# Stormwater Management Report

# Parking Lot Expansion

**Project Address:**
55 Wamsutta Street
New Bedford, Massachusetts

**Date:**
02/10/2021

**Prepared For:**
Wamsutta II LLC, c/o Acorn, Inc
25 Braintree Hill Office Park, Suite 104
Braintree, MA 02184


**Prepared by:**

HIGHPOINT

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# TABLE OF CONTENTS



**FIGURES**

- USGS Map
- Soils Map
- FEMA FIRM
- Historic Watershed Plan
- Post-Development Watershed Plan
- Subcatchment Watershed Plan

**APPENDIX A** — **Hydrologic Calculations**

- Historic Conditions
- Post-Development Conditions

**APPENDIX B** — **Hydraulic Calculations**

- Pipe Capacity Analysis
- TSS Removal Calculations
- Water Quality Volume Conversion to Flow Rate
- 4' First Defense® Vortex Separator water quality structure Estimated Net Annual Reduction Sizing Report
- Water Quality Unit Data Sheet

**APPENDIX C** — **Supporting Information**

- Construction Phase Operation and Maintenance Plan
- Long Term Operation and Maintenance Plan
- Massachusetts Stormwater Checklist
- Signed Illicit Discharge Compliance Statement

## INTRODUCTION

This analysis summarizes historic and post-development stormwater impacts associated with the expansion of the existing parking lot located at #55 Wamsutta Street in New Bedford, Massachusetts. The subject property is shown on the City of New Bedford Assessors' Map 78, Lot 125. The site is bounded by an apartment complex at #1 Wamsutta Street to the north and east, Wamsutta Street to the south, and a residential apartment complex at #76 Wamsutta Street to the west. The property is located within the Industrial B (IB) Zoning District and lies within the Wamsutta Mill Overlay District (WMOD).

The project site was originally 54,545 $ft^2$ in area. The Owner/Applicant recently acquired an additional 20,157 $ft^2$ of land area identified as Parcel 'A' in the Approval Not Required (ANR) Plan dated July 31, 2020, prepared by Farland Corp. The ANR Plan created Parcel 'A' by transferring land from 1 Wamsutta Street, Map 78 Lot 224, to the subject property, increasing the total area to 74,702 $ft^2$.

The project proposes to expand the existing 80 space paved parking lot associated with the existing residential building on the property by creating a new paved parking lot with an additional 52 spaces within Parcel 'A' to the east of the existing lot. Access to the lot is to be provided via a 22 foot wide drive aisle located at the east end of the proposed parking lot. Other improvements include vertical concrete curb, wheel stop, landscape improvements, and extended drainage collection system.

Parcel A is currently vacant. Historically, Parcel A was used as parking for the buildings at #1 Wamsutta Street. The development as proposed will reduce the overall impervious cover of Parcel A with respect to the prior use, qualifying as a redevelopment.

Under the historic conditions, runoff generated from Parcel A was either captured by the existing catch basins at #55 Wamsutta Street, or it traveled overland and uncontrolled onto Wamsutta Street, where it was captured by existing municipal catch basins.

Work associated with the site improvements includes:

- Installation of a new paved parking lot and associated driveway east of the existing building and parking lot.
- Installation of erosion control devices and removal of deteriorated pavement and portions of chain link fence.
- Installation of wheels stops to protect existing site lighting.
- Installation of new vertical concrete curb as indicated on sheet C200, "SITE LAYOUT PLAN", dated February 10, 2021.
- Installation of two new deep-sump catch basins, one 48" diameter drainage manhole, and 12" SCH 40 PVC storm pipes.

For detailed information regarding existing site conditions and proposed development, refer to the plans entitled, "Parking Lot Expansion", dated 02/10/2021, prepared by Highpoint Engineering, Inc.

## METHODOLOGY

The hydrologic analysis models the historic and post-development stormwater characteristics for the site, and compares changes in peak rate of runoff and water quality associated with the proposed redevelopment. Where increases to peak rate of runoff or reductions in water quality are identified, Stormwater Best Management Practices (BMP's) and Low Impact Development (LID) techniques are considered. The analysis shall prove that post-development hydrologic conditions generally mimic historic hydrologic conditions, and any potential impacts to downstream properties, infrastructure, or environmentally sensitive areas are mitigated.

The historic hydrologic model establishes the limits of the study area and down-gradient Points of Analysis (POAs), which is dependent on topographic and environmental conditions. The model quantifies watershed stormwater runoff characteristics related to topography, land use/cover types and soil conditions, computing peak runoff rates for specific design storm frequencies under historic conditions at the POAs.

The post-development hydrologic model analyzes the same study area, and accounts for changes in the watershed area topography, and land use/cover types associated with the proposed development. The model computes the changes to the peak runoff rates at the same POAs, and BMPs are implemented to mitigate stormwater impacts due to development. In addition, BMP's are implemented to improve water quality and reduce Total Suspended Solid (TSS) pollutant concentrations.

For this analysis one (1) POA has been established including:

- POA 1: Municipal Drainage System in Wamsutta Street

The hydrologic model, analysis, and proposed mitigation measures have been developed using the following resources:

- Hydrologic modeling techniques and methods established in NRCS - Technical Releases No. 20 and No. 55 (TR-20 and TR-55) using proprietary HydroCAD® stormwater modeling software.
- Massachusetts Department of Environmental Protection – Stormwater Handbook Volumes #1 and #2 (as amended).

*Rainfall Data*

Peak stormwater discharges are determined for total rainfall estimated for the 2, 10, and 100-year storm event recurrence intervals. For this analysis, the values to be used for the 24-hour rainfall calculations were taken from Technical Paper 40 (TP 40) and are outlined in Table 1 below:

*Table 1 – Summary of Rainfall Data*

| Rainfall Recurrence Interval | 24 Hour Rainfall Depth |
|---|---|
| 2 Year Storm | 3.50 inches |
| 10 Year Storm | 4.85 inches |
| 100 Year Storm | 7.15 inches |

*Soils Data*

Based upon the USDA – Soil Conservation Service (SCS) for Bristol County, Massachusetts, soils underlying the site are classified as follows:

*Table 2. – Summary of USDA Soil Classification*

| Soil Classification | Hydrologic Soil Group (HSG) |
|---|---|
| Urban Land | Unclassified (Assumed D)* |

## HISTORIC CONDITIONS

The existing use of Parcel A was most recently parking for the existing building located at 1 Wamsutta Street. The study area was divided into the two (2) watershed areas as described below and analyzed at the POA described in the "Methodology" section of this report. The existing watershed areas include:

- Historic Ws-1 – This area consists of existing deteriorated pavement, landscape parking islands, unmaintained open space, and an existing stormwater gravel spillway. Runoff from a portion of the existing paved parking lot, and unmaintained open space from 1 Wamsutta Street flows overland to the west and onto the subject property. Runoff associated with WS-1 flows overland, uncontrolled to an existing catch basin located generally in the center of the watershed. The collected runoff is conveyed to an existing 4' First Defense® Vortex Separator manufactured by Hydro International, which provides water quality treatment of the runoff prior to discharge into the municipal drainage system in Wamsutta Street.
- Historic Ws-2 – This area consists of existing deteriorated pavement, landscape parking islands, and unmaintained open space. Runoff from a small portion of the paved parking lot and unmaintained open space from 1 Wamsutta Street flows overland to the south and onto the subject property. Runoff associated with Historic WS-2 flows overland uncontrolled to the south and is collected in the municipal drainage system in Wamsutta Street.

Refer to Figures – Historic Watershed Plan for information and limits of the existing watershed areas.

For the Historic Watershed analysis, Table 3 presents a comparison of watershed areas, the weighted TR-55 runoff curve numbers (CN – based on ground cover types), and Time of Concentrations ($T_c$) for the existing Watershed Areas:

*Table 3. – Historic Watershed Area and Runoff Curve Number*

| | Historic Ws-1 | Historic Ws-2 |
|---|---|---|
| Area ($ft^2$) | 40,294 | 6,939 |
| CN | 93 | 94 |
| Tc | 8.5 min | 6.7 min |

## POST-DEVELOPMENT CONDITIONS

The project proposes to construct a new paved parking lot consisting of 52 new parking stalls, new stormwater collection system, and will utilize the existing 4' First Defense® Vortex Separator water quality unit for stormwater mitigation, previously installed within the existing parking lot at 55 Wamsutta Street as part of the original residential development.

