow Depth = 4.46" for 10-YEAR event
Inflow = 1.68 cfs @ 12.00 hrs, Volume= 0.112 af
Outflow = 1.65 cfs @ 12.01 hrs, Volume= 0.112 af, Atten= 2%, Lag= 0.3 min
Discarded = 0.01 cfs @ 4.70 hrs, Volume= 0.051 af
Primary = 1.63 cfs @ 12.01 hrs, Volume= 0.061 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 97.97' @ 12.01 hrs Surf.Area= 618 sf Storage= 1,150 cf

Plug-Flow detention time= 326.6 min calculated for 0.112 af (100% of inflow)
Center-of-Mass det. time= 326.6 min (1,070.1 - 743.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	94.37'	504 cf	**15.75'W x 39.22'L x 3.83'H Field A** 2,368 cf Overall - 689 cf Embedded = 1,679 cf x 30.0% Voids
#2A	95.20'	689 cf	**ADS_StormTech SC-740 +Cap** x 15 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 15 Chambers in 3 Rows
		1,193 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	95.20'	**12.0" Round Culvert** L= 67.7' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 95.20' / 94.25' S= 0.0140 '/' Cc= 0.900 n= 0.009 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	97.70'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	94.37'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 4.70 hrs HW=94.41' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=1.62 cfs @ 12.01 hrs HW=97.97' (Free Discharge)
└**1=Culvert** (Passes 1.62 cfs of 4.50 cfs potential flow)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 1.62 cfs @ 1.49 fps)

Pond DP3: Infiltration System - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

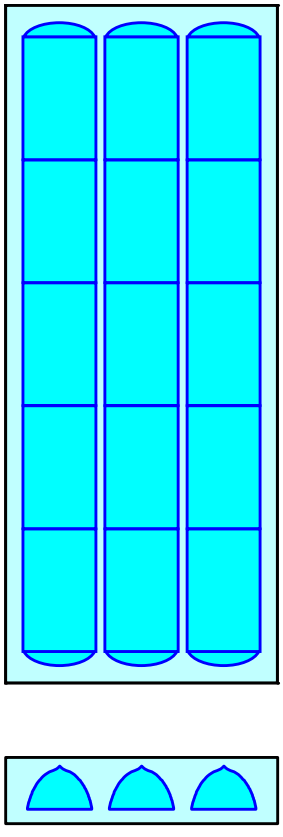
5 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 37.22' Row Length +12.0" End Stone x 2 = 39.22' Base Length
3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width
10.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.83' Field Height

15 Chambers x 45.9 cf = 689.1 cf Chamber Storage

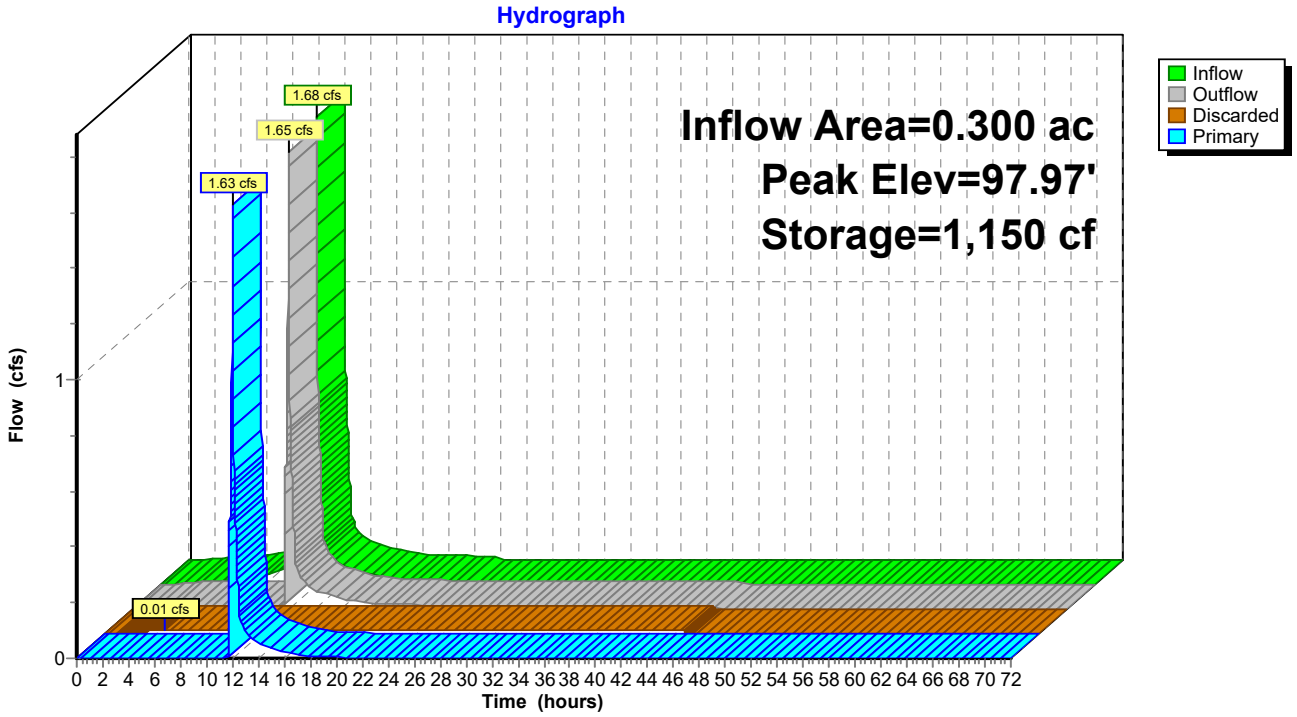
2,367.7 cf Field - 689.1 cf Chambers = 1,678.6 cf Stone x 30.0% Voids = 503.6 cf Stone Storage

Chamber Storage + Stone Storage = 1,192.7 cf = 0.027 af
Overall Storage Efficiency = 50.4%
Overall System Size = 39.22' x 15.75' x 3.83'

15 Chambers
87.7 cy Field
62.2 cy Stone



Pond DP3: Infiltration System



Summary for Pond DP4: Detention System

Inflow Area = 0.213 ac, 64.09% Impervious, Inflow Depth = 3.49" for 10-YEAR event
Inflow = 1.04 cfs @ 12.00 hrs, Volume= 0.062 af
Outflow = 0.16 cfs @ 12.44 hrs, Volume= 0.062 af, Atten= 85%, Lag= 26.6 min
Primary = 0.16 cfs @ 12.44 hrs, Volume= 0.062 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 97.15' @ 12.44 hrs Surf.Area= 719 sf Storage= 929 cf

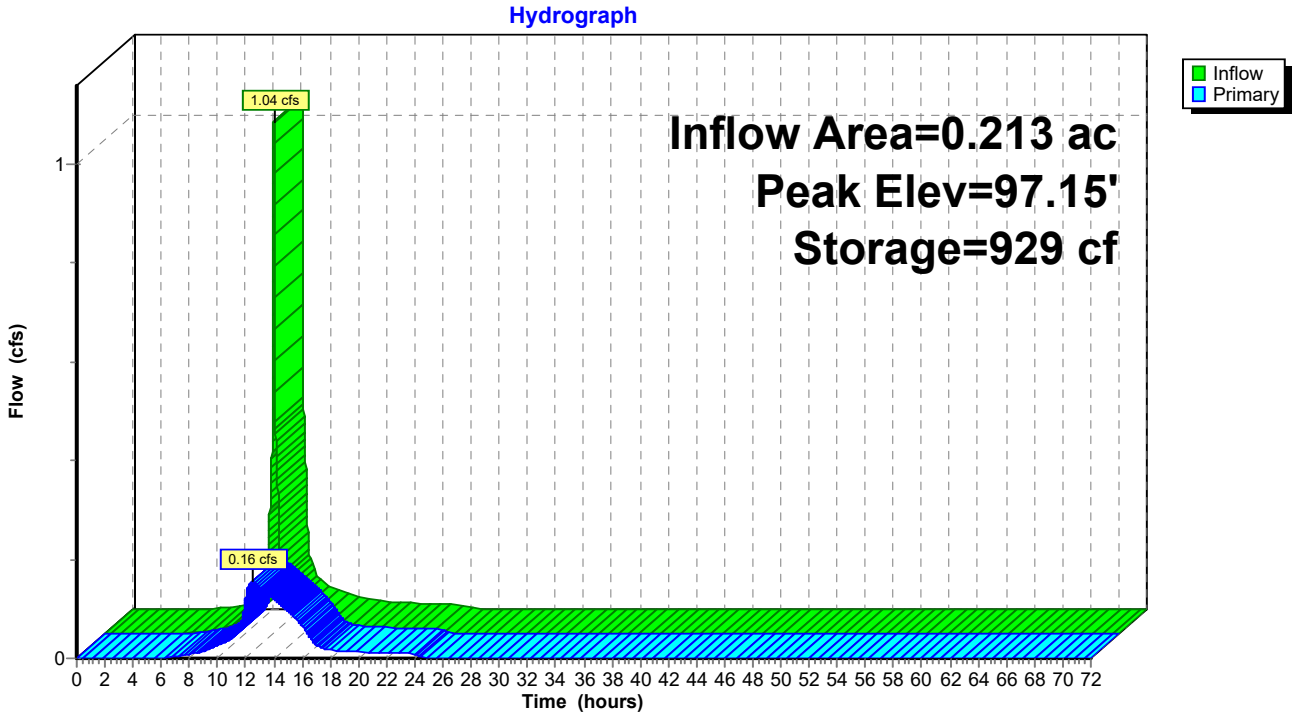
Plug-Flow detention time= 58.3 min calculated for 0.062 af (100% of inflow)
Center-of-Mass det. time= 58.2 min (849.2 - 791.0)

Volume	Invert	Avail.Storage	Storage Description
#1	94.86'	388 cf	**10.57'W x 68.00'L x 2.67'H Prismatoid** 1,919 cf Overall - 625 cf Embedded = 1,294 cf x 30.0% Voids
#2	95.19'	625 cf	**24.0" Round 24" Perforated Pipe** x 3 Inside #1 L= 66.3'
		1,013 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	94.86'	**12.0" Round Culvert** L= 126.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 94.86' / 94.25' S= 0.0048 '/' Cc= 0.900 n= 0.009 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	97.19'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	94.86'	**2.0" Vert. 2" Orifice** C= 0.600

Primary OutFlow Max=0.16 cfs @ 12.44 hrs HW=97.15' (Free Discharge)
↑└**1=Culvert** (Passes 0.16 cfs of 3.99 cfs potential flow)
↑ ├**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└**3=2" Orifice** (Orifice Controls 0.16 cfs @ 7.15 fps)

Pond DP4: Detention System

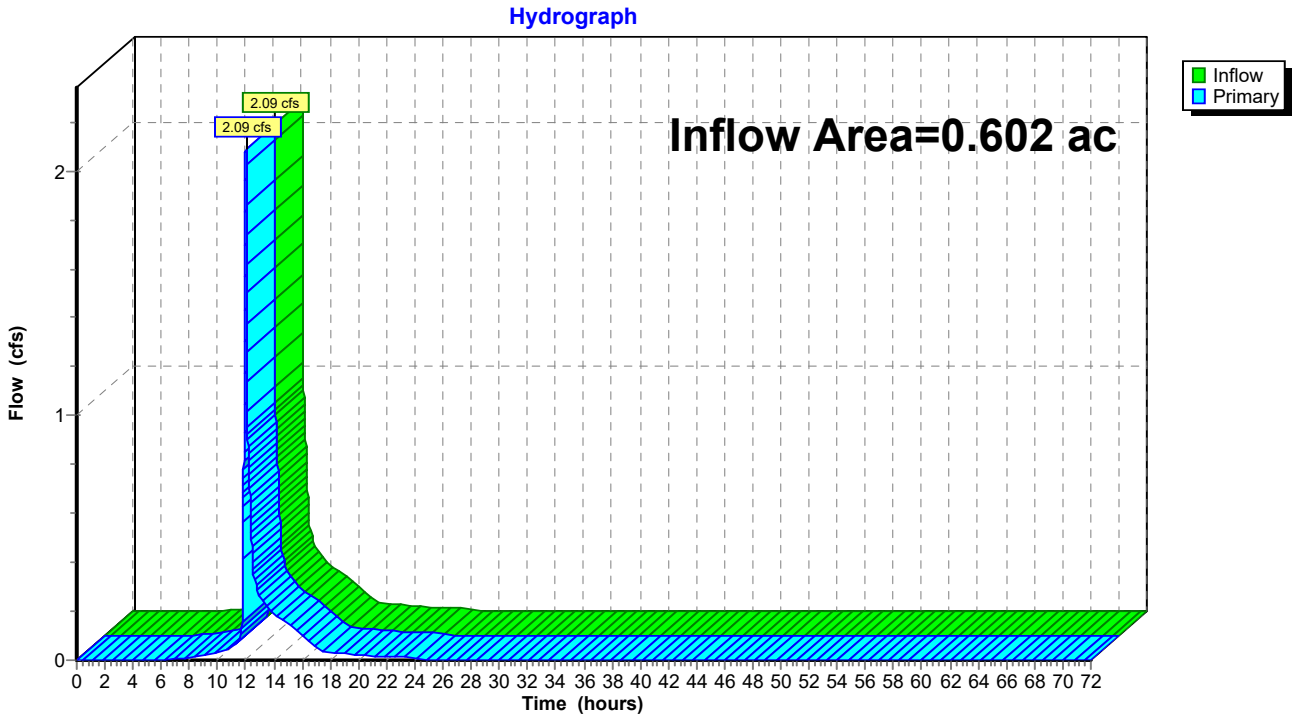


Summary for Link DP#1: Cow Island Pond

Inflow Area = 0.602 ac, 76.14% Impervious, Inflow Depth = 2.84" for 10-YEAR event
Inflow = 2.09 cfs @ 12.00 hrs, Volume= 0.143 af
Primary = 2.09 cfs @ 12.00 hrs, Volume= 0.143 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link DP#1: Cow Island Pond



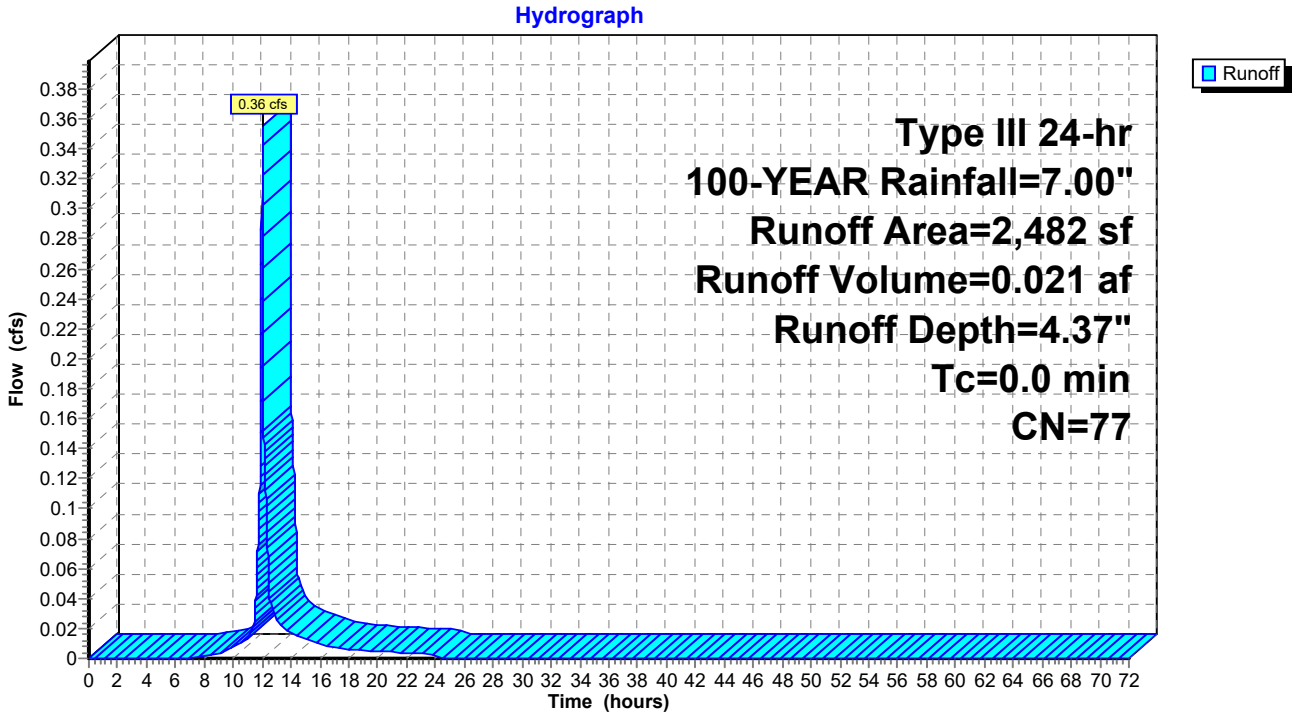
Summary for Subcatchment P1: Adj to Gardner Street