The developed site is divided into two (2) watershed areas as described below. The one (1) POA will remain unchanged.

- Pr Ws-1 - This area consists of existing pavement, proposed pavement from the expanded parking lot, contributing open areas, and an existing gravel spillway. Runoff from a portion of the existing and proposed paved parking lot, and unmaintained open space from 1 Wamsutta Street flows overland to the west and onto the subject property. A portion of the runoff associated with WS-1 flows overland, uncontrolled to an existing catch basin located generally in the center of the northern half of the watershed. The remaining portion of the runoff flows overland, uncontrolled to the two proposed deep-sump catch basins in the south side of Pr WS-1. The collected runoff is conveyed to an existing 4' First Defense® Vortex Separator manufactured by Hydro International, which provides water quality treatment of the runoff prior to discharge into the municipal drainage system in Wamsutta Street.
- Pr Ws-2 - This area consists of existing deteriorated pavement, landscape parking islands, and unmaintained open space. Runoff from a small portion of the deteriorated pavement and unmaintained open space from 1 Wamsutta Street flows overland to the south and onto the subject property. Runoff associated with Pr WS-2 flows overland uncontrolled to the south and is collected in the municipal drainage system in Wamsutta Street.

Refer to Figures - Post-Development Watershed Plan for information and limits of the proposed watershed areas.

Table 4 presents a comparison of watershed area, the weighted TR-55 runoff curve number (CN – based on ground cover types), and Time of Concentration ($T_c$) for the proposed watersheds:

*Table 4. – Post-Development Watershed Areas and Runoff Curve Numbers*

| | Pr Ws-1 | Pr Ws-2 |
|---|---|---|
| Area ($ft^2$) | 44,492 | 3,913 |
| CN | 93 | 83 |
| Tc | 8.0 min | 6.7 min |

The project is designed to collect and direct the stormwater runoff generated from the developed portions of the site to the new stormwater collection system or to the existing catch basin previously described. The collected runoff will receive treatment via the existing First Defense® Vortex Separator water quality unit prior to discharge to POA 1, the municipal drainage system in Wamsutta Street. In addition to the existing portions of the property, the water quality unit was originally designed to treat the required water quality flow rate per the Massachusetts Stormwater Handbook. Calculations provided in Appendix B –

Hydraulic Calculations will show that the existing water quality unit is adequately sized to accept and treat the additional runoff generated from Pr Ws-1.

## STORMWATER MITIGATION

The proposed stormwater management facilities are designed to improve water quality and mitigate the stormwater associated with the development.

The following is a summary of the drainage infrastructure and BMP utilized for the project:

- Existing drainage collection system, two proposed deep-sump catch basins, one proposed 48" diameter drainage manhole, the existing 4' First Defense® Vortex Separator water quality unit and Sch 40 PVC pipe collection system to convey runoff generated from the paved parking areas, both existing and proposed.

The following tables summarize the historic and post-development peak rates of runoff for the project after implementation of the selected stormwater BMPs at the POA:

*Table 5. – Summary of Historic- and Post-Development Peak Rates of Runoff*

| Design Storm | **POA 1 (Municipal Drainage System)** | | |
|---|---|---|---|
| | **Historic-Dev** | **Post-Dev** | **Change** |
| 2 Year | 3.12 cfs | 3.08 cfs | -0.04 cfs |
| 10 Year | 4.52 cfs | 4.49 cfs | -0.03 cfs |
| 100 Year | 6.87 cfs | 6.86 cfs | -0.01 cfs |

The stormwater management system design provides a minimum 80% removal of total suspended solids (TSS) for the first flush (0.5" rain) from the contributing impervious area. TSS Removal calculations has been completed and can be found in Appendix B – Hydraulic Calculations.

Construction Phase and Long-Term Stormwater Maintenance and Operation Plans (O&M Plans) have been included in Appendix C – Operations and Maintenance Plans. Supporting Information of this report and include information on the responsible party for the O&M plan implementation, a project overview, and the structural BMP to be utilized on site.

## CONCLUSION

The proposed project will preserve the existing runoff patterns of the site and off-site discharge locations. Potential stormwater impacts associated with the site improvements will be mitigated to the maximum extent practicable for a redevelopment as required by State and City of New Bedford Regulations.

The proposed project will comply with Standards outlined in the Massachusetts Stormwater Management Handbook and City of New Bedford Stormwater Management Rules and Regulations as follows:

| | | |
|---|---|---|
| STANDARD **1** | No New Untreated Discharges | All existing discharge points are maintained. |
| STANDARD **2** | Peak Rate Attenuation | Peak discharge rates do not exceed historic rates for all three storm events at POA 1. |
| STANDARD **3** | Recharge | Due to the characteristics of the existing soils (urban fill), recharge is not feasible for this project. |
| STANDARD **4** | Water Quality | The existing 4' First Defense® Vortex Separator water quality unit have been designed to capture and treat the 1/2" Water Quality Volume from the contributing Watershed Area 1 and improve the water quality of runoff discharging to the municipal drainage system. |
| STANDARD **5** | Land Uses with Higher Potential Pollutant Loads | The proposed project is not a listed activity associated with a LUHPPL defined in the Handbook. |
| STANDARD **6** | Critical Areas | The project site is not located within a Critical Area. |
| STANDARD **7** | Redevelopments and Other Projects Subject to the Standards only to the Maximum Extent Practicable | The proposed project qualifies as a redevelopment per the State and City Regulations and will meet the standards to the maximum extent practicable. |
| STANDARD **8** | Construction Period Pollution Prevention and Erosion and Sedimentation Control | The project is not required to obtain an EPA - NPDES Construction General Permit prior to construction. A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan will be provided prior to construction. |
| STANDARD **9** | Operation & Maintenance Plan | Both Construction Phase and Long-Term Operation and Maintenance Plans are included in the report. |
| STANDARD **10** | Prohibition of Illicit Discharges | An Illicit Discharge Compliance Statement is submitted by the Owner and included in Appendix C. |

# FIGURES

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Source: Office of Geographic and Environmental Information (MassGIS); Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs; NearMap Ltd./NearMap US, Inc.


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# USGS MAP

**55 Wamsutta Street**
**New Bedford, MA 02740**

**February 5, 2021**

N
W E
S

0 1,000 2,000 4,000 Feet

1 in = 2,000 ft

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**LEGEND**

- Subject Property

**MassDOT Roads**

**Road Type**

- Limited Access Highway
- Other Numbered Highway
- Major Road, Collector
- Minor Road, Arterial
- Ramp
- Level III Assessors Parcels
- Bristol South Soils

SOIL SUMMARY:

602 Urban land (No HSG)
606 Water, miscellaneous (No HSG)
607 Water, saline (No HSG)

Source: "Soil Survey of Bristol County, Massachusetts - Southern Part," Rino J. Roffinoli & Peter C. Fletcher, October 1981.

Source: Office of Geographic and Environmental Information (MassGIS); Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs; NearMap Ltd./NearMap US, Inc.


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# SOILS MAP

**55 Wamsutta Street**
**New Bedford, MA 02740**

**February 5, 2021**

N
W E
S

0 150 300 600 Feet

1 in = 300 ft

# National Flood Hazard Layer FIRMette

FEMA

70°55'53"W 41°39'11"N


70°55'15"W 41°38'44"N

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

1:6,000

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

## Legend

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

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

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

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

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

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

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

N

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

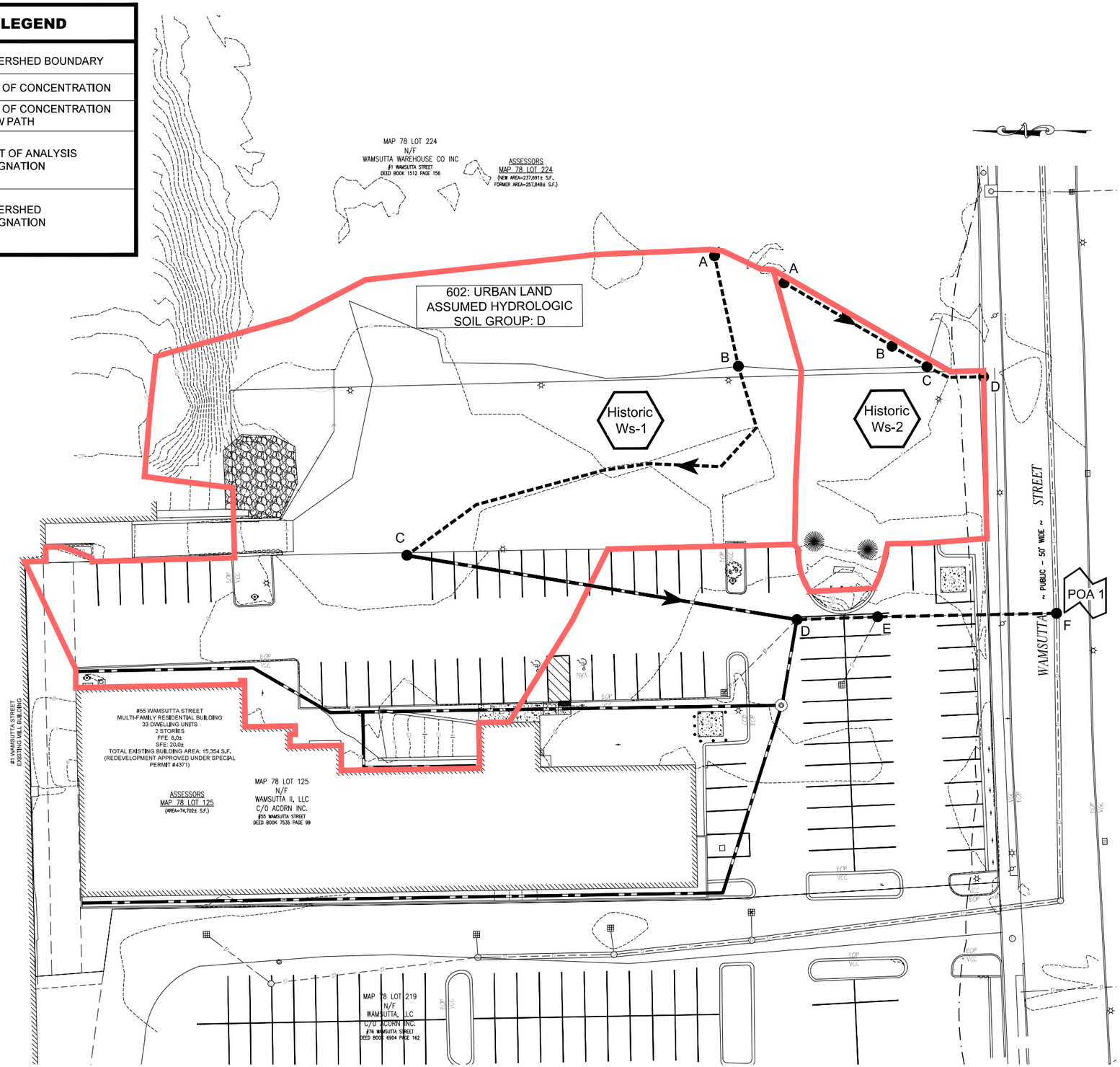
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/13/2021 at 3:53 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

## SYMBOL LEGEND

| | |
|---|---|
| | WATERSHED BOUNDARY |
| | TIME OF CONCENTRATION |
| | TIME OF CONCENTRATION FLOW PATH |
| POA 1 | POINT OF ANALYSIS DESIGNATION |
| Historic Ws-1 | WATERSHED DESIGNATION |




## PRE-DEVELOPMENT WATERSHED SUMMARY

WATERSHED AREA: Historic Ws-1

- TOTAL AREA = 40,294 S.F.
- GRAVEL = 808 S.F.
- GOOD OPEN SPACE = 298 S.F.
- FAIR OPEN SPACE = 14,129 S.F.
- IMPERVIOUS AREA = 25,059 S.F.
- CURVE NUMBER (CN) = 93
- TIME OF CONCENTRATION (Tc) =8.5 MIN.

WATERSHED AREA: Historic Ws-2

- TOTAL AREA = 6,939 S.F.
- GRAVEL = 0 S.F.
- GOOD OPEN SPACE = 591 S.F.
- FAIR OPEN SPACE = 14,129 S.F.
- IMPERVIOUS AREA = 5,180 S.F.
- CURVE NUMBER (CN) = 94
- TIME OF CONCENTRATION (Tc) =6.7 MIN.

## POINT OF ANALYSIS SUMMARY

| | |
|---|---|
| POA 1 | MUNICIPAL DRAINAGE SYSTEM |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CONSULTANT:

SEAL

# PARKING LOT EXPANSION

55 WAMSUTTA STREET
NEW BEDFORD, MA
ASSESSOR'S MAP 78, LOT 125

OWNER/APPLICANT: WAMSUTTA II, LLC C/O ACORN, INC

REV DATE DESCRIPTION

ISSUE TYPE:
SITE PLAN REVIEW
ISSUE DATE:
02/10/2021
PROJECT NUMBER:
20047

DRAWN BY: BSR
CHECKED BY: NCD



SHEET TITLE:
HISTORIC WATERSHED PLAN

SHEET NUMBER:
PRE

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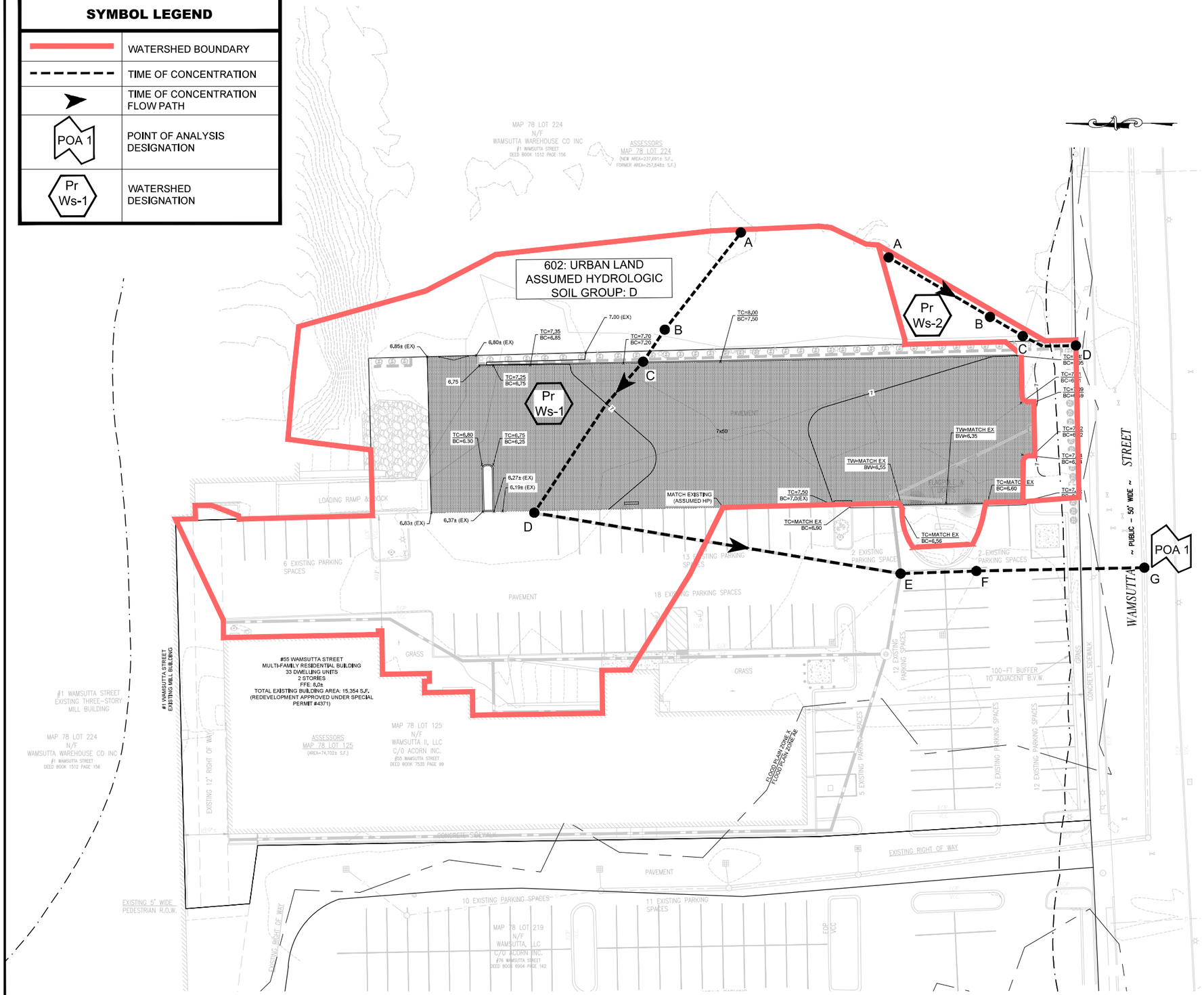
## SYMBOL LEGEND