Runoff = 0.36 cfs @ 12.00 hrs, Volume= 0.021 af, Depth= 4.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YEAR Rainfall=7.00"

Area (sf)	CN	Description
270	98	Paved parking, HSG C
2,212	74	>75% Grass cover, Good, HSG C
2,482	77	Weighted Average
2,212		89.12% Pervious Area
270		10.88% Impervious Area

Subcatchment P1: Adj to Gardner Street



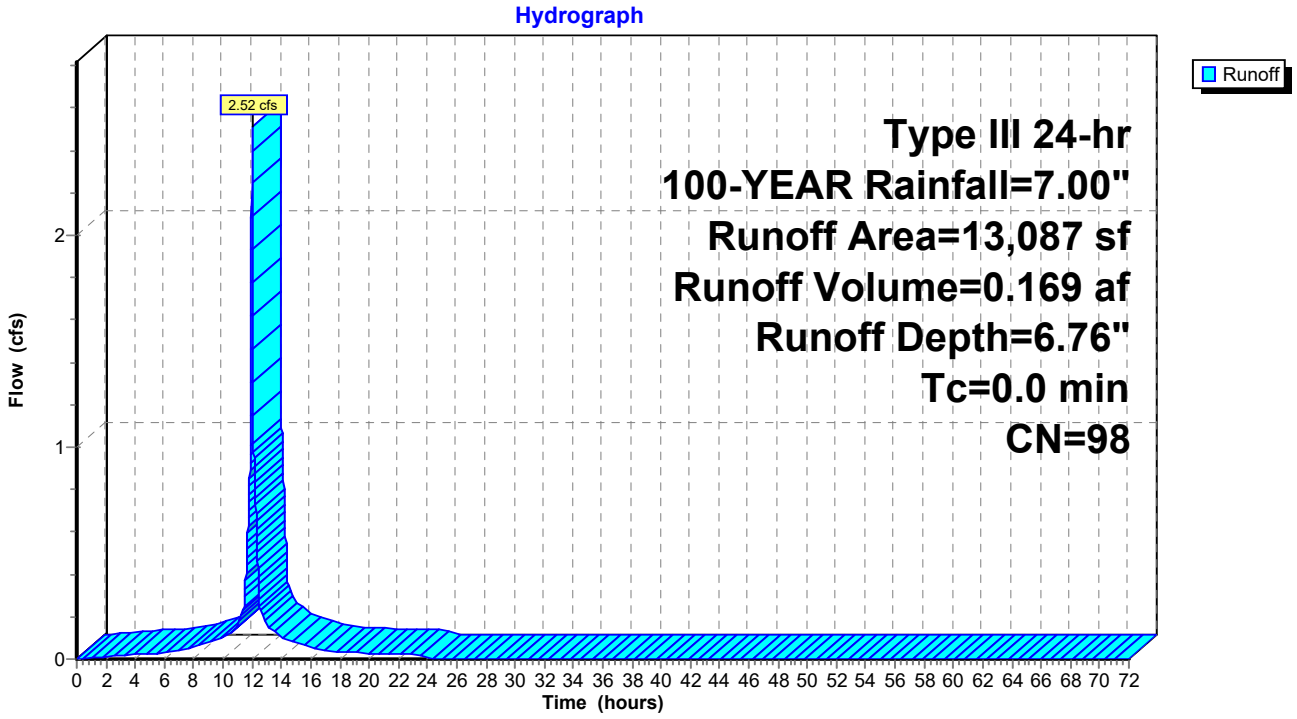
Summary for Subcatchment P2: 178 Gardner Street Roof Tops

Runoff = 2.52 cfs @ 12.00 hrs, Volume= 0.169 af, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YEAR Rainfall=7.00"

Area (sf)	CN	Description
13,087	98	Paved parking, HSG C
13,087		100.00% Impervious Area

Subcatchment P2: 178 Gardner Street Roof Tops



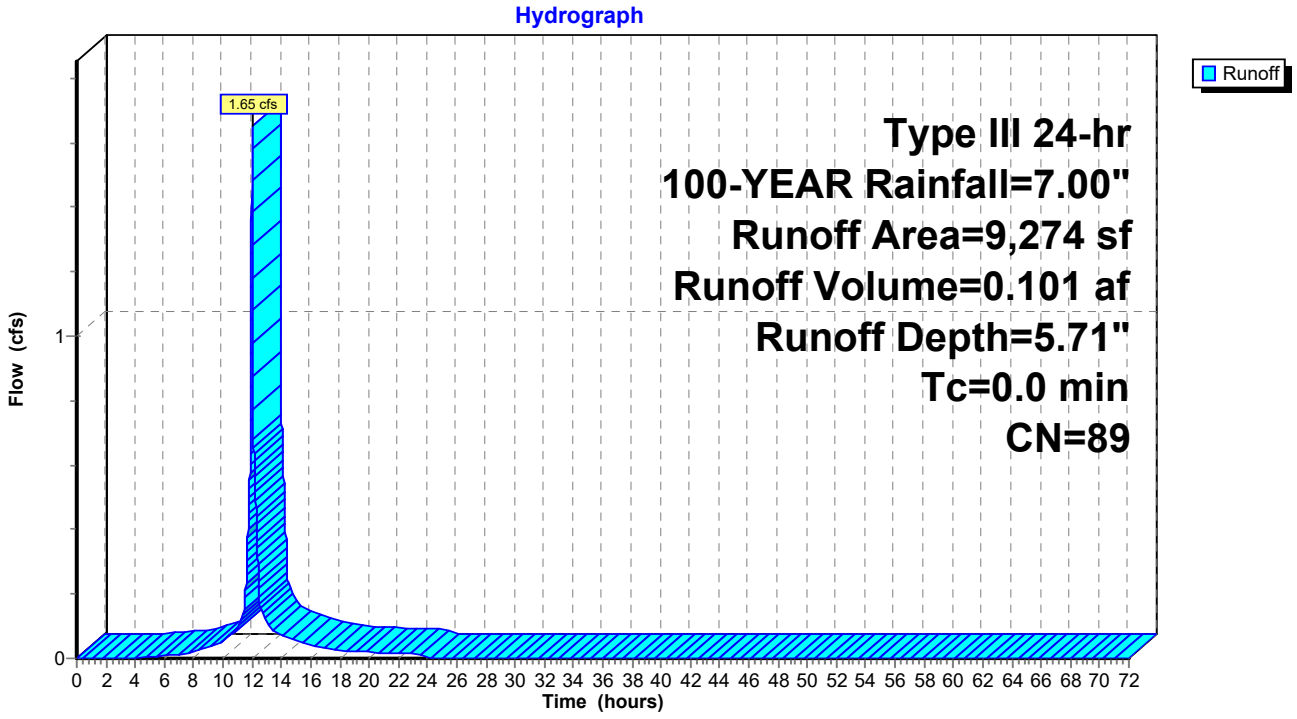
Summary for Subcatchment P3: Parking Lot & Adj Landscaped Area

Runoff = 1.65 cfs @ 12.00 hrs, Volume= 0.101 af, Depth= 5.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YEAR Rainfall=7.00"

Area (sf)	CN	Description
5,944	98	Paved parking, HSG C
3,330	74	>75% Grass cover, Good, HSG C
9,274	89	Weighted Average
3,330		35.91% Pervious Area
5,944		64.09% Impervious Area

Subcatchment P3: Parking Lot & Adj Landscaped Area



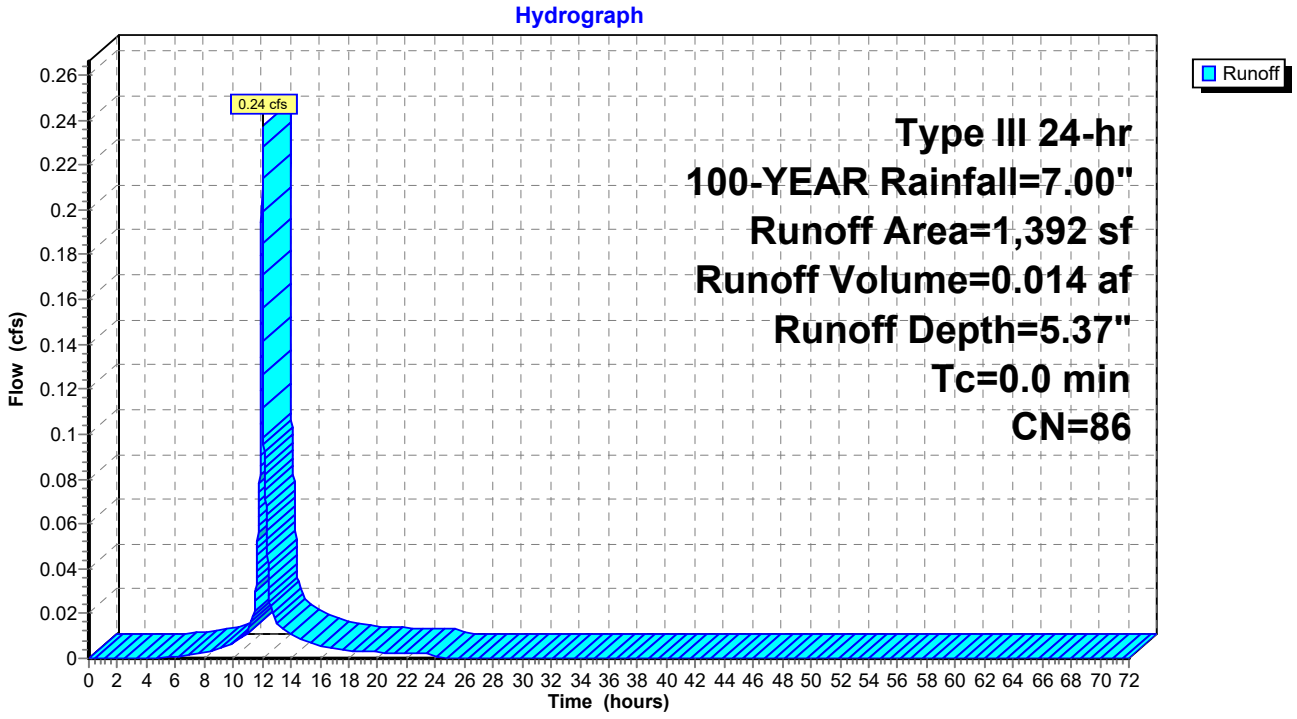
Summary for Subcatchment P4: Adj to Charles Park Road

Runoff = 0.24 cfs @ 12.00 hrs, Volume= 0.014 af, Depth= 5.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YEAR Rainfall=7.00"

Area (sf)	CN	Description
674	98	Paved parking, HSG C
718	74	>75% Grass cover, Good, HSG C
1,392	86	Weighted Average
718		51.58% Pervious Area
674		48.42% Impervious Area

Subcatchment P4: Adj to Charles Park Road

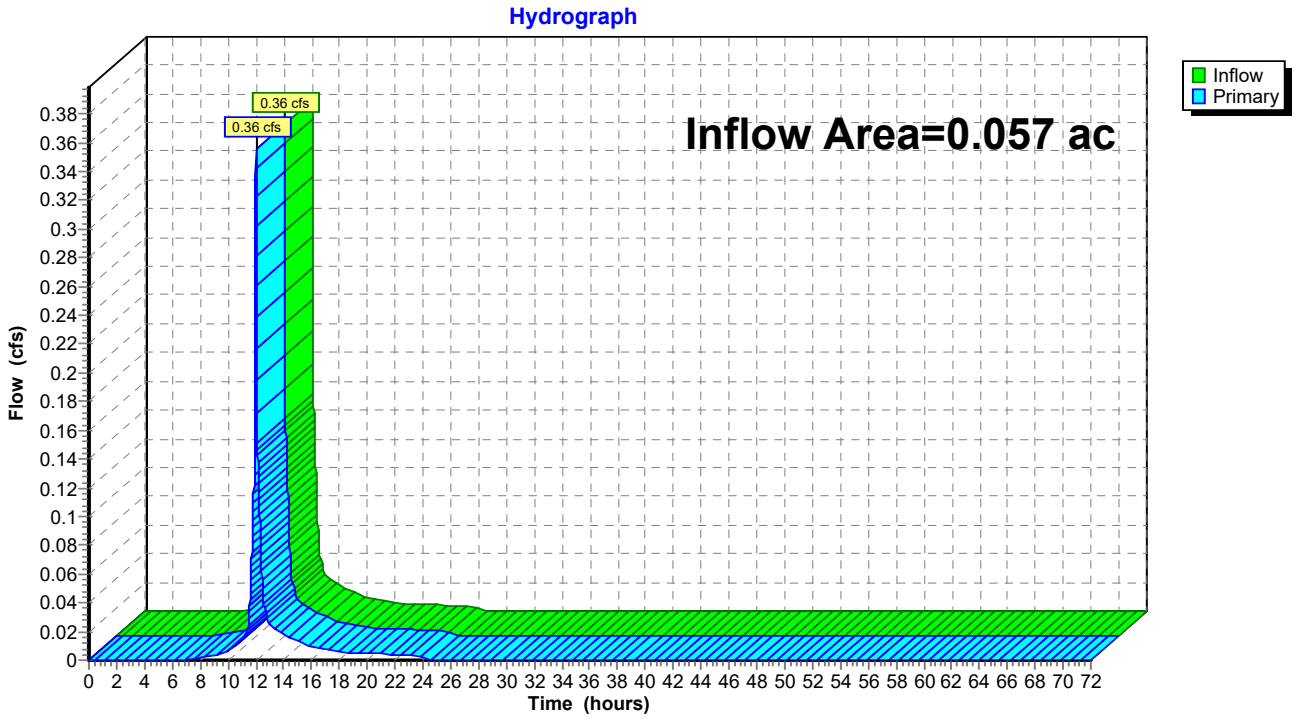


Summary for Pond DP1: Gardner Street Drainage System

Inflow Area = 0.057 ac, 10.88% Impervious, Inflow Depth = 4.37" for 100-YEAR event
Inflow = 0.36 cfs @ 12.00 hrs, Volume= 0.021 af
Primary = 0.36 cfs @ 12.00 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond DP1: Gardner Street Drainage System