| | |
|---|---|
| ——— | WATERSHED BOUNDARY |
| - - - - - - | TIME OF CONCENTRATION |
| ➤ | TIME OF CONCENTRATION FLOW PATH |
| POA 1 | POINT OF ANALYSIS DESIGNATION |
| Pr Ws-1 | WATERSHED DESIGNATION |





## POST-DEVELOPMENT WATERSHED SUMMARY

WATERSHED AREA: Pr Ws-1
- TOTAL AREA = 44,492 S.F.
- GRAVEL = 799 S.F.
- GOOD OPEN SPACE = 2,204 S.F.
- FAIR OPEN SPACE = 12,861 S.F.
- IMPERVIOUS AREA = 28,628 S.F.
- CURVE NUMBER (CN) = 93
- TIME OF CONCENTRATION (Tc) =8.0 MIN.

WATERSHED AREA: Pr Ws-2
- TOTAL AREA = 2,741 S.F.
- GRAVEL = 0 S.F.
- GOOD OPEN SPACE = 1,486 S.F.
- FAIR OPEN SPACE = 1,124 S.F
- IMPERVIOUS AREA = 131 S.F.
- CURVE NUMBER (CN) = 83
- TIME OF CONCENTRATION (Tc) =6.7 MIN.

## POINT OF ANALYSIS SUMMARY

| | |
|---|---|
| POA 1 | MUNICIPAL DRAINAGE SYSTEM |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55 WAMSUTTA STREET
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ASSESSOR'S MAP 78, LOT 125

OWNER/APPLICANT: WAMSUTTA II, LLC C/O ACORN, INC

| REV | DATE | DESCRIPTION |
|---|---|---|

ISSUE TYPE:
SITE PLAN REVIEW
ISSUE DATE:
02/10/2021
PROJECT NUMBER:
20047

DRAWN BY: BSR
CHECKED BY: NCD



SHEET TITLE:
POST DEVELOPMENT WATERSHED PLAN

SHEET NUMBER:
POST

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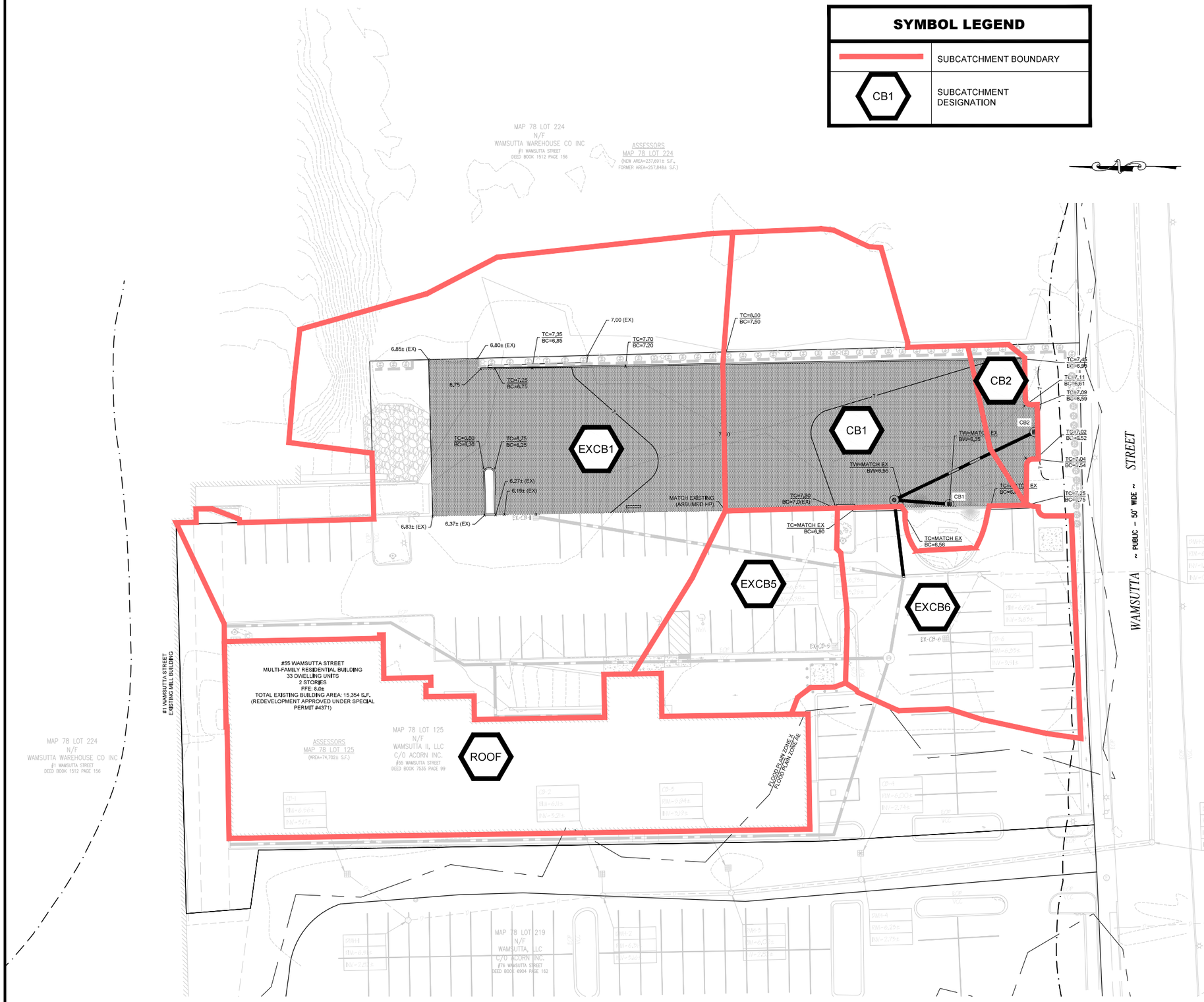
## SYMBOL LEGEND

| | |
|---|---|
| | SUBCATCHMENT BOUNDARY |
| CB1 | SUBCATCHMENT DESIGNATION |




### SUBCATCHMENT SUMMARY

| SUBCAT NAME | GROUND COVER | AREA (SF) |
|---|---|---|
| | | |
| CB1 | GRAVEL | 0 |
| | OPEN | 4442 |
| | IMP | 7188 |
| | TOTAL | 11630 |
| | | |
| CB2 | GRAVEL | 0 |
| | OPEN | 114 |
| | IMP | 1036 |
| | TOTAL | 1150 |
| | | |
| EXCB1 | GRAVEL | 754 |
| | OPEN | 10557 |
| | IMP | 20402 |
| | TOTAL | 31713 |
| | | |
| EXCB5 | GRAVEL | 0 |
| | OPEN | 1788 |
| | IMP | 4108 |
| | TOTAL | 5896 |
| | | |
| EXCB6 | GRAVEL | 0 |
| | OPEN | 421 |
| | IMP | 7673 |
| | TOTAL | 8094 |
| | | |
| ROOF | GRAVEL | 0 |
| | OPEN | 0 |
| | IMP | 15353 |
| | TOTAL | 15353 |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SITE PLAN REVIEW

ISSUE DATE:
02/10/2021

PROJECT NUMBER:
20047

DRAWN BY: BSR

CHECKED BY: NCD



SHEET TITLE:
SUBCATCHMENT WATERSHED PLAN

SHEET NUMBER:
SUBCAT

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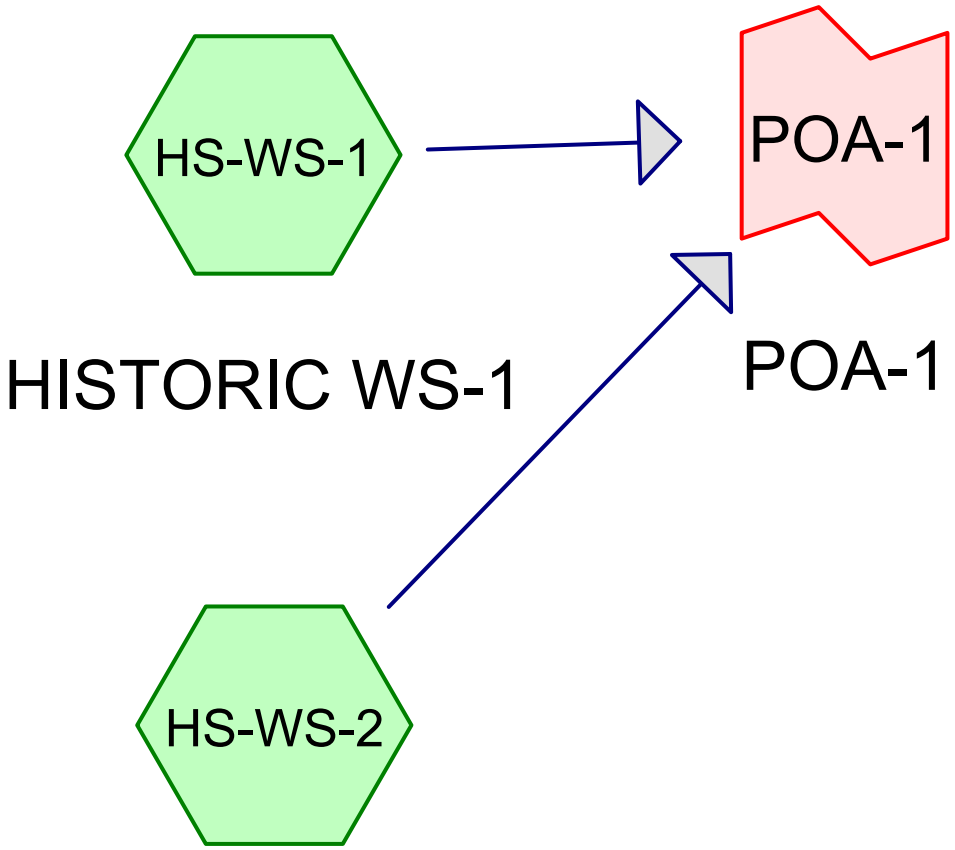
# APPENDIX A

## Hydrologic Calculations




Subcat Reach Pond Link

**Routing Diagram for 20047_PRE**
Prepared by {enter your company name here}, Printed 2/10/2021

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment HS-WS-1: HISTORIC WS-1** Runoff Area=40,592 sf 61.73% Impervious Runoff Depth=2.73"
Flow Length=488' Tc=8.5 min CN=93 Runoff=2.64 cfs 9,251 cf

**Subcatchment HS-WS-2: HISTORIC WS-2** Runoff Area=6,939 sf 74.65% Impervious Runoff Depth=2.84"
Flow Length=90' Tc=6.7 min CN=94 Runoff=0.49 cfs 1,640 cf

**Link POA-1: POA-1** Inflow=3.12 cfs 10,891 cf
Primary=3.12 cfs 10,891 cf

**Total Runoff Area = 47,531 sf Runoff Volume = 10,891 cf Average Runoff Depth = 2.75"**
**36.38% Pervious = 17,292 sf 63.62% Impervious = 30,239 sf**

## Summary for Subcatchment HS-WS-1: HISTORIC WS-1

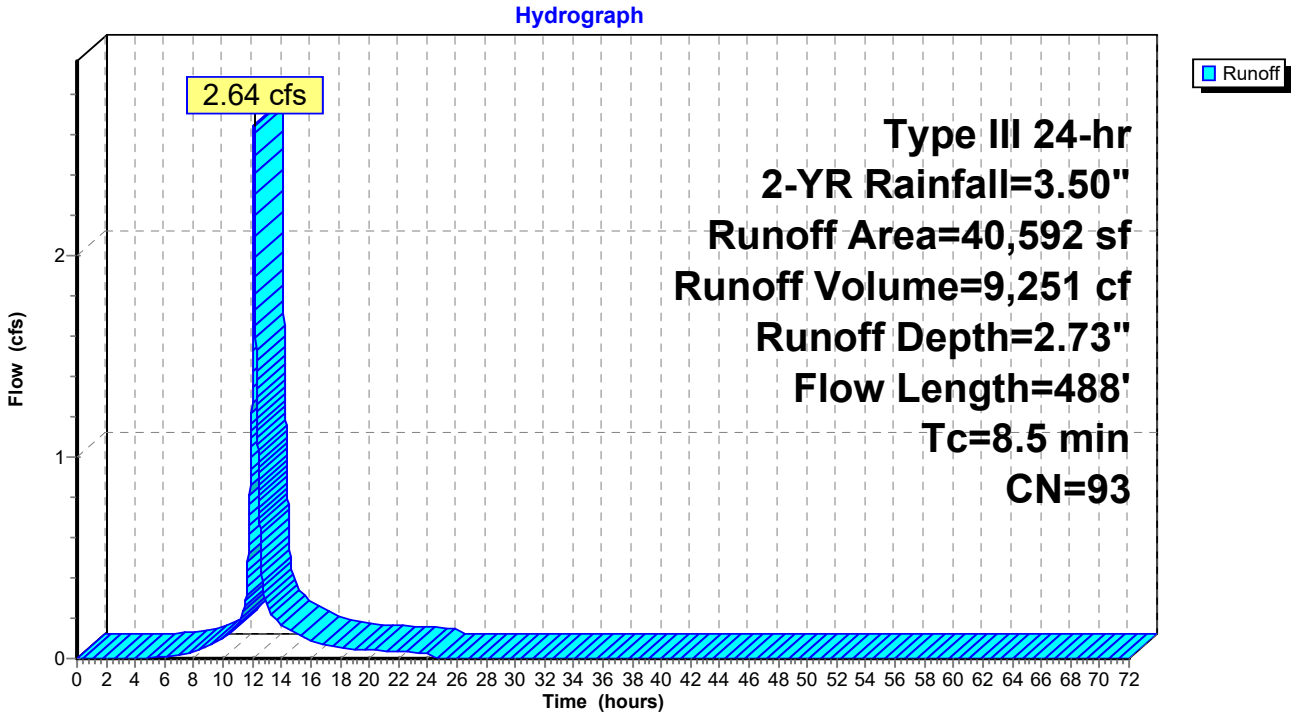
Runoff = 2.64 cfs @ 12.12 hrs, Volume= 9,251 cf, Depth= 2.73"