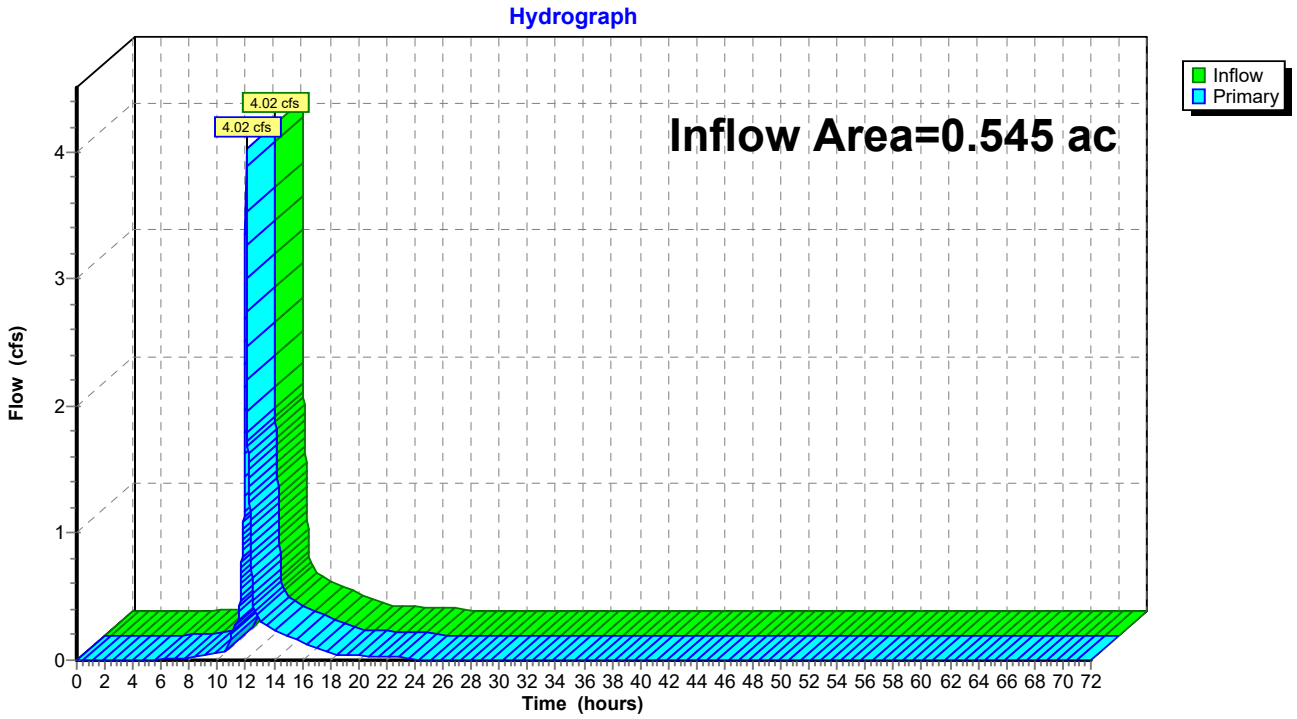


Summary for Pond DP2: Charles Park Road Drainage System

Inflow Area = 0.545 ac, 82.96% Impervious, Inflow Depth = 5.12" for 100-YEAR event
Inflow = 4.02 cfs @ 12.02 hrs, Volume= 0.232 af
Primary = 4.02 cfs @ 12.02 hrs, Volume= 0.232 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond DP2: Charles Park Road Drainage System



Summary for Pond DP3: Infiltration System

Inflow Area = 0.300 ac,100.00% Impervious, Inflow Depth = 6.76" for 100-YEAR event
Inflow = 2.52 cfs @ 12.00 hrs, Volume= 0.169 af
Outflow = 2.47 cfs @ 12.00 hrs, Volume= 0.169 af, Atten= 2%, Lag= 0.2 min
Discarded = 0.01 cfs @ 2.65 hrs, Volume= 0.052 af
Primary = 2.46 cfs @ 12.00 hrs, Volume= 0.117 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 98.06' @ 12.00 hrs Surf.Area= 618 sf Storage= 1,165 cf

Plug-Flow detention time= 231.1 min calculated for 0.169 af (100% of inflow)
Center-of-Mass det. time= 231.2 min (968.6 - 737.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	94.37'	504 cf	**15.75'W x 39.22'L x 3.83'H Field A** 2,368 cf Overall - 689 cf Embedded = 1,679 cf x 30.0% Voids
#2A	95.20'	689 cf	**ADS_StormTech SC-740 +Cap** x 15 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 15 Chambers in 3 Rows
		1,193 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	95.20'	**12.0" Round Culvert** L= 67.7' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 95.20' / 94.25' S= 0.0140 '/' Cc= 0.900 n= 0.009 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	97.70'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	94.37'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 2.65 hrs HW=94.41' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=2.44 cfs @ 12.00 hrs HW=98.05' (Free Discharge)
└**1=Culvert** (Passes 2.44 cfs of 4.58 cfs potential flow)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 2.44 cfs @ 1.72 fps)

Pond DP3: Infiltration System - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

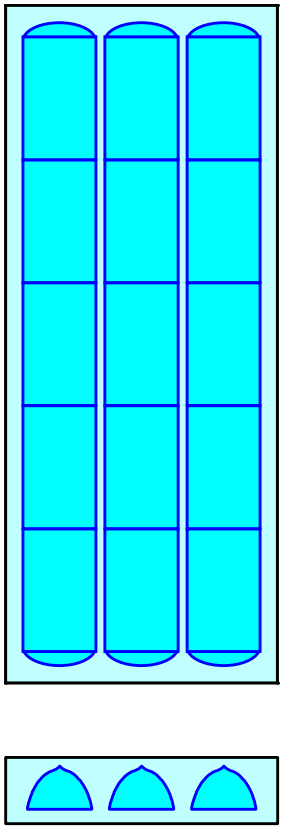
5 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 37.22' Row Length +12.0" End Stone x 2 = 39.22' Base Length
3 Rows x 51.0" Wide + 6.0" Spacing x 2 + 12.0" Side Stone x 2 = 15.75' Base Width
10.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.83' Field Height

15 Chambers x 45.9 cf = 689.1 cf Chamber Storage

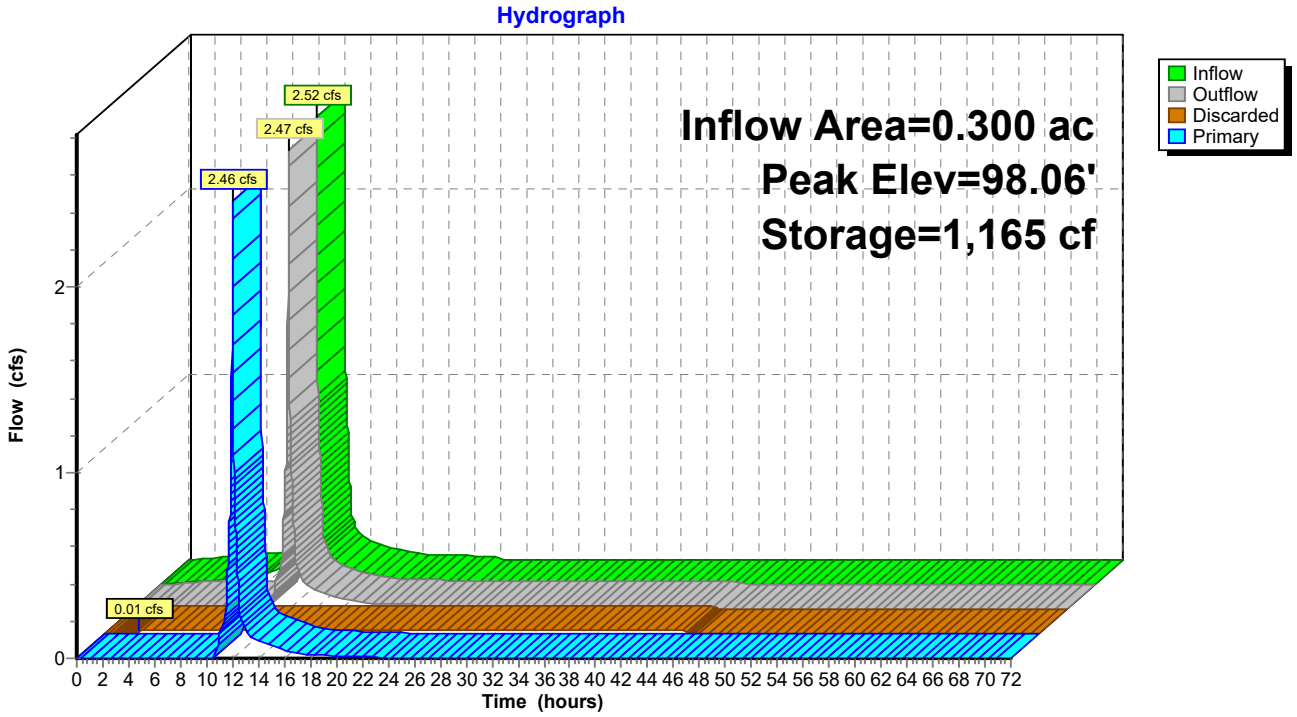
2,367.7 cf Field - 689.1 cf Chambers = 1,678.6 cf Stone x 30.0% Voids = 503.6 cf Stone Storage

Chamber Storage + Stone Storage = 1,192.7 cf = 0.027 af
Overall Storage Efficiency = 50.4%
Overall System Size = 39.22' x 15.75' x 3.83'

15 Chambers
87.7 cy Field
62.2 cy Stone



Pond DP3: Infiltration System



Summary for Pond DP4: Detention System

Inflow Area = 0.213 ac, 64.09% Impervious, Inflow Depth = 5.71" for 100-YEAR event
Inflow = 1.65 cfs @ 12.00 hrs, Volume= 0.101 af
Outflow = 1.49 cfs @ 12.02 hrs, Volume= 0.101 af, Atten= 10%, Lag= 1.3 min
Primary = 1.49 cfs @ 12.02 hrs, Volume= 0.101 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 97.43' @ 12.02 hrs Surf.Area= 719 sf Storage= 991 cf

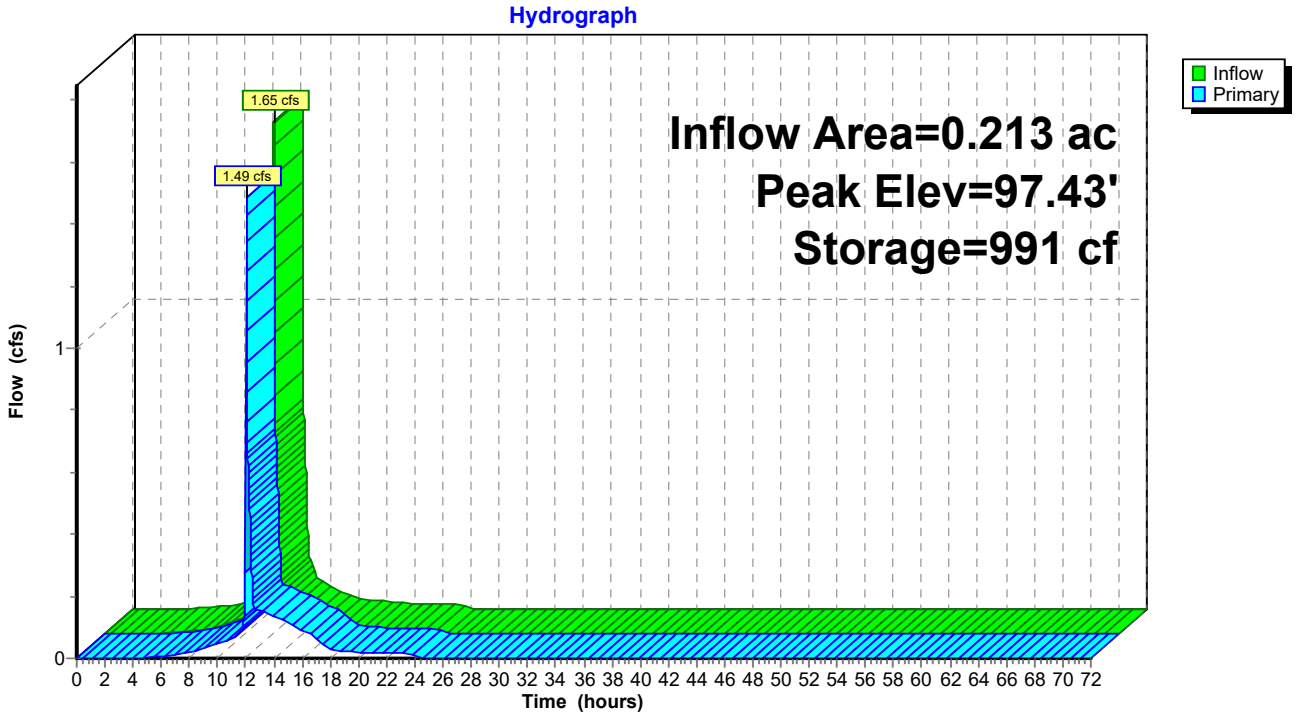
Plug-Flow detention time= 49.2 min calculated for 0.101 af (100% of inflow)
Center-of-Mass det. time= 49.4 min (827.1 - 777.6)

Volume	Invert	Avail.Storage	Storage Description
#1	94.86'	388 cf	**10.57'W x 68.00'L x 2.67'H Prismatoid** 1,919 cf Overall - 625 cf Embedded = 1,294 cf x 30.0% Voids
#2	95.19'	625 cf	**24.0" Round 24" Perforated Pipe** x 3 Inside #1 L= 66.3'
		1,013 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	94.86'	**12.0" Round Culvert** L= 126.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 94.86' / 94.25' S= 0.0048 '/' Cc= 0.900 n= 0.009 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	97.19'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	94.86'	**2.0" Vert. 2" Orifice** C= 0.600

Primary OutFlow Max=1.47 cfs @ 12.02 hrs HW=97.43' (Free Discharge)
↑└**1=Culvert** (Passes 1.47 cfs of 4.29 cfs potential flow)
↑└**2=Broad-Crested Rectangular Weir** (Weir Controls 1.30 cfs @ 1.37 fps)
└**3=2" Orifice** (Orifice Controls 0.17 cfs @ 7.59 fps)

Pond DP4: Detention System

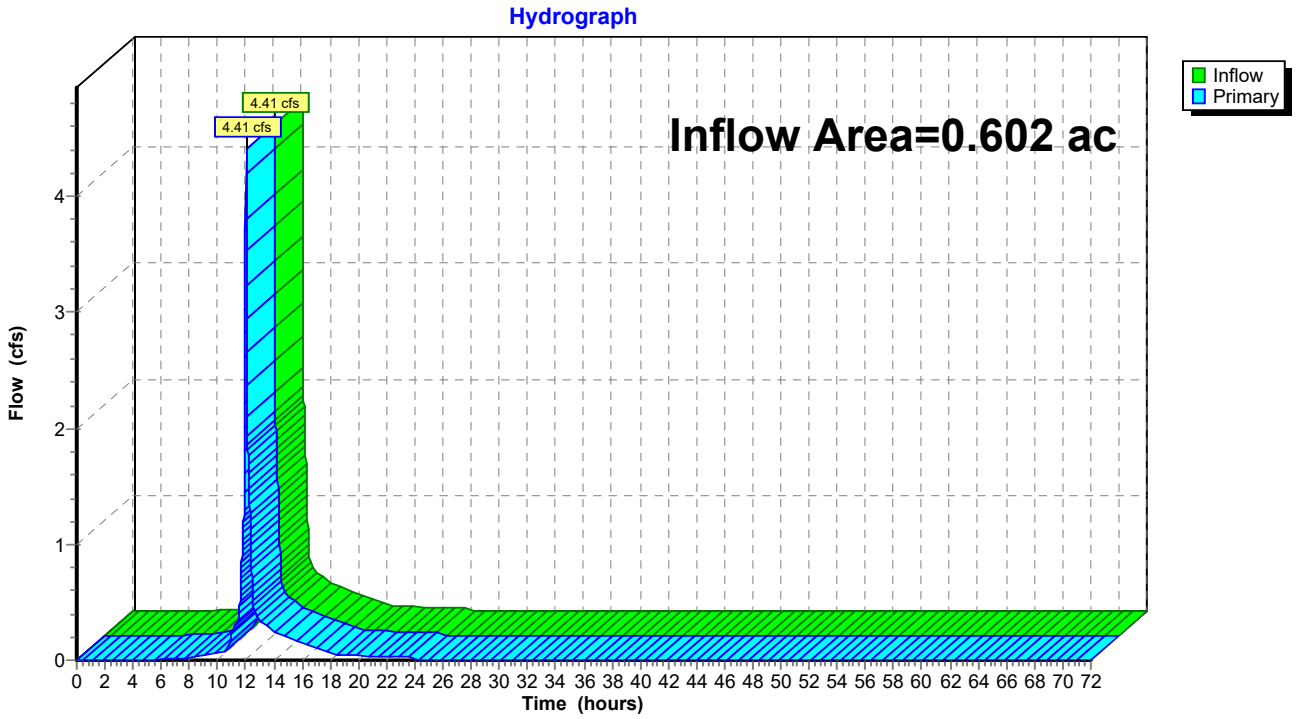


Summary for Link DP#1: Cow Island Pond

Inflow Area = 0.602 ac, 76.14% Impervious, Inflow Depth = 5.05" for 100-YEAR event
Inflow = 4.41 cfs @ 12.01 hrs, Volume= 0.253 af
Primary = 4.41 cfs @ 12.01 hrs, Volume= 0.253 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link DP#1: Cow Island Pond