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-YR Rainfall=3.50"

| Area (sf) | CN | Description |
|---|---|---|
| 25,059 | 98 | Paved parking, HSG D |
| 808 | 96 | Gravel surface, HSG D |
| 298 | 80 | >75% Grass cover, Good, HSG D |
| 14,427 | 84 | 50-75% Grass cover, Fair, HSG D |
| 40,592 | 93 | Weighted Average |
| 15,533 | | 38.27% Pervious Area |
| 25,059 | | 61.73% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.5 | 45 | 0.0150 | 0.14 | | **Sheet Flow, A - B**<br>Grass: Short n= 0.150 P2= 3.50" |
| 1.7 | 181 | 0.0080 | 1.82 | | **Shallow Concentrated Flow, B - C**<br>Paved Kv= 20.3 fps |
| 0.9 | 158 | 0.0050 | 2.98 | 2.34 | **Pipe Channel, C - D**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.014 |
| 0.2 | 32 | 0.0050 | 2.98 | 2.34 | **Pipe Channel, D - E**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.014 |
| 0.2 | 72 | 0.0200 | 5.96 | 4.68 | **Pipe Channel, E - F**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.014 |
| 8.5 | 488 | Total | | | |

## Subcatchment HS-WS-1: HISTORIC WS-1



## Hydrograph for Subcatchment HS-WS-1: HISTORIC WS-1

| Time (hours) | Precip. (inches) | Excess (inches) | Runoff (cfs) |
|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 0.04 | 0.00 | 0.00 |
| 2.00 | 0.07 | 0.00 | 0.00 |
| 3.00 | 0.11 | 0.00 | 0.00 |
| 4.00 | 0.15 | 0.00 | 0.00 |
| 5.00 | 0.20 | 0.00 | 0.00 |
| 6.00 | 0.25 | 0.01 | 0.01 |
| 7.00 | 0.32 | 0.03 | 0.02 |
| 8.00 | 0.40 | 0.06 | 0.04 |
| 9.00 | 0.51 | 0.12 | 0.06 |
| 10.00 | 0.66 | 0.21 | 0.10 |
| 11.00 | 0.88 | 0.36 | 0.17 |
| 12.00 | 1.75 | 1.09 | **1.43** |
| 13.00 | 2.62 | 1.90 | **0.26** |
| 14.00 | 2.84 | 2.10 | 0.16 |
| 15.00 | 2.99 | 2.24 | 0.12 |
| 16.00 | 3.10 | 2.35 | 0.09 |
| 17.00 | 3.18 | 2.43 | 0.07 |
| 18.00 | 3.25 | 2.49 | 0.05 |
| 19.00 | 3.30 | 2.54 | 0.05 |
| 20.00 | 3.35 | 2.59 | 0.04 |
| 21.00 | 3.39 | 2.63 | 0.04 |
| 22.00 | 3.43 | 2.67 | 0.03 |
| 23.00 | 3.47 | 2.70 | 0.03 |
| 24.00 | **3.50** | **2.73** | 0.03 |
| 25.00 | 3.50 | 2.73 | 0.00 |
| 26.00 | 3.50 | 2.73 | 0.00 |
| 27.00 | 3.50 | 2.73 | 0.00 |
| 28.00 | 3.50 | 2.73 | 0.00 |
| 29.00 | 3.50 | 2.73 | 0.00 |
| 30.00 | 3.50 | 2.73 | 0.00 |
| 31.00 | 3.50 | 2.73 | 0.00 |
| 32.00 | 3.50 | 2.73 | 0.00 |
| 33.00 | 3.50 | 2.73 | 0.00 |
| 34.00 | 3.50 | 2.73 | 0.00 |
| 35.00 | 3.50 | 2.73 | 0.00 |
| 36.00 | 3.50 | 2.73 | 0.00 |
| 37.00 | 3.50 | 2.73 | 0.00 |
| 38.00 | 3.50 | 2.73 | 0.00 |
| 39.00 | 3.50 | 2.73 | 0.00 |
| 40.00 | 3.50 | 2.73 | 0.00 |
| 41.00 | 3.50 | 2.73 | 0.00 |
| 42.00 | 3.50 | 2.73 | 0.00 |
| 43.00 | 3.50 | 2.73 | 0.00 |
| 44.00 | 3.50 | 2.73 | 0.00 |
| 45.00 | 3.50 | 2.73 | 0.00 |
| 46.00 | 3.50 | 2.73 | 0.00 |
| 47.00 | 3.50 | 2.73 | 0.00 |
| 48.00 | 3.50 | 2.73 | 0.00 |
| 49.00 | 3.50 | 2.73 | 0.00 |
| 50.00 | 3.50 | 2.73 | 0.00 |
| 51.00 | 3.50 | 2.73 | 0.00 |
| 52.00 | 3.50 | 2.73 | 0.00 |
| 53.00 | 3.50 | 2.73 | 0.00 |
| 54.00 | 3.50 | 2.73 | 0.00 |
| 55.00 | 3.50 | 2.73 | 0.00 |
| 56.00 | 3.50 | 2.73 | 0.00 |
| 57.00 | 3.50 | 2.73 | 0.00 |
| 58.00 | 3.50 | 2.73 | 0.00 |
| 59.00 | 3.50 | 2.73 | 0.00 |
| 60.00 | 3.50 | 2.73 | 0.00 |
| 61.00 | 3.50 | 2.73 | 0.00 |
| 62.00 | 3.50 | 2.73 | 0.00 |
| 63.00 | 3.50 | 2.73 | 0.00 |
| 64.00 | 3.50 | 2.73 | 0.00 |
| 65.00 | 3.50 | 2.73 | 0.00 |
| 66.00 | 3.50 | 2.73 | 0.00 |
| 67.00 | 3.50 | 2.73 | 0.00 |
| 68.00 | 3.50 | 2.73 | 0.00 |
| 69.00 | 3.50 | 2.73 | 0.00 |
| 70.00 | 3.50 | 2.73 | 0.00 |
| 71.00 | 3.50 | 2.73 | 0.00 |
| 72.00 | 3.50 | 2.73 | 0.00 |

## Summary for Subcatchment HS-WS-2: HISTORIC WS-2

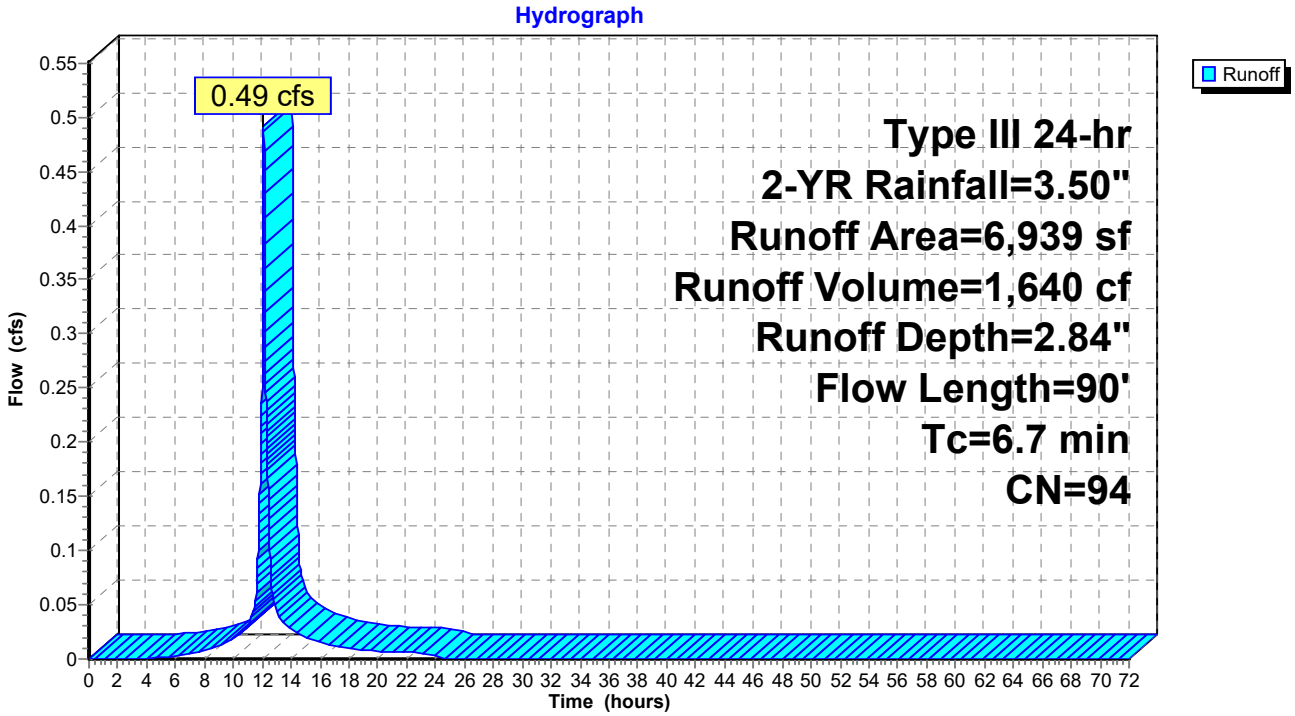
Runoff = 0.49 cfs @ 12.09 hrs, Volume= 1,640 cf, Depth= 2.84"