Appendix C:
Water Quality Calculations

Pond DP3: Infiltration System - POST_178 Gardner

Summary | Wizards | Hydrograph | Discharge | Storage | Events | Sizing

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	94.37	0.00	0.00	0.00
2.00	0.01	5	94.40	0.01	**0.01**	0.00
4.00	0.02	28	94.52	0.01	**0.01**	0.00
6.00	0.03	115	94.99	0.01	0.01	0.00
8.00	0.05	310	95.54	0.01	0.01	0.00
10.00	0.10	761	96.60	0.01	0.01	0.00
12.00	**2.52**	**1,165**	**98.05**	**2.46**	0.01	**2.44**
14.00	0.10	1,107	97.74	0.10	0.01	0.09
16.00	0.06	1,103	97.72	0.06	0.01	0.04
18.00	0.03	1,101	97.71	0.03	0.01	0.02
20.00	0.03	1,101	97.71	0.03	0.01	0.01
22.00	0.02	1,101	97.71	0.02		1
24.00	0.01	1,100	97.70	0.02		0
26.00	0.00	995	97.26	0.01		0
28.00	0.00	890	96.94	0.01	0.01	0.00
30.00	0.00	785	96.66	0.01	0.01	0.00
32.00	0.00	680	96.39	0.01	0.01	0.00
34.00	0.00	575	96.14	0.01	0.01	0.00
36.00	0.00	470	95.90	0.01	0.01	0.00
38.00	0.00	365	95.66	0.01	0.01	0.00
40.00	0.00	260	95.43	0.01	0.01	0.00
42.00	0.00	155	95.20	0.01	0.01	0.00
44.00	0.00	50	94.64			0.00
46.00	0.00	0	94.37			0.00
48.00	0.00	0	94.37			0.00
50.00	0.00	0	94.37	0.00	0.00	0.00
52.00	0.00	0	94.37	0.00	0.00	0.00
54.00	0.00	0	94.37	0.00	0.00	0.00
56.00	0.00	0	94.37	0.00	0.00	0.00
58.00	0.00	0	94.37	0.00	0.00	0.00
60.00	0.00	0	94.37	0.00	0.00	0.00
62.00	0.00	0	94.37	0.00	0.00	0.00
64.00	0.00	0	94.37	0.00	0.00	0.00
66.00	0.00	0	94.37	0.00	0.00	0.00
68.00	0.00	0	94.37	0.00	0.00	0.00
70.00	0.00	0	94.37	0.00	0.00	0.00
72.00	0.00	0	94.37	0.00	0.00	0.00

RECHARGE VOLUME

S-M COMPLETELY DEWATERED

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: 178 Gardner Street, W. Roxbury

TSS Removal Calculation Worksheet

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

Total TSS Removal = 89%

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

Project: G&H

Prepared By: George N. Mihov, PE

Date: 12/10/2020

*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

Appendix D:
Operation and Maintenance Plan

West Roxbury Residences
Stormwater Management System

Operation and Maintenance Plan (O&M)
and
Long Term Pollution Prevention Plan (LTPPP)

December, 2020

This Stormwater Management System Operation and Maintenance Plan provides for the inspection and maintenance of structural Best Management Practices (BMPs) and for measures to prevent pollution associated with the West Roxbury Residences at 178 Gardner Street in Boston, MA.

This document has been prepared in accordance with the requirements of the Stormwater Regulations included in the Massachusetts Wetlands Protection Act Regulations (310 CMR 10).

Responsible Party

WBA Townhomes LLC will be responsible for the operation and maintenance of the stormwater management facilities and associated stormwater management features.

Contact Information:
Peter Davos
WBA Townhomes LLC
94 Grayfield Ave
West Roxbury, MA 02132
Phone: (617) 719-8668

The stormwater management system will be maintained properly to assure its continued performance, as follows.

1. Catch basins
   a. Inspect quarterly (January, April, July, October)
   b. Clean 2 times per year or when deposits reach ½ the depth of the sump

2. Subsurface Infiltration System
   a. Inspect every 6 months and after every major storm event, remove debris
   b. Remove any debris that may clog system.
   c. Remove sediment if depth reaches 3 inches.

3. Water Quality Units
   Follow manufacturer's recommendations including at a minimum:
   a. Inspect twice a year (spring and fall) minimum and after major storm events

b. Sediment removal is required when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated.
c. Remove floatable trash, debris and oil.

Maintenance of these components will be conducted in accordance with the Mass DEP Stormwater Policy Manual as noted in the attached Operation and Maintenance table summarizing the pertinent inspection and maintenance activities. The Mass DEP Stormwater Policy Manual is available at the following web-site:

http://www.mass.gov/eea/agencies/massdep/water/regulations/massachusetts-stormwater-handbook.html

Practices for Long Term Pollution Prevention

Litter Pick-up
The Owner will conduct litter pick-up from the stormwater management facilities in conjunction with routine maintenance activities.

Routine Inspection and Maintenance of Stormwater BMPs
The Owner will conduct inspection and maintenance of the stormwater management practices in accordance with the guidelines discussed above.

Maintenance of Landscaped Areas
The Owner shall minimize use of fertilizers, herbicides, and pesticides for the maintenance of facilities covered by this plan.

Prohibition of Illicit Discharges

The DEP Stormwater Management Standards prohibit illicit discharges to the storm water management system. Illicit discharges are discharges that do not entirely consist of stormwater, except for certain specified non-stormwater discharges.

Discharges from the following activities are not considered illicit discharges:

firefighting
water line flushing
landscape irrigation
uncontaminated groundwater
potable water sources
water used to clean residential buildings without detergents
foundation drains
footing drains
individual resident car washing
flows from riparian habitats and wetlands
dechlorinated water from swimming pools
water used for street washing
air conditioning condensation

There are no known or proposed illicit connections associated with this project.

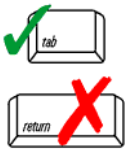
Appendix E:
Checklist for Stormwater Report

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

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature

January 20, 2021

Signature and Date

Checklist

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

☐ New development

☐ Redevelopment

☒ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

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

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

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

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

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

☐ Static ☒ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☒ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

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

☒ An Illicit Discharge Compliance Statement is attached;

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

Appendix F:
Illicit Discharge Compliance Statement

Illicit Discharge Compliance Statement

Project Name: West Roxbury Residences, 178 Gardner Street, West Roxbury, MA

By signing this statement, I confirm that no illicit discharges (as defined in Section 40 CFR 122.34(b)(3) of the Phase II Stormwater Regulations under the Clean Water Act) are proposed to enter the stormwater system at 178 Gardner Street. Illicit discharge detection and elimination procedures will be implemented routinely by visual inspections to prevent illicit discharges into the stormwater system. All personnel working at 178 Gardner Street will be informed of the illicit discharge detection and elimination procedures and that no illicit discharges are allowed to enter the stormwater system.

Signature: 

Title: MANAGER

Date: 11/9/21

Company: WBA Townhomes, LLC

Address: 178 Gardner Street, West Roxbury, MA 02132

Telephone Number: 617-719-8668

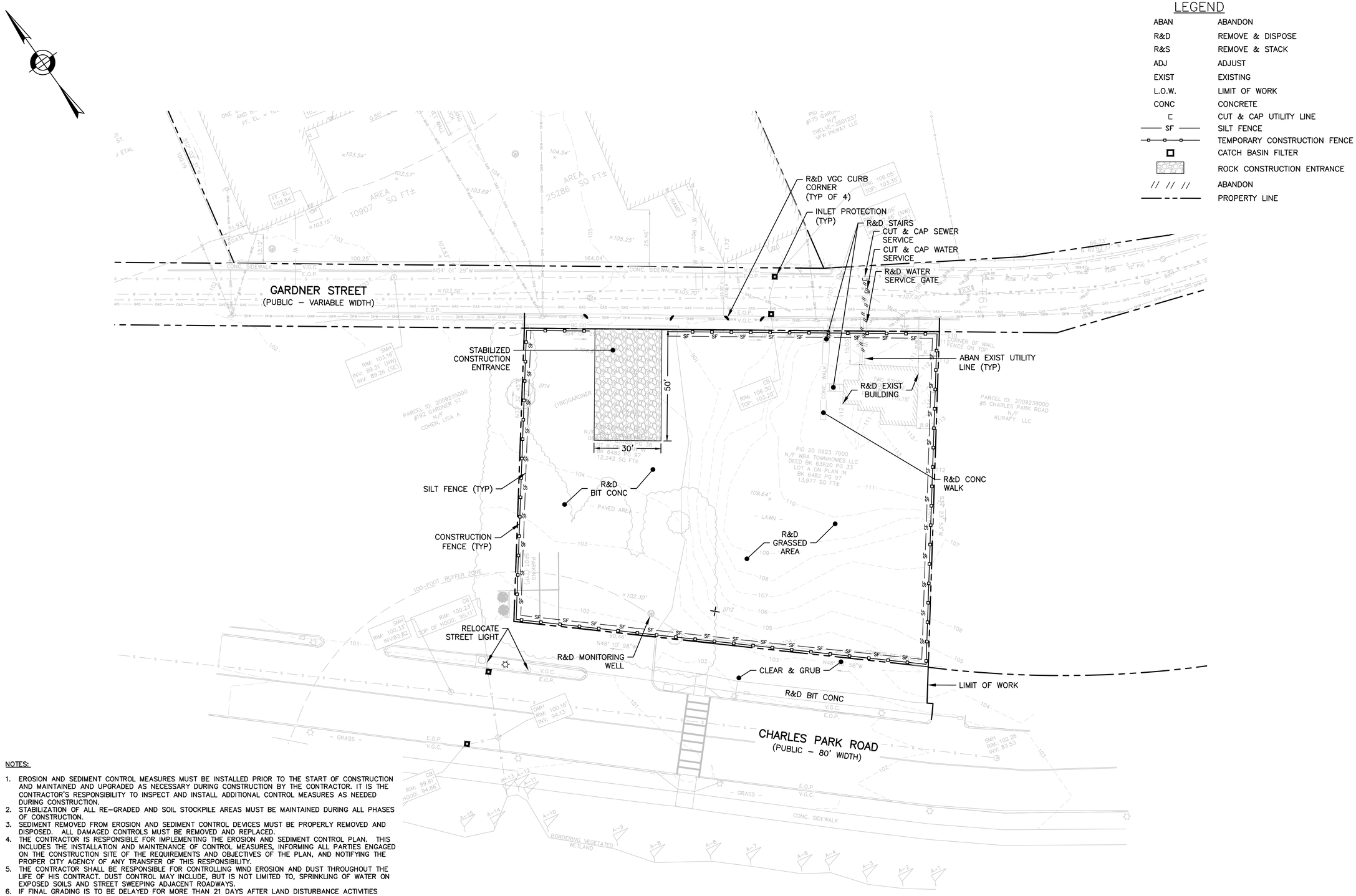
Appendix G:
Proposed Plans

PROVIDED UNDER SEPARATE COVER

HOWARD STEIN HUDSON

11 Beacon Street, Suite 1010
Boston, Massachusetts 02108
617.482.7080

www.hshassoc.com



NOTES:

1. EROSION AND SEDIMENT CONTROL MEASURES MUST BE INSTALLED PRIOR TO THE START OF CONSTRUCTION AND MAINTAINED AND UPGRADED AS NECESSARY DURING CONSTRUCTION BY THE CONTRACTOR. IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSPECT AND INSTALL ADDITIONAL CONTROL MEASURES AS NEEDED DURING CONSTRUCTION.
2. STABILIZATION OF ALL RE–GRADED AND SOIL STOCKPILE AREAS MUST BE MAINTAINED DURING ALL PHASES OF CONSTRUCTION.
3. SEDIMENT REMOVED FROM EROSION AND SEDIMENT CONTROL DEVICES MUST BE PROPERLY REMOVED AND DISPOSED. ALL DAMAGED CONTROLS MUST BE REMOVED AND REPLACED.
4. THE CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTING THE EROSION AND SEDIMENT CONTROL PLAN. THIS INCLUDES THE INSTALLATION AND MAINTENANCE OF CONTROL MEASURES, INFORMING ALL PARTIES ENGAGED ON THE CONSTRUCTION SITE OF THE REQUIREMENTS AND OBJECTIVES OF THE PLAN, AND NOTIFYING THE PROPER CITY AGENCY OF ANY TRANSFER OF THIS RESPONSIBILITY.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTROLLING WIND EROSION AND DUST THROUGHOUT THE LIFE OF HIS CONTRACT. DUST CONTROL MAY INCLUDE, BUT IS NOT LIMITED TO, SPRINKLING OF WATER ON EXPOSED SOILS AND STREET SWEEPING ADJACENT ROADWAYS.
6. IF FINAL GRADING IS TO BE DELAYED FOR MORE THAN 21 DAYS AFTER LAND DISTURBANCE ACTIVITIES CEASE, TEMPORARY VEGETATION OR MULCH SHALL BE USED TO STABILIZED SOILS WITHIN 14 DAYS OF THE LAST DISTURBANCE.
7. IF A DISTURBED AREA WILL BE EXPOSED FOR GREATER THAN ONE YEAR, PERMANENT GRASSES OR OTHER APPROVED COVER MUST BE INSTALLED.
8. THE CONTRACTOR MUST KEEP ON–SITE AT ALL TIMES ADDITIONAL FILTER BERMS AND/OR SILT FENCE FOR THE INSTALLATION AT THE DIRECTION OF THE ENGINEER OR CONSERVATION COMMISSION TO MITIGATE ANY EMERGENCY CONDITION.
9. THE EROSION AND SEDIMENT CONTROLS AS SHOWN MAY NOT BE PRACTICAL DURING ALL STAGES OF CONSTRUCTION. EARTHWORK ACTIVITY ON–SITE MUST BE DONE IN A MANNER SUCH THAT RUNOFF IS DIRECTED TO A SEDIMENT CONTROL DEVICE OR INFILTRATED TO THE GROUND.
10. DEMOLITION AND CONSTRUCTION DEBRIS MUST BE PROPERLY CONTAINED AND DISPOSED OF.
11. DISPOSAL OF ALL DEMOLISHED MATERIALS IS THE RESPONSIBILITY OF THE CONTRACTOR AND MUST BE HAULED OFF–SITE IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL REQUIREMENTS.

PROJECT NAME

West Roxbury Residences

PROJECT ADDRESS

178 Gardner Street
West Roxbury, MA

CLIENT

WBA Townhomes, LLC

ARCHITECT

DESIGN
KHALSA

17 IVALOO STREET SUITE 400
SOMERVILLE, MA 02143
TELEPHONE: 617-591-8682 FAX: 617-591-2086

CONSULTANTS:

HOWARD STEIN HUDSON
11 Beacon Street, Suite 1010
Boston, MA 02108
www.hshassoc.com

REGISTRATION

Project number	18111
Date	08/18/2020
Drawn by	MGB
Checked by	REL
Scale	1"=20'

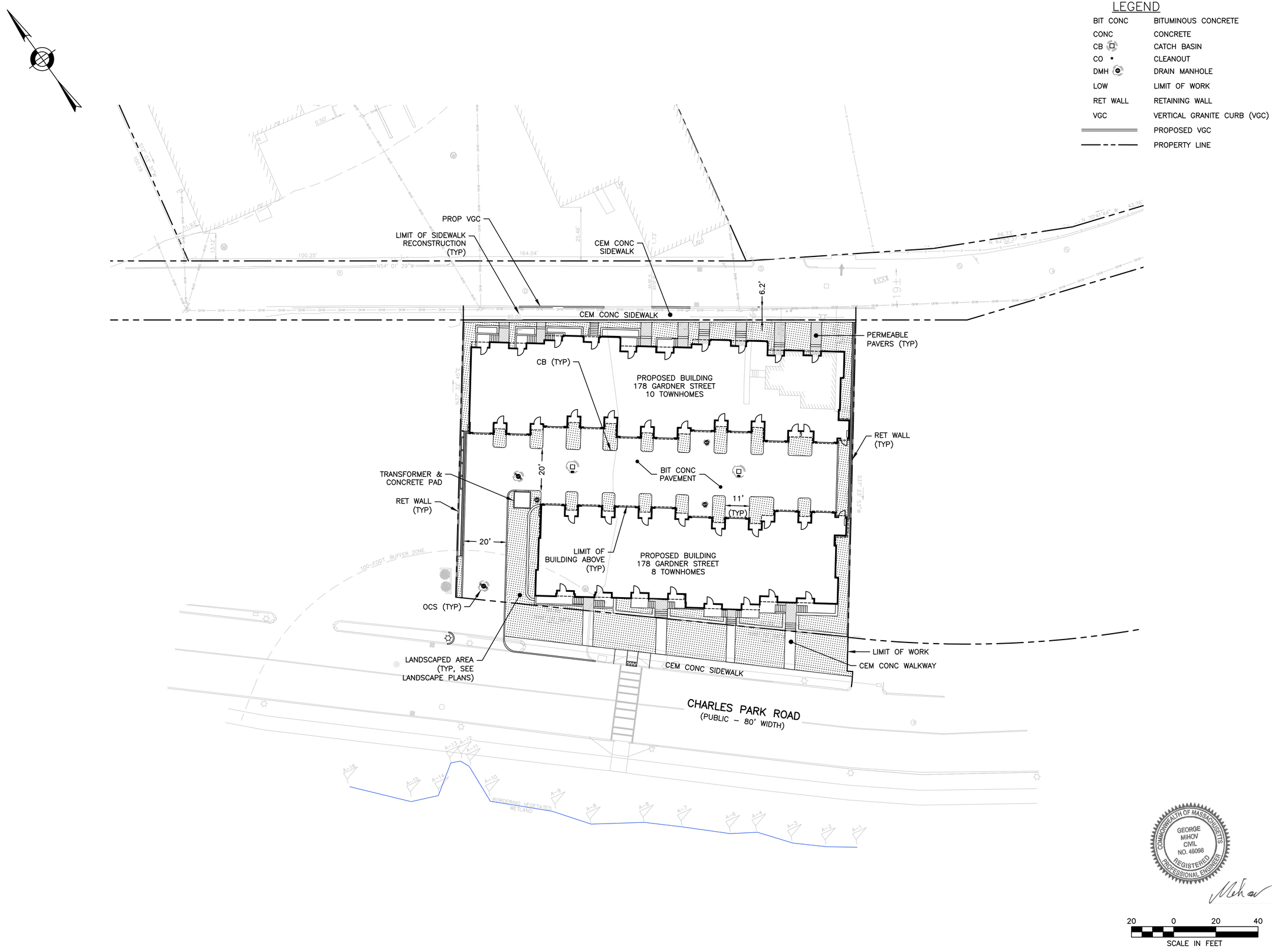
REVISIONS

No.	Description	Date
1	BWSC PERMIT SET	10.08.2020
	PROGRESS DWG-DRAFT	11.11.2020
	50 % PROGRESS SET	11.25.2020
	BWSC PERMIT SET	12.16.2020

178 Gardner Street - Site Preparation Plan

C-100

West Roxbury Residences



COMMONWEALTH OF MASSACHUSETTS
GEORGE MIHOV
CIVIL
NO. 46098
REGISTERED PROFESSIONAL ENGINEER

PROJECT NAME

West Roxbury Residences

PROJECT ADDRESS

178 Gardner Street
West Roxbury, MA

CLIENT

WBA Townhomes, LLC

ARCHITECT

DESIGN
KHALSA

17 IVALOO STREET SUITE 400
SOMERVILLE, MA 02143
TELEPHONE: 617-591-8682 FAX: 617-591-2086

CONSULTANTS:

HOWARD STEIN HUDSON
11 Beacon Street, Suite 1010
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www.hshassoc.com

REGISTRATION

Project number	18111
Date	08/18/2020
Drawn by	MGB
Checked by	REL
Scale	1"=20'

REVISIONS

No.	Description	Date
1	BWSC PERMIT SET	10.08.2020
	PROGRESS DWG-DRAFT	11.11.2020
	50 % PROGRESS SET	11.25.2020
	BWSC PERMIT SET	12.16.2020

178 Gardner Street - Site Layout Plan

C-200

West Roxbury Residences

Last Saved by: GMIHOV
Printed by: George Mihov

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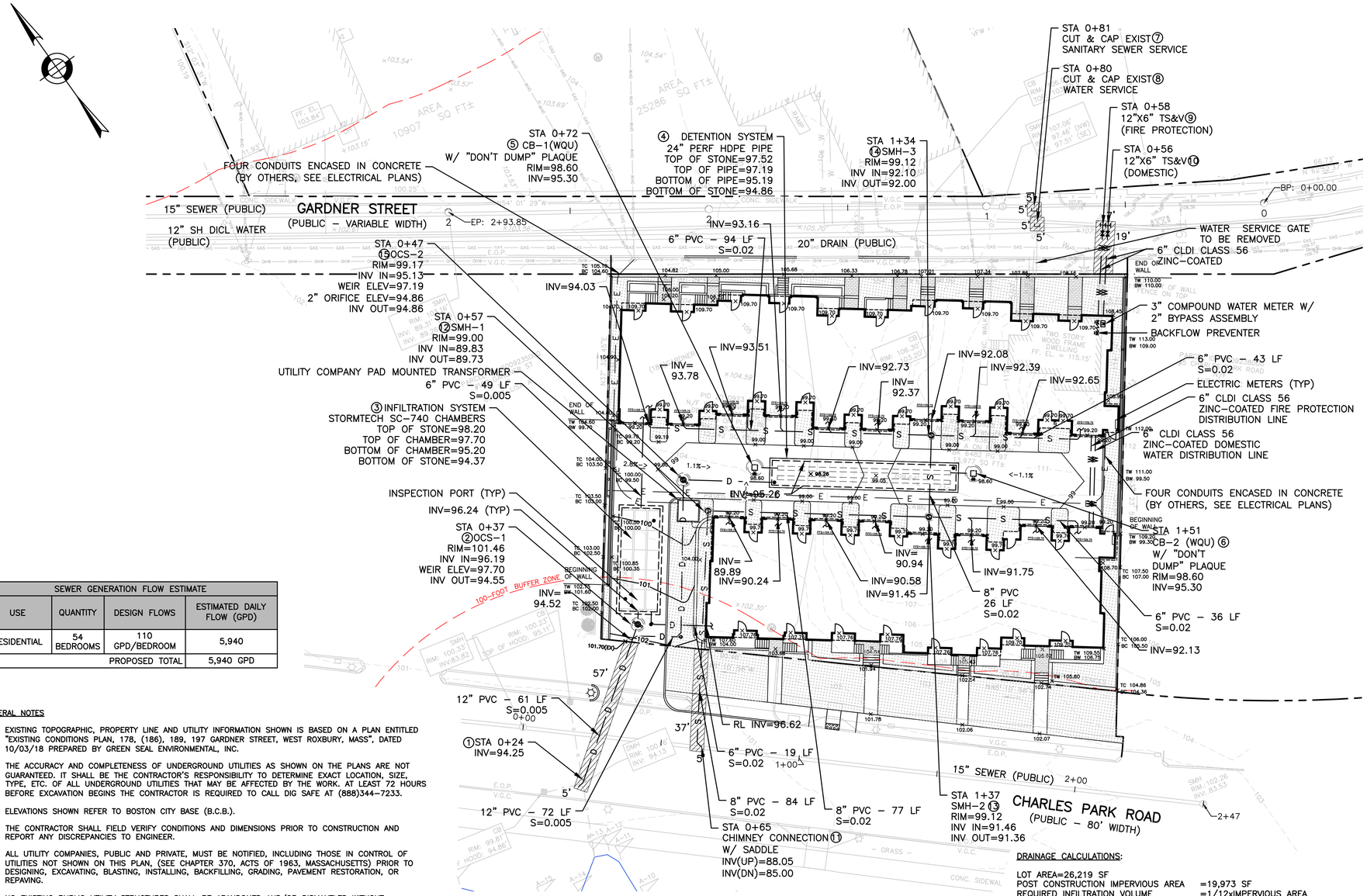

LEGEND

CLDI	CEMENT–LINED DUCTILE IRON
EXIST	EXISTING
HDPE	HIGH–DENSITY POLYETHYLENE
INV	INVERT
LF	LINEAR FEET
PVC	POLYVINYL CHLORIDE PIPE
RCP	REINFORCED CONCRETE PIPE
RD	ROOF DRAIN
S	SLOPE
TC/BC	TOP OF CURB/BOTTOM OF CURB
TS&V	TAPPING SLEEVE & VALVE
WQU	WATER QUALITY UNIT
AD	AREA DRAIN
CB	CATCH BASIN
CO	CLEANOUT
DMH	DRAIN MANHOLE
GV	GATE VALVE
HYD	HYDRANT
OCS	OUTLET CONTROL STRUCTURE
SMH	SEWER MANHOLE
D	STORM DRAIN
E	ELECTRIC DUCTBANK
G	GAS LINE
S	SANITARY SEWER
T	TELECOMMUNICATIONS DUCTBANK
W	WATER LINE
	PROPERTY LINE

SEWER GENERATION FLOW ESTIMATE			
USE	QUANTITY	DESIGN FLOWS	ESTIMATED DAILY FLOW (GPD)
RESIDENTIAL	54 BEDROOMS	110 GPD/BEDROOM	5,940
		PROPOSED TOTAL	5,940 GPD

GENERAL NOTES

1. EXISTING TOPOGRAPHIC, PROPERTY LINE AND UTILITY INFORMATION SHOWN IS BASED ON A PLAN ENTITLED "EXISTING CONDITIONS PLAN, 178, (186), 189, 197 GARDNER STREET, WEST ROXBURY, MASS", DATED 10/03/18 PREPARED BY GREEN SEAL ENVIRONMENTAL, INC.
2. THE ACCURACY AND COMPLETENESS OF UNDERGROUND UTILITIES AS SHOWN ON THE PLANS ARE NOT GUARANTEED. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE EXACT LOCATION, SIZE, TYPE, ETC. OF ALL UNDERGROUND UTILITIES THAT MAY BE AFFECTED BY THE WORK. AT LEAST 72 HOURS BEFORE EXCAVATION BEGINS THE CONTRACTOR IS REQUIRED TO CALL DIG SAFE AT (888)344–7233.
3. ELEVATIONS SHOWN REFER TO BOSTON CITY BASE (B.C.B.).
4. THE CONTRACTOR SHALL FIELD VERIFY CONDITIONS AND DIMENSIONS PRIOR TO CONSTRUCTION AND REPORT ANY DISCREPANCIES TO ENGINEER.
5. ALL UTILITY COMPANIES, PUBLIC AND PRIVATE, MUST BE NOTIFIED, INCLUDING THOSE IN CONTROL OF UTILITIES NOT SHOWN ON THIS PLAN, (SEE CHAPTER 370, ACTS OF 1963, MASSACHUSETTS) PRIOR TO DESIGNING, EXCAVATING, BLASTING, INSTALLING, BACKFILLING, GRADING, PAVEMENT RESTORATION, OR REPAVING.
6. NO EXISTING PUBLIC UTILITY STRUCTURES SHALL BE ABANDONED AND/OR DISMANTLED WITHOUT AUTHORIZATION FROM THE ENGINEER.
7. CONTRACTOR SHALL MAINTAIN ALL EXISTING UTILITIES EXCEPT THOSE NOTED TO BE ABANDONED OR REMOVED & DISPOSED.
8. THE CONTRACTOR SHALL DISPOSE OF ALL WASTE MATERIAL IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS AT HIS OWN EXPENSE, OUTSIDE OF THE PROJECT LIMITS.
9. ALL WATER, SEWER, AND DRAIN WORK SHALL BE PERFORMED ACCORDING TO THE REQUIREMENTS AND STANDARD DETAILS OF THE BOSTON WATER AND SEWER COMMISSION.
10. BWSC OPERATIONS (617–989–7276) MUST BE NOTIFIED 48 HOURS IN ADVANCE PRIOR TO THE INSTALLATION OF WATER AND FIRE SERVICES AND, IF NEEDED, SHUTTING DOWN OF THE MAIN.
11. A PREREQUISITE FOR FILING A GENERAL SERVICE APPLICATION WITH THE BOSTON WATER AND SEWER COMMISSION FOR NEW CONSTRUCTION IS THE ROUGH CONSTRUCTION SIGN–OFF DOCUMENT FROM THE CITY OF BOSTON'S INSPECTIONAL SERVICES DEPARTMENT.
12. IF WATER USE FROM HYDRANT IS PROPOSED THE CONTRACTOR MUST APPLY FOR A HYDRANT METER PERMIT FROM THE BWSC AND PAY ALL COSTS INCLUDING DEPOSIT, RENTAL, AND WATER USAGE FEES.
13. ALL CONSTRUCTION WORK PERFORMED ON THE BWSC'S UTILITIES MUST BE INSPECTED BY A BWSC CONSTRUCTION INSPECTOR. AS–BUILT PLANS SHALL BE SUBMITTED TO THE BWSC FOLLOWING THE COMPLETION OF THE INSTALLATIONS. THE CONTRACTOR SHALL PREPARE AS–BUILT PLAN (ELECTRONICALLY) OF THE UTILITY SYSTEM WORK FOR SUBMITTAL TO BWSC, AND IS INCIDENTAL TO THE WORK.
14. ANY CONSTRUCTION DEWATERING REQUIRES A DRAINAGE DISCHARGE PERMIT FROM THE BWSC AND A NPDES PERMIT FROM THE EPA.
15. CONTRACTOR MUST PAY ALL FEES AND PERMITS.
16. ALL METER INSTALLATIONS REQUIRE THE INSTALLATION OF A METER TRANSMISSION UNIT (MTU) AS PART OF BWSC'S AUTOMATIC READING (AMR) SYSTEM.
17. SANITARY SEWER AND STORM DRAINS MUST BE A MINIMUM OF 10 FEET APART FROM ANY NEW OR EXISTING WATER SERVICES.
18. PIPE MATERIALS (UNLESS OTHERWISE NOTED)
    STORM DRAIN: SDR–35 PVC
    SANITARY SEWER: SDR–35 PVC
    WATER PIPE: CLDI CLASS 56 (ZINC COATED)