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-YR Rainfall=3.50"

| Area (sf) | CN | Description |
|---|---|---|
| 5,180 | 98 | Paved parking, HSG D |
| 0 | 96 | Gravel surface, HSG D |
| 591 | 80 | >75% Grass cover, Good, HSG D |
| 1,168 | 84 | 50-75% Grass cover, Fair, HSG D |
| 6,939 | 94 | Weighted Average |
| 1,759 | | 25.35% Pervious Area |
| 5,180 | | 74.65% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.4 | 50 | 0.0130 | 0.13 | | **Sheet Flow, A - B** Grass: Short n= 0.150 P2= 3.50" |
| 0.1 | 16 | 0.0130 | 1.84 | | **Shallow Concentrated Flow, B - C** Unpaved Kv= 16.1 fps |
| 0.2 | 24 | 0.0150 | 2.49 | | **Shallow Concentrated Flow, C - D** Paved Kv= 20.3 fps |
| 6.7 | 90 | Total | | | |

## Subcatchment HS-WS-2: HISTORIC WS-2



## Hydrograph for Subcatchment HS-WS-2: HISTORIC WS-2

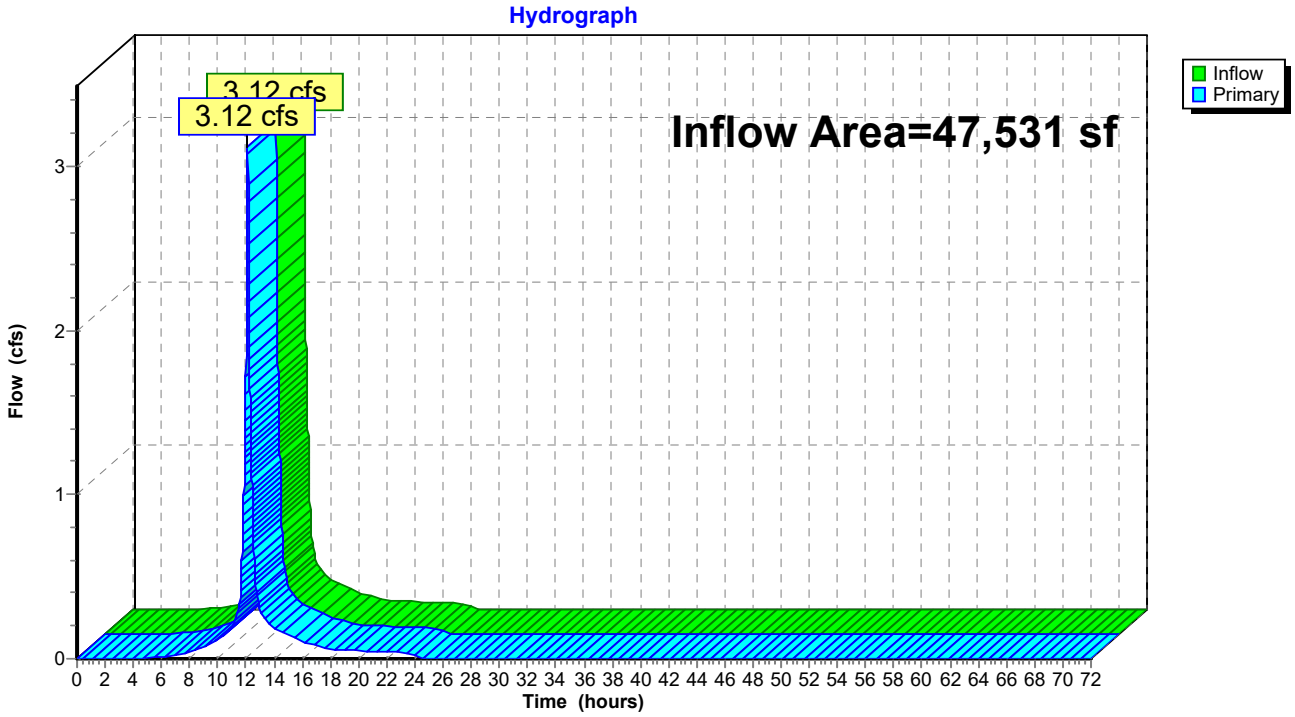
| Time (hours) | Precip. (inches) | Excess (inches) | Runoff (cfs) |
|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 0.04 | 0.00 | 0.00 |
| 2.00 | 0.07 | 0.00 | 0.00 |
| 3.00 | 0.11 | 0.00 | 0.00 |
| 4.00 | 0.15 | 0.00 | 0.00 |
| 5.00 | 0.20 | 0.01 | 0.00 |
| 6.00 | 0.25 | 0.02 | 0.00 |
| 7.00 | 0.32 | 0.04 | 0.00 |
| 8.00 | 0.40 | 0.08 | 0.01 |
| 9.00 | 0.51 | 0.14 | 0.01 |
| 10.00 | 0.66 | 0.24 | 0.02 |
| 11.00 | 0.88 | 0.40 | 0.03 |
| 12.00 | 1.75 | 1.16 | **0.29** |
| 13.00 | 2.62 | 1.99 | **0.04** |
| 14.00 | 2.84 | 2.19 | 0.03 |
| 15.00 | 2.99 | 2.34 | 0.02 |
| 16.00 | 3.10 | 2.45 | 0.01 |
| 17.00 | 3.18 | 2.53 | 0.01 |
| 18.00 | 3.25 | 2.59 | 0.01 |
| 19.00 | 3.30 | 2.64 | 0.01 |
| 20.00 | 3.35 | 2.69 | 0.01 |
| 21.00 | 3.39 | 2.73 | 0.01 |
| 22.00 | 3.43 | 2.77 | 0.01 |
| 23.00 | 3.47 | 2.80 | 0.01 |
| 24.00 | **3.50** | **2.84** | 0.00 |
| 25.00 | 3.50 | 2.84 | 0.00 |
| 26.00 | 3.50 | 2.84 | 0.00 |
| 27.00 | 3.50 | 2.84 | 0.00 |
| 28.00 | 3.50 | 2.84 | 0.00 |
| 29.00 | 3.50 | 2.84 | 0.00 |
| 30.00 | 3.50 | 2.84 | 0.00 |
| 31.00 | 3.50 | 2.84 | 0.00 |
| 32.00 | 3.50 | 2.84 | 0.00 |
| 33.00 | 3.50 | 2.84 | 0.00 |
| 34.00 | 3.50 | 2.84 | 0.00 |
| 35.00 | 3.50 | 2.84 | 0.00 |
| 36.00 | 3.50 | 2.84 | 0.00 |
| 37.00 | 3.50 | 2.84 | 0.00 |
| 38.00 | 3.50 | 2.84 | 0.00 |
| 39.00 | 3.50 | 2.84 | 0.00 |
| 40.00 | 3.50 | 2.84 | 0.00 |
| 41.00 | 3.50 | 2.84 | 0.00 |
| 42.00 | 3.50 | 2.84 | 0.00 |
| 43.00 | 3.50 | 2.84 | 0.00 |
| 44.00 | 3.50 | 2.84 | 0.00 |
| 45.00 | 3.50 | 2.84 | 0.00 |
| 46.00 | 3.50 | 2.84 | 0.00 |
| 47.00 | 3.50 | 2.84 | 0.00 |
| 48.00 | 3.50 | 2.84 | 0.00 |
| 49.00 | 3.50 | 2.84 | 0.00 |
| 50.00 | 3.50 | 2.84 | 0.00 |
| 51.00 | 3.50 | 2.84 | 0.00 |
| 52.00 | 3.50 | 2.84 | 0.00 |
| 53.00 | 3.50 | 2.84 | 0.00 |
| 54.00 | 3.50 | 2.84 | 0.00 |
| 55.00 | 3.50 | 2.84 | 0.00 |
| 56.00 | 3.50 | 2.84 | 0.00 |
| 57.00 | 3.50 | 2.84 | 0.00 |
| 58.00 | 3.50 | 2.84 | 0.00 |
| 59.00 | 3.50 | 2.84 | 0.00 |
| 60.00 | 3.50 | 2.84 | 0.00 |
| 61.00 | 3.50 | 2.84 | 0.00 |
| 62.00 | 3.50 | 2.84 | 0.00 |
| 63.00 | 3.50 | 2.84 | 0.00 |
| 64.00 | 3.50 | 2.84 | 0.00 |
| 65.00 | 3.50 | 2.84 | 0.00 |
| 66.00 | 3.50 | 2.84 | 0.00 |
| 67.00 | 3.50 | 2.84 | 0.00 |
| 68.00 | 3.50 | 2.84 | 0.00 |
| 69.00 | 3.50 | 2.84 | 0.00 |
| 70.00 | 3.50 | 2.84 | 0.00 |
| 71.00 | 3.50 | 2.84 | 0.00 |
| 72.00 | 3.50 | 2.84 | 0.00 |