BWSC INSPECTION SIGN–OFF SCHEDULE				
ITEM NO.	DESCRIPTION OF SERVICE	QTY	BWSC INSPECTOR/DATE	COMMENT
1	DRAIN SADDLE CONNECTION	1		
	DYE TEST			
2	OCS–1	1		
3	INFILTRATION SYSTEM	1		
4	DETENTION SYSTEM	1		
5	CB–1	1		
6	CB–2	1		
7	CUT & CAP SANITARY SEWER SERVICE	1		
8	CUT & CAP WATER SERVICE	1		
9	FIRE PROTECTION SERVICE CONNECTION	1		
10	DOMESTIC WATER SERVICE CONNECTION	1		
11	CHIMNEY CONNECTION W/ SADDLE	1		
	DYE TEST			
12	SMH–1	1		
13	SMH–2			
14	SMH–3			
	"DO NOT DUMP" PLAQUE	2		

DRAINAGE CALCULATIONS:

LOT AREA=26,219 SF
POST CONSTRUCTION IMPERVIOUS AREA =19,973 SF
REQUIRED INFILTRATION VOLUME =1/12xIMPERVIOUS AREA
=1/12x19,973
=1,664 CF

REQUIRED ROOF INFILTRATION VOLUME =1/12xROOF AREA
=1/12x13085
=1090.4 CF

PROPOSED STORAGE VOLUME =2,038.6 CF

INFILTRATION SYSTEM STORAGE VOLUME
=688.5+410.5=1,099.0 CF

CHAMBER STORAGE
STORMTECH SC740 CHAMBERS
=# OF CHAMBERS X CHAMBER VOLUME
=45.9x15
=688.5 CF

STONE STORAGE
=(LxWxH) – CHAMBER VOLUME X 30% VOIDS
=(39.22x15.75x3.33) – 688.5 X 0.30
=410.5 CF

DETENTION SYSTEM STORAGE VOLUME
=624.6+315.0=939.6

24" PERFORATED PIPE STORAGE VOLUME
=TOTAL PIPE LENGTH X π X r^2
=198.9 X 3.14 X 1^2
=624.6 CF

STONE STORAGE
=(LxWxH) – CHAMBER VOLUME X 30% VOIDS
=(68.00x10.57x2.33) – 624.6 X 0.30
=315.0 CF

COMMONWEALTH OF MASSACHUSETTS
GEORGE MIHOV
CIVIL
NO. 48098
REGISTERED PROFESSIONAL ENGINEER

SCALE IN FEET
20 0 20 40

BWSC SITE PLAN#: 20431

OWNER:
WEST BRIGHTON ACQUISITIONS, LLC
C/O PETER V. DAVOS
94 GRAYFIELD AVENUE
WEST ROXBURY, MA 02109

TELEPHONE:

PROPERTY ADDRESSES:
178 GARDNER STREET
WEST ROXBURY, MASSACHUSETTS 02132
WARD: 20
PARCEL: 2009236000 & 2009237000

LAND USE CODE: WEST ROXBURY NEIGHBORHOOD COMMUNITY COMMERCIAL

EXISTING WATER ACCOUNTS:
178 GARDNER STREET – WATER ACCOUNT#: 658412
WATER METER #: 03011308

ESTIMATE WASTEWATER FLOW: 5,940 GPD

PROJECT SITE AREA: 0.60 ACRES

FOR BWSC USE ONLY

PROJECT NAME
West Roxbury Residences

PROJECT ADDRESS
178 Gardner Street
West Roxbury, MA

CLIENT
WBA Townhomes, LLC

ARCHITECT
DESIGN KHALSA
17 IVALOO STREET SUITE 400
SOMERVILLE, MA 02143
TELEPHONE: 617-591-8682 FAX: 617-591-2086

CONSULTANTS:
HOWARD STEIN HUDSON
11 Beacon Street, Suite 1010
Boston, MA 02108
www.hshassoc.com

REGISTRATION

Project number	18111
Date	08/18/2020
Drawn by	MGB
Checked by	REL
Scale	1"=20'

REVISIONS

No.	Description	Date
1	BWSC PERMIT SET	10.08.2020
	PROGRESS DWG-DRAFT	11.11.2020
	50 % PROGRESS SET	11.25.2020
	BWSC PERMIT SET	12.16.2020

178 Gardner Street - Site Grading & Utilities Plan

C-300

West Roxbury Residences

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Printed by: George Mihov

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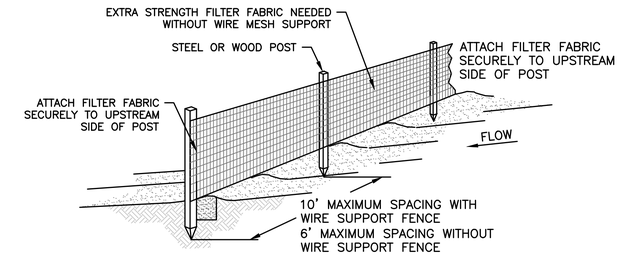
EROSION & SEDIMENT CONTROL NOTES:

1. EROSION AND SEDIMENT CONTROL MEASURES MUST BE INSTALLED PRIOR TO THE START OF CONSTRUCTION AND MAINTAINED AND UPGRADED AS NECESSARY DURING CONSTRUCTION BY THE CONTRACTOR. IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSPECT AND INSTALL ADDITIONAL CONTROL MEASURES AS NEEDED DURING CONSTRUCTION.
2. ALL CATCH BASINS RECEIVING DRAINAGE FROM THE PROJECT SITE MUST BE PROVIDED WITH A CATCH BASIN FILTER.
3. STABILIZATION OF ALL RE-GRADED AND SOIL STOCKPILE AREAS MUST BE MAINTAINED DURING ALL PHASES OF CONSTRUCTION.
4. SEDIMENT REMOVED FROM EROSION AND SEDIMENT CONTROL DEVICES MUST BE PROPERLY REMOVED AND DISPOSED. ALL DAMAGED CONTROLS MUST BE REMOVED AND REPLACED.
5. THE CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTING THE EROSION AND SEDIMENT CONTROL PLAN. THIS INCLUDES THE INSTALLATION AND MAINTENANCE OF CONTROL MEASURES, INFORMING ALL PARTIES ENGAGED ON THE CONSTRUCTION SITE OF THE REQUIREMENTS AND OBJECTIVES OF THE PLAN, AND NOTIFYING THE PROPER CITY AGENCY OF ANY TRANSFER OF THIS RESPONSIBILITY.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTROLLING WIND EROSION AND DUST THROUGHOUT THE LIFE OF HIS CONTRACT. DUST CONTROL MAY INCLUDE, BUT IS NOT LIMITED TO, SPRINKLING OF WATER ON EXPOSED SOILS AND STREET SWEEPING ADJACENT ROADWAYS.
7. IF FINAL GRADING IS TO BE DELAYED FOR MORE THAN 21 DAYS AFTER LAND DISTURBANCE ACTIVITIES CEASE, TEMPORARY VEGETATION OR MULCH SHALL BE USED TO STABILIZED SOILS WITHIN 14 DAYS OF THE LAST DISTURBANCE.
8. IF A DISTURBED AREA WILL BE EXPOSED FOR GREATER THAN ONE YEAR, PERMANENT GRASSES OR OTHER APPROVED COVER MUST BE INSTALLED.
9. THE CONTRACTOR MUST KEEP ON-SITE AT ALL TIMES ADDITIONAL FILTER BERMS AND/OR SILT FENCE FOR THE INSTALLATION AT THE DIRECTION OF THE ENGINEER OR CONSERVATION COMMISSION TO MITIGATE ANY EMERGENCY CONDITION.
10. THE CONSTRUCTION FENCING AND EROSION AND SEDIMENT CONTROLS AS SHOWN MAY NOT BE PRACTICAL DURING ALL STAGES OF CONSTRUCTION. EARTHWORK ACTIVITY ON-SITE MUST BE DONE IN A MANNER SUCH THAT RUNOFF IS DIRECTED TO A SEDIMENT CONTROL DEVICE OR INFILTRATED TO THE GROUND.
11. DEMOLITION AND CONSTRUCTION DEBRIS MUST BE PROPERLY CONTAINED AND DISPOSED OF.
12. DISPOSAL OF ALL DEMOLISHED MATERIALS IS THE RESPONSIBILITY OF THE CONTRACTOR AND MUST BE HAULED OFF-SITE IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL REQUIREMENTS.



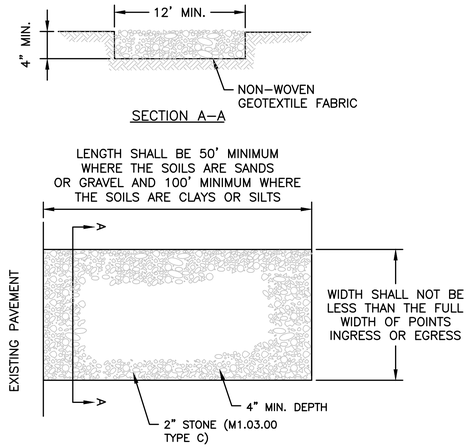
TRENCH DETAIL

INSTALLATION WITHOUT TRENCHING

NOTES:

1. EROSION CONTROL BARRIER (HAY BALES, SILT FENCE OR EROSION STOCK) SHALL BE PLACED AROUND ALL MATERIAL STOCKPILE AREAS AND MAINTAINED AT STAGING AREAS TO ASSURE NO SILTATION ONTO PUBLIC OR PRIVATE WAYS OR PROPERTY.

EROSION CONTROL BARRIER
NOT TO SCALE

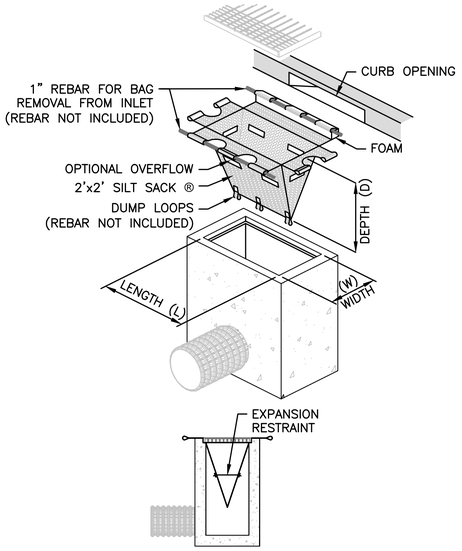


PLAN

NOTES:

1. INSTALLATION: THE AREA OF THE ENTRANCE SHOULD BE CLEARED OF ALL VEGETATION, ROOTS, AND OTHER OBJECTIONABLE MATERIAL. THE GRAVEL SHALL BE PLACED TO THE SPECIFIED DIMENSIONS NOTED ABOVE.
2. MAINTENANCE: THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENTS ONTO PUBLIC RIGHT-OF-WAYS. THIS WILL REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE, OR ADDITIONAL LENGTH, AS CONDITIONS DEMAND, AND REPAIR, AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHT-OF-WAYS MUST BE REMOVED IMMEDIATELY.
3. LOCATION: SEE C1.0 FOR LOCATION OF CONSTRUCTION ENTRANCES.

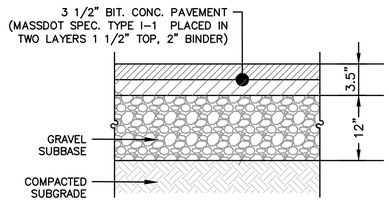
ROCK CONSTRUCTION ENTRANCE
NOT TO SCALE



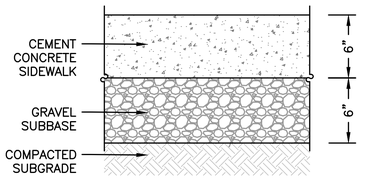
SIDE VIEW INSTALLED

CATCH BASIN FILTER

TEMPORARY INLET PROTECTION
NOT TO SCALE



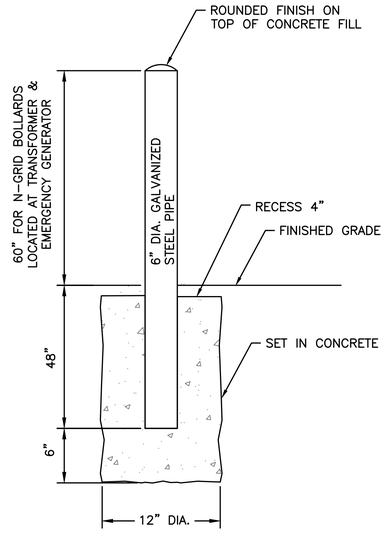
BITUMINOUS CONCRETE PAVEMENT
NOT TO SCALE



NOTES:

1. CONCRETE SIDEWALK DETAIL AND NOTES APPLY TO SIDEWALK WITHIN THE RIGHT-OF-WAY.
2. CONCRETE SHALL BE 4,000 PSI.
3. SIDEWALKS ARE TO BE RAKED FINISH WITH 3/8 INCH TROWEL JOINTS.

CEM CONC SIDEWALK SECTION DETAIL
NOT TO SCALE



NOTE:

1. DIG POST HOLE FOR BOLLARD, PARTIALLY FILL HOLE WITH CONCRETE MIX, INSTALL PIPE, FILL HOLE, AND FILL PIPE W/CONCRETE MIX.
2. SUPPORT BOLLARD AND PROTECT FROM DAMAGE WHILE CONCRETE CURES. THEN PAINT WITH APPROPRIATE PAINT. COLOR AS REQUIRED BY OWNER.

UTILITY BOLLARD
NOT TO SCALE

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West Roxbury Residences

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West Roxbury, MA

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Scale	N.T.S.

REVISIONS

No.	Description	Date
1	BWSC PERMIT SET	10.08.2020
	PROGRESS DWG-DRAFT	11.11.2020
	50 % PROGRESS SET	11.25.2020
	BWSC PERMIT SET	12.16.2020

178 Gardner Street - Site Details

C-400

West Roxbury Residences

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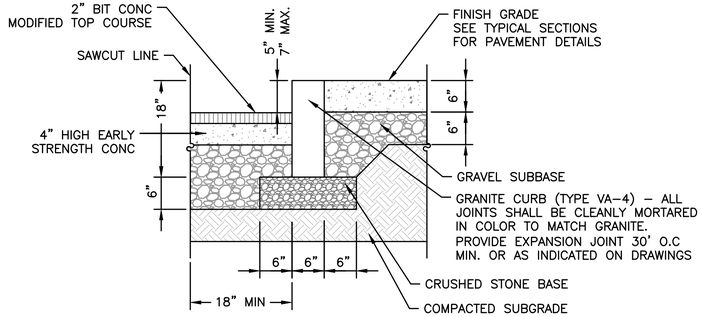
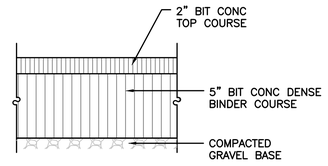
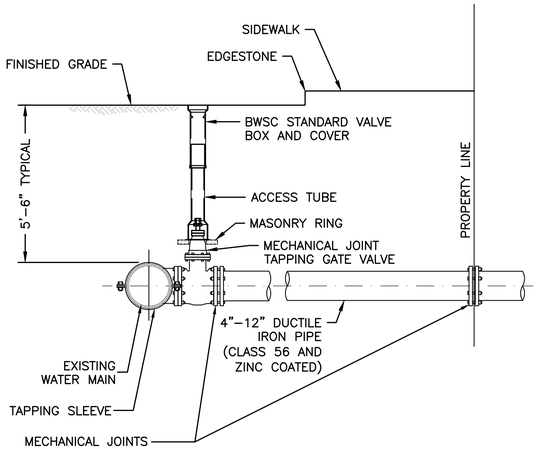


VERTICAL GRANITE CURB AT STREET
NOT TO SCALE



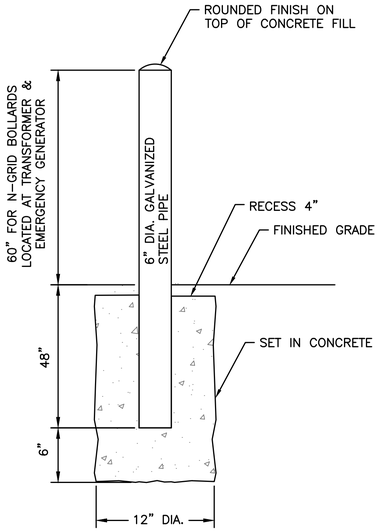
TRENCH PATCH DETAIL
NOT TO SCALE



NOTES:

1. CONCRETE THRUST BLOCK TO BE USED ONLY WHERE IT WILL BEAR ON UNDISTURBED EARTH.
2. USE RESTRAINED JOINT FITTINGS OR TIE RODS WHERE CONCRETE THRUST BLOCK IS UNACCEPTABLE.
3. SIZE OF BLOCK OR MEGALUG TO BE DESIGNED FOR SPECIFIC CONDITIONS.

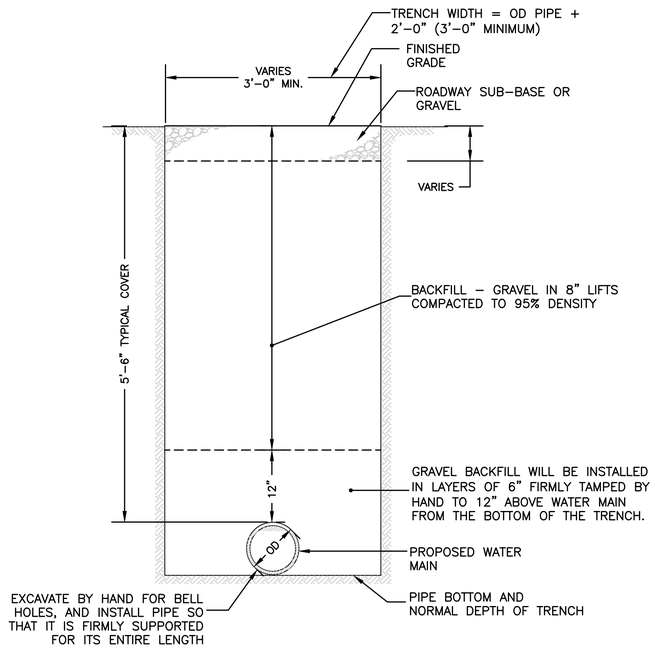
TAPPING SLEEVE & VALVE (A-09)
NOT TO SCALE



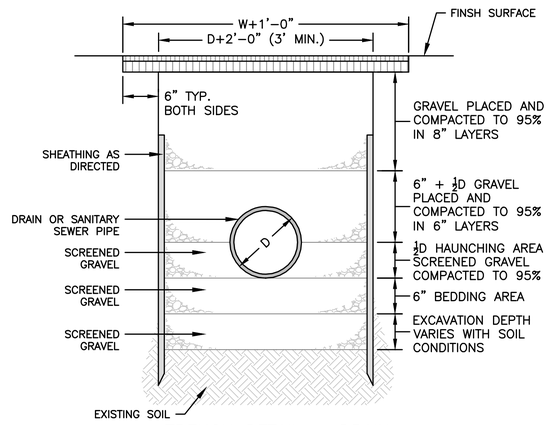
NOTE:

1. DIG POST HOLE FOR BOLLARD, PARTIALLY FILL HOLE WITH CONCRETE MIX, INSTALL PIPE, FILL HOLE, AND FILL PIPE W/CONCRETE MIX.
2. SUPPORT BOLLARD AND PROTECT FROM DAMAGE WHILE CONCRETE CURES. THEN PAINT WITH APPROPRIATE PAINT. COLOR AS REQUIRED BY OWNER.

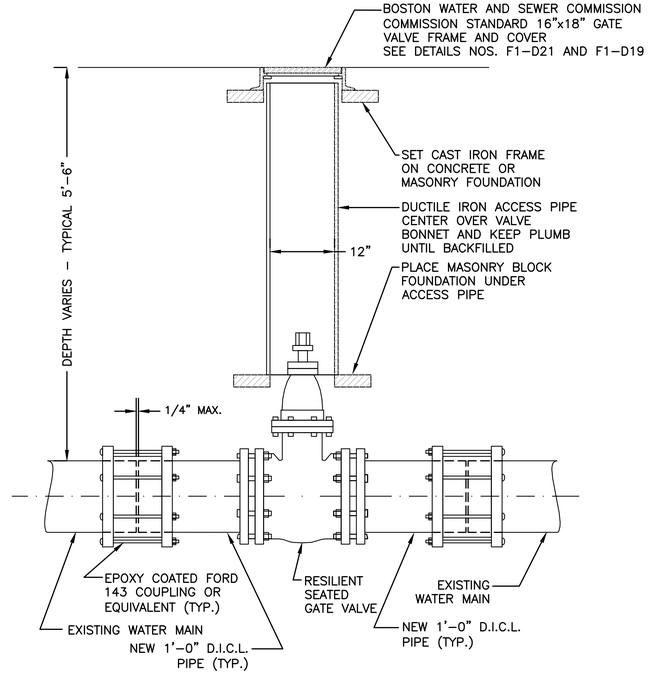
UTILITY BOLLARD
NOT TO SCALE



TRENCH DETAIL - WATER MAIN (A-05)
NOT TO SCALE



TRENCH DETAIL - DRAIN & SANITARY SEWER
NOT TO SCALE



NOTE:

1. ALL EXCAVATION AND BACKFILLING AND PAVING SHALL BE IN ACCORDANCE WITH THE CITY OF BOSTON REQUIREMENTS.

TYPICAL GATE VALVE INSTALLATION
NOT TO SCALE

Last Saved by: GMilNOV
Printed by: George Milnov

PROJECT NAME
West Roxbury Residences

PROJECT ADDRESS
178 Gardner Street
West Roxbury, MA

CLIENT
WBA Townhomes, LLC

ARCHITECT
DESIGN
KHALSA
17 IVALOO STREET SUITE 400
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TELEPHONE: 617-591-8682 FAX: 617-591-2086

CONSULTANTS:
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REGISTRATION

Project number	18111
Date	08/18/2020
Drawn by	MGB
Checked by	REL
Scale	N.T.S.

REVISIONS

No.	Description	Date
1	BWSC PERMIT SET	10.08.2020
	PROGRESS DWG-DRAFT	11.11.2020
	50 % PROGRESS SET	11.25.2020
	BWSC PERMIT SET	12.16.2020

178 Gardner Street - Site Details

C-401

West Roxbury Residences

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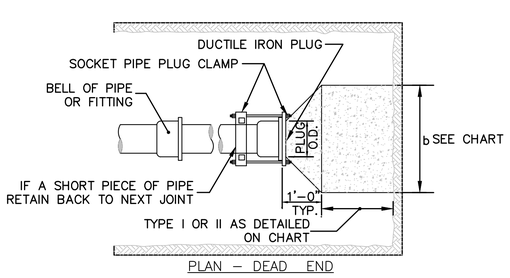
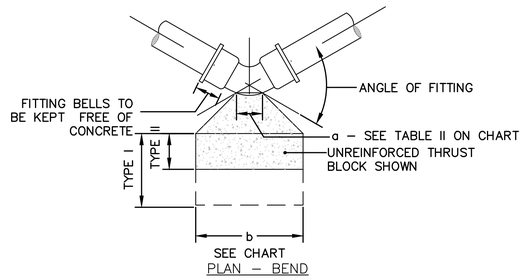
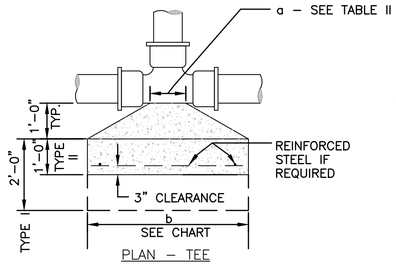


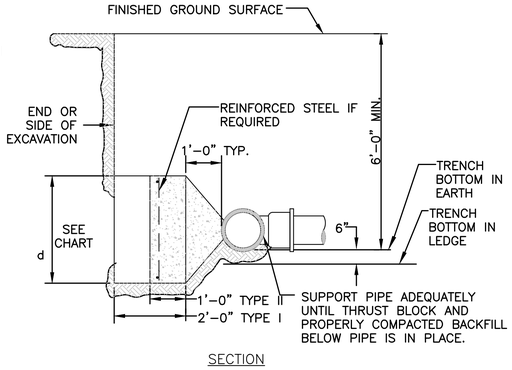
PLAN – DEAD END



PLAN – BEND



PLAN – TEE



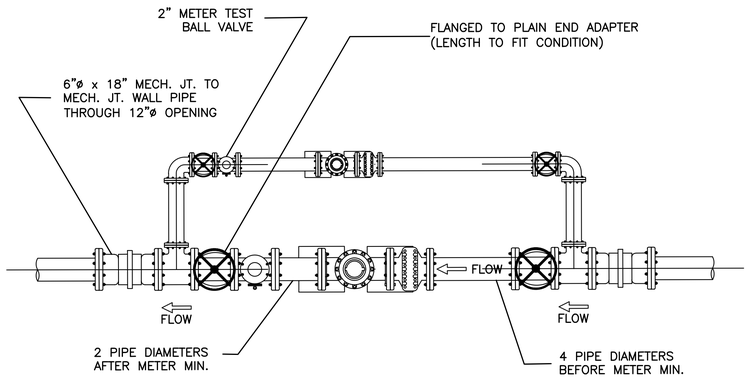
SECTION

THRUST BLOCK (A–01a)

NOT TO SCALE

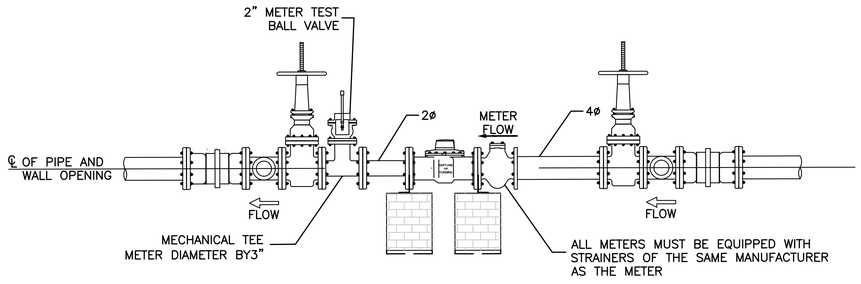
THRUST BLOCK (A–01b)

NOT TO SCALE



PLAN

INSTALLATION OF REMOTE READING DEVICES BY COMMISSION



ELEVATION

NOTES:

1. BY–PASS METER CAN BE 1 SIZE SMALLER THAN MAIN METER.
2. ALL GATES TO BE TEFLON COATED.
3. CONTRACTOR SHALL NOTIFY BWSC METER DEPT. TO DETERMINE IF METER CONDUIT MUST BE INSTALLED. IF REQUIRED THE CONTRACTOR SHALL SUPPLY THE WIRE AND INSTALL AS SPECIFIED.
4. SEE PLUMBING PLANS FOR ADDITIONAL INFORMATION.

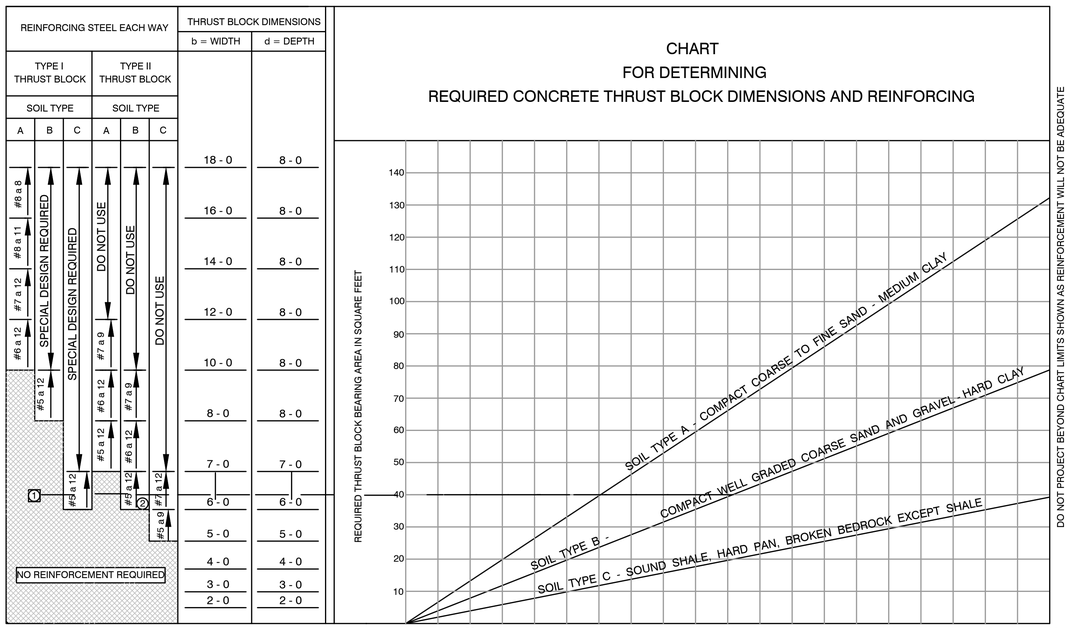
3" WATER METER W/ 2" BYPASS

NOT TO SCALE

TABLE II - "a" DIMENSION - FEET		
PIPE DIAMETER - INCHES	90° FITTING	OTHERS
6, 8, 10 & 12	1 - 6	1 - 0
16 & 20	2 -0	1 - 6
24" - 30"	3 - 0	2 - 0

TABLE I - THRUST - KIPS (WATER PRESSURE = 200 P.S.I.)											
PIPE DIAMETER INCHES		6	8	10	12	16	20	24	30	36	42
DEAD ENDS AND TEES		5.6	10	15.8	22.6	40.2	62.8	90.4	141.0	203.6	277.0
ANGLE FITTINGS	90°	7.9	14.2	22.4	32.0	56.8	88.8	127.7	199.0	288.0	392.0
	67 1/2°	-	11.1	17.6	25.1	44.7	70.0	100.2	157.0	226.0	308.0
	56 1/4°	-	-	14.9	21.2	37.9	59.2	85.1	133.0	192.0	261.0
	45°	-	-	-	17.3	30.8	48.1	69.0	108.0	156.0	212.0
	33 3/4°	-	-	-	13.1	23.3	36.5	52.5	82.0	118.0	161.0
	22 1/2°	-	-	-	8.8	15.7	24.5	35.2	55.0	79.5	108.0

DESIGN THRUST BLOCKS OR OTHER SUITABLE ANCHORAGE TO SUIT ACTUAL CONDITIONS



THRUST BLOCK DIMENSIONS (A–01c)

NOT TO SCALE

PROJECT NAME
West Roxbury Residences

PROJECT ADDRESS
178 Gardner Street
West Roxbury, MA

CLIENT
WBA Townhomes, LLC

ARCHITECT

DESIGN KHALSA
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CONSULTANTS:

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REGISTRATION

Project number	18111
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Scale	N.T.S.

REVISIONS

No.	Description	Date
1	BWSC PERMIT SET	10.08.2020
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	50 % PROGRESS SET	11.25.2020
	BWSC PERMIT SET	12.16.2020

178 Gardner Street - Site Details

C-402

West Roxbury Residences

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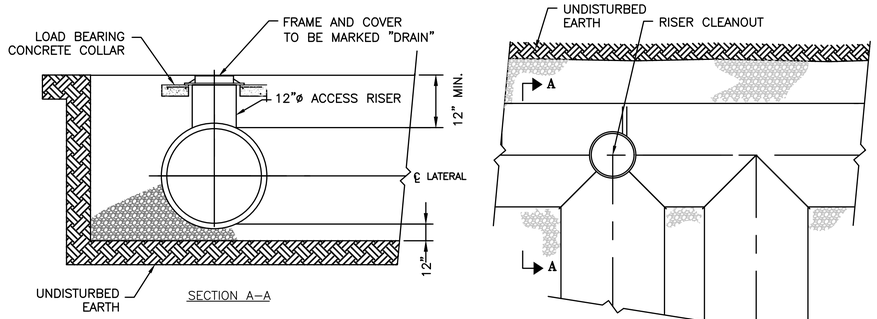
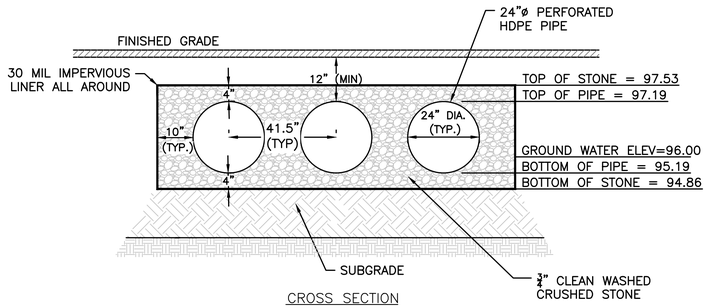
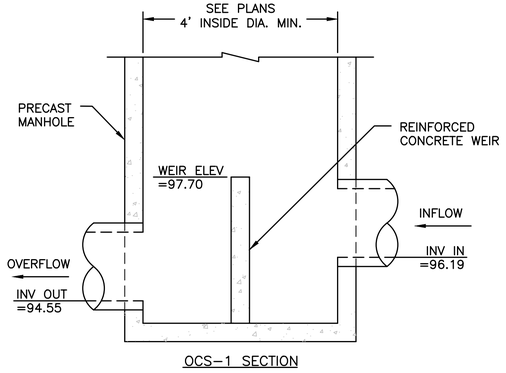




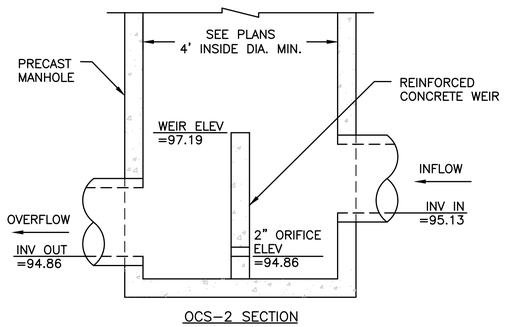
CROSS SECTION

SUBSURFACE STORMWATER DETENTION SYSTEM
24" PERFORATED HDPE PIPE

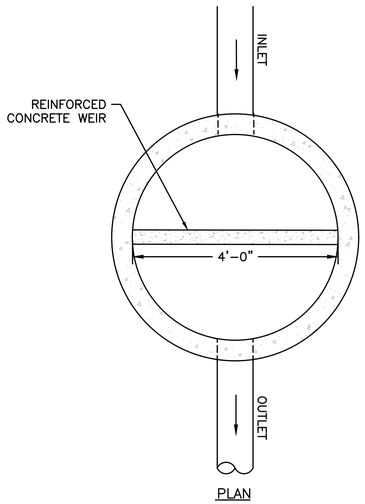
NOT TO SCALE



OCS–1 SECTION



OCS–2 SECTION



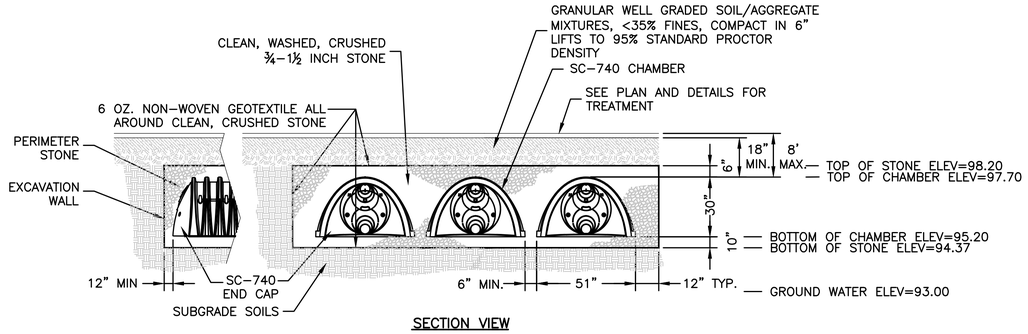
PLAN

NOTES:
1. 6 INCH MIN. WALL THICKNESS AND 7 INCH MIN. BASE THICKNESS WITH 4'–0" DIAMETER MANHOLES.
2. 6 INCH LIP OPTIONAL UNLESS OTHERWISE NOTED. CONCRETE INVERT AND SHELF MAY BE SUBSTITUTED IN STORM DRAIN MANHOLES AS DIRECTED BY THE ENGINEER.
3. CONTRACTOR TO SUBMIT METHOD OF BRACING WEIR.

OUTLET CONTROL STRUCTURE 1 & 2

NOT TO SCALE

PROPOSED INFILTRATION SYSTEM
(15) STORMTECH ADS STORMTECH SC–740 CHAMBERS
(6) STORMTECH SC–740 END CAPS
INSTALLED WITH 6" COVER STONE, 10" BASE STONE, 12" SIDE STONE, 12" END STONE, 12" ROW SPACING AND 30% STONE VOIDS



SECTION VIEW

STORMWATER CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC–740 OR APPROVED EQUAL.
2. CHAMBERS SHALL BE MANUFACTURED FROM VIRGIN POLYPROPYLENE OR POLYETHYLENE RESINS. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORT PANELS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
3. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG–DURATION DEAD LOADS AND 2) SHORT–DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
4. CHAMBERS SHALL MEET ASTM F2922 (POLYETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
5. CHAMBERS SHALL BE DESIGNED AND ALLOWABLE LOADS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
6. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. THE CHAMBER MANUFACTURER SHALL SUBMIT THE FOLLOWING UPON REQUEST TO THE SITE DESIGN ENGINEER FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE:
   a. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY AASHTO FOR THERMOPLASTIC PIPE.
   b. A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET. THE 50 YEAR CREEP MODULUS DATA SPECIFIED IN ASTM F2418 OR ASTM F2922 MUST BE USED AS PART OF THE AASHTO STRUCTURAL EVALUATION TO VERIFY LONG–TERM PERFORMANCE.
   c. STRUCTURAL CROSS SECTION DETAIL ON WHICH THE STRUCTURAL EVALUATION IS BASED.
8. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT – NOTES FOR THE BIDDING AND INSTALLATION OF THE SC–740 SYSTEM

1. STORMTECH SC–740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE–CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC–740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC–310/SC–740/DC–780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM – 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE WITH AN AASHTO M43 DESIGNATION BETWEEN #3 AND #57.
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF CATCH BASIN FILTER INSERT DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

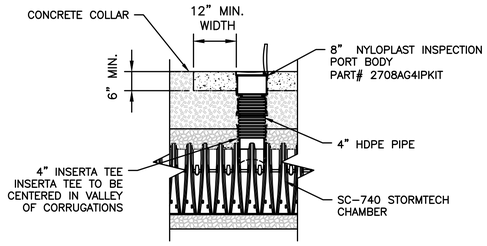
1. STORMTECH SC–740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC–310/SC–740/DC–780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER MC–3500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC–310/SC–740/DC–780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC–310/SC–740/DC–780 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1–888–892–2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

SUBSURFACE INFILTRATION SYSTEM
STORMTECH SC–740 CHAMBERS

NOT TO SCALE



SC–740 INSPECTION PORT DETAIL

NOT TO SCALE

PROJECT NAME
West Roxbury Residences

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WBA Townhomes, LLC

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178 Gardner Street - Site Details

C-403

West Roxbury Residences

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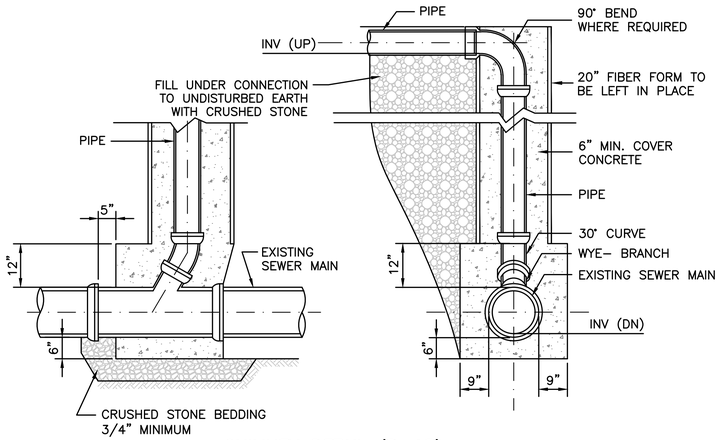
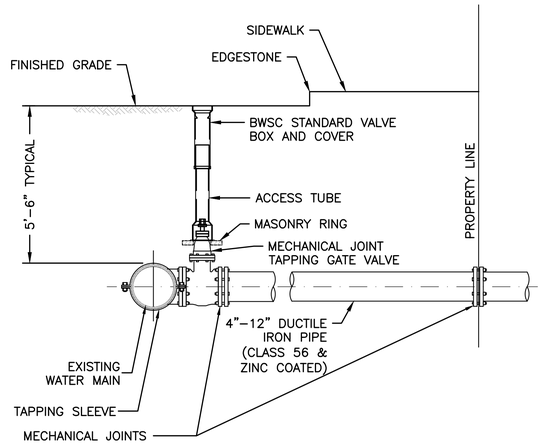


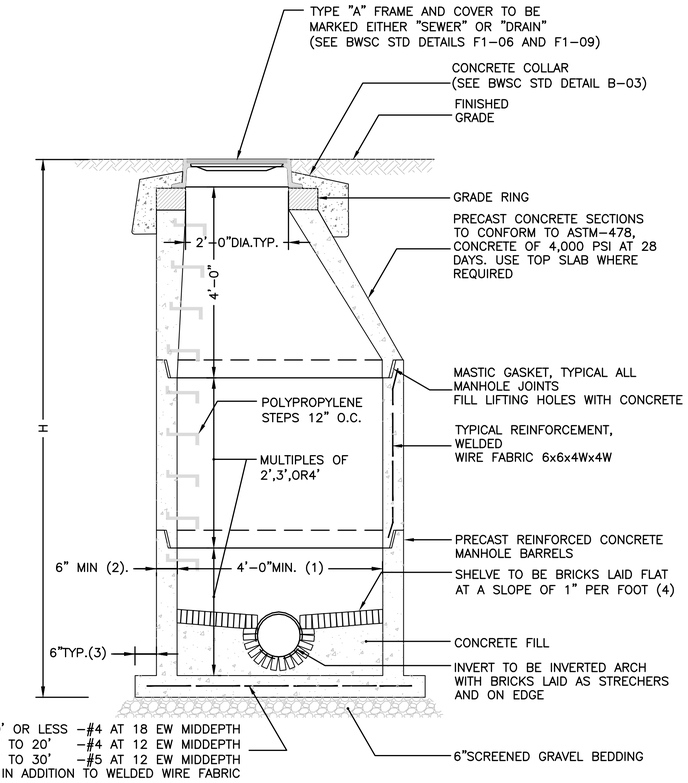
CHIMNEY DETAIL (B-15)
NOT TO SCALE



NOTES:

1. CONCRETE THRUST BLOCK TO BE USED ONLY WHERE IT WILL BEAR ON UNDISTURBED EARTH.
2. USE RESTRAINED JOINT FITTINGS OR TIE RODS WHERE CONCRETE THRUST BLOCK IS UNACCEPTABLE.
3. SIZE OF BLOCK OR MEGALUG TO BE DESIGNED FOR SPECIFIC CONDITIONS.

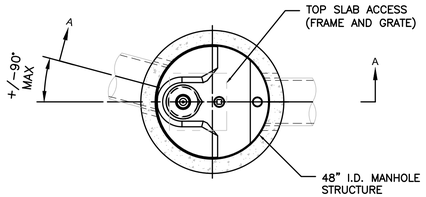
TAPPING SLEEVE & VALVE (A-09)
NOT TO SCALE



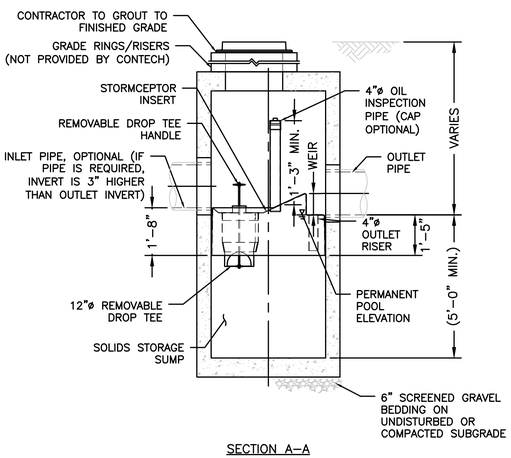
NOTES:

1. 5'-0" DIAMETER FOR ALL MANHOLE DEPTHS GREATER THAN 20 FEET OR WHEN ORDERED BY THE ENGINEER.
2. 6 INCH MIN. WALL THICKNESS AND 7 INCH MIN. BASE THICKNESS WITH 5'-0" DIAMETER MANHOLES.
3. 6 INCH LIP OPTIONAL UNLESS OTHERWISE NOTED. CONCRETE INVERT AND SHELF MAY BE SUBSTITUTED IN STORM DRAIN MANHOLES AS DIRECTED BY THE ENGINEER.

PRECAST CONCRETE MANHOLE
NOT TO SCALE



PLAN VIEW
TOP SLAB NOT SHOWN

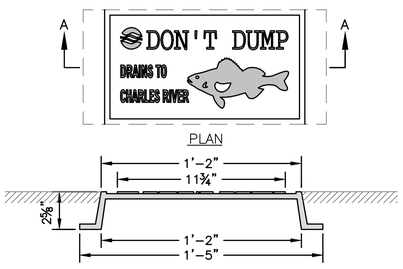


SECTION A-A

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
3. STORMCEPTOR WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. STORMCEPTOR STRUCTURE SHALL MEET AASHTO **HS20** LOAD RATING, ASSUMING EARTH COVER OF 0' - 2', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO **M306** AND BE CAST WITH THE CONTECH LOGO.
5. STORMCEPTOR STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C478 AND AASHTO LOAD FACTOR DESIGN METHOD.

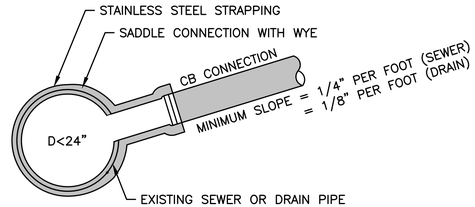
INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMCEPTOR MANHOLE STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET AND OUTLET PIPE(S). MATCH PIPE INVERTS WITH ELEVATIONS SHOWN. ALL PIPE CENTERLINES TO MATCH PIPE OPENING CENTERLINES.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

WATER QUALITY UNIT - STC 450i
NOT TO SCALE



NOTE:
CATCH BASIN SIGNS TO BE PROVIDED BY THE BOSTON WATER AND SEWER COMMISSION (BWSC).

8" X 14" CATCH BASIN SIGN (F1-D23)
NOT TO SCALE



NOTES:

1. FULL PVC OR IRON SADDLE MAY BE USED TO CONNECT TO EXISTING PVC, CLAY, CONCRETE, OR IRON PIPE.
2. SADDLES MUST HAVE RUBBER GASKETS AND SHALL BE TIGHTENED WITH STRAPS. SADDLES WILL NOT BE CEMENTED ONTO THE PIPE.
3. FULL WYE CONNECTION FITTINGS MAY BE USED.
4. PIPE SHALL BE CUT TO CONFORM TO THE OPENING IN THE SADDLE.
5. CONNECTIONS DIRECTLY INTO THE EXISTING PIPE WITHOUT A SADDLE OR A FULL WYE FITTING ARE NOT ALLOWED.

TYPICAL SADDLE CONNECTION TO EXISTING SEWER OR DRAIN (B-12b)
NOT TO SCALE

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