## Summary for Link POA-1: POA-1

Inflow Area = 47,531 sf, 63.62% Impervious, Inflow Depth = 2.75" for 2-YR event
Inflow = 3.12 cfs @ 12.11 hrs, Volume= 10,891 cf
Primary = 3.12 cfs @ 12.11 hrs, Volume= 10,891 cf, Atten= 0%, Lag= 0.0 min

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

## Link POA-1: POA-1



## Hydrograph for Link POA-1: POA-1

| Time (hours) | Inflow (cfs) | Elevation (feet) | Primary (cfs) |
|---|---|---|---|
| 0.00 | 0.00 | **0.00** | 0.00 |
| 1.00 | 0.00 | 0.00 | 0.00 |
| 2.00 | 0.00 | 0.00 | 0.00 |
| 3.00 | 0.00 | 0.00 | 0.00 |
| 4.00 | 0.00 | 0.00 | 0.00 |
| 5.00 | 0.01 | 0.00 | 0.01 |
| 6.00 | 0.01 | 0.00 | 0.01 |
| 7.00 | 0.03 | 0.00 | 0.03 |
| 8.00 | 0.04 | 0.00 | 0.04 |
| 9.00 | 0.07 | 0.00 | 0.07 |
| 10.00 | 0.12 | 0.00 | 0.12 |
| 11.00 | 0.20 | 0.00 | 0.20 |
| 12.00 | **1.72** | 0.00 | **1.72** |
| 13.00 | **0.31** | 0.00 | **0.31** |
| 14.00 | 0.19 | 0.00 | 0.19 |
| 15.00 | 0.14 | 0.00 | 0.14 |
| 16.00 | 0.10 | 0.00 | 0.10 |
| 17.00 | 0.08 | 0.00 | 0.08 |
| 18.00 | 0.06 | 0.00 | 0.06 |
| 19.00 | 0.05 | 0.00 | 0.05 |
| 20.00 | 0.05 | 0.00 | 0.05 |
| 21.00 | 0.04 | 0.00 | 0.04 |
| 22.00 | 0.04 | 0.00 | 0.04 |
| 23.00 | 0.04 | 0.00 | 0.04 |
| 24.00 | 0.03 | 0.00 | 0.03 |
| 25.00 | 0.00 | 0.00 | 0.00 |
| 26.00 | 0.00 | 0.00 | 0.00 |
| 27.00 | 0.00 | 0.00 | 0.00 |
| 28.00 | 0.00 | 0.00 | 0.00 |
| 29.00 | 0.00 | 0.00 | 0.00 |
| 30.00 | 0.00 | 0.00 | 0.00 |
| 31.00 | 0.00 | 0.00 | 0.00 |
| 32.00 | 0.00 | 0.00 | 0.00 |
| 33.00 | 0.00 | 0.00 | 0.00 |
| 34.00 | 0.00 | 0.00 | 0.00 |
| 35.00 | 0.00 | 0.00 | 0.00 |
| 36.00 | 0.00 | 0.00 | 0.00 |
| 37.00 | 0.00 | 0.00 | 0.00 |
| 38.00 | 0.00 | 0.00 | 0.00 |
| 39.00 | 0.00 | 0.00 | 0.00 |
| 40.00 | 0.00 | 0.00 | 0.00 |
| 41.00 | 0.00 | 0.00 | 0.00 |
| 42.00 | 0.00 | 0.00 | 0.00 |
| 43.00 | 0.00 | 0.00 | 0.00 |
| 44.00 | 0.00 | 0.00 | 0.00 |
| 45.00 | 0.00 | 0.00 | 0.00 |
| 46.00 | 0.00 | 0.00 | 0.00 |
| 47.00 | 0.00 | 0.00 | 0.00 |
| 48.00 | 0.00 | 0.00 | 0.00 |
| 49.00 | 0.00 | 0.00 | 0.00 |
| 50.00 | 0.00 | 0.00 | 0.00 |
| 51.00 | 0.00 | 0.00 | 0.00 |
| 52.00 | 0.00 | 0.00 | 0.00 |
| 53.00 | 0.00 | 0.00 | 0.00 |
| 54.00 | 0.00 | 0.00 | 0.00 |
| 55.00 | 0.00 | 0.00 | 0.00 |
| 56.00 | 0.00 | 0.00 | 0.00 |
| 57.00 | 0.00 | 0.00 | 0.00 |
| 58.00 | 0.00 | 0.00 | 0.00 |
| 59.00 | 0.00 | 0.00 | 0.00 |
| 60.00 | 0.00 | 0.00 | 0.00 |
| 61.00 | 0.00 | 0.00 | 0.00 |
| 62.00 | 0.00 | 0.00 | 0.00 |
| 63.00 | 0.00 | 0.00 | 0.00 |
| 64.00 | 0.00 | 0.00 | 0.00 |
| 65.00 | 0.00 | 0.00 | 0.00 |
| 66.00 | 0.00 | 0.00 | 0.00 |
| 67.00 | 0.00 | 0.00 | 0.00 |
| 68.00 | 0.00 | 0.00 | 0.00 |
| 69.00 | 0.00 | 0.00 | 0.00 |
| 70.00 | 0.00 | 0.00 | 0.00 |
| 71.00 | 0.00 | 0.00 | 0.00 |
| 72.00 | 0.00 | 0.00 | 0.00 |

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment HS-WS-1: HISTORIC WS-1** Runoff Area=40,592 sf 61.73% Impervious Runoff Depth=4.05"
Flow Length=488' Tc=8.5 min CN=93 Runoff=3.83 cfs 13,702 cf

**Subcatchment HS-WS-2: HISTORIC WS-2** Runoff Area=6,939 sf 74.65% Impervious Runoff Depth=4.16"
Flow Length=90' Tc=6.7 min CN=94 Runoff=0.71 cfs 2,406 cf

**Link POA-1: POA-1** Inflow=4.52 cfs 16,108 cf
Primary=4.52 cfs 16,108 cf

**Total Runoff Area = 47,531 sf Runoff Volume = 16,108 cf Average Runoff Depth = 4.07"**
**36.38% Pervious = 17,292 sf 63.62% Impervious = 30,239 sf**

## Summary for Subcatchment HS-WS-1: HISTORIC WS-1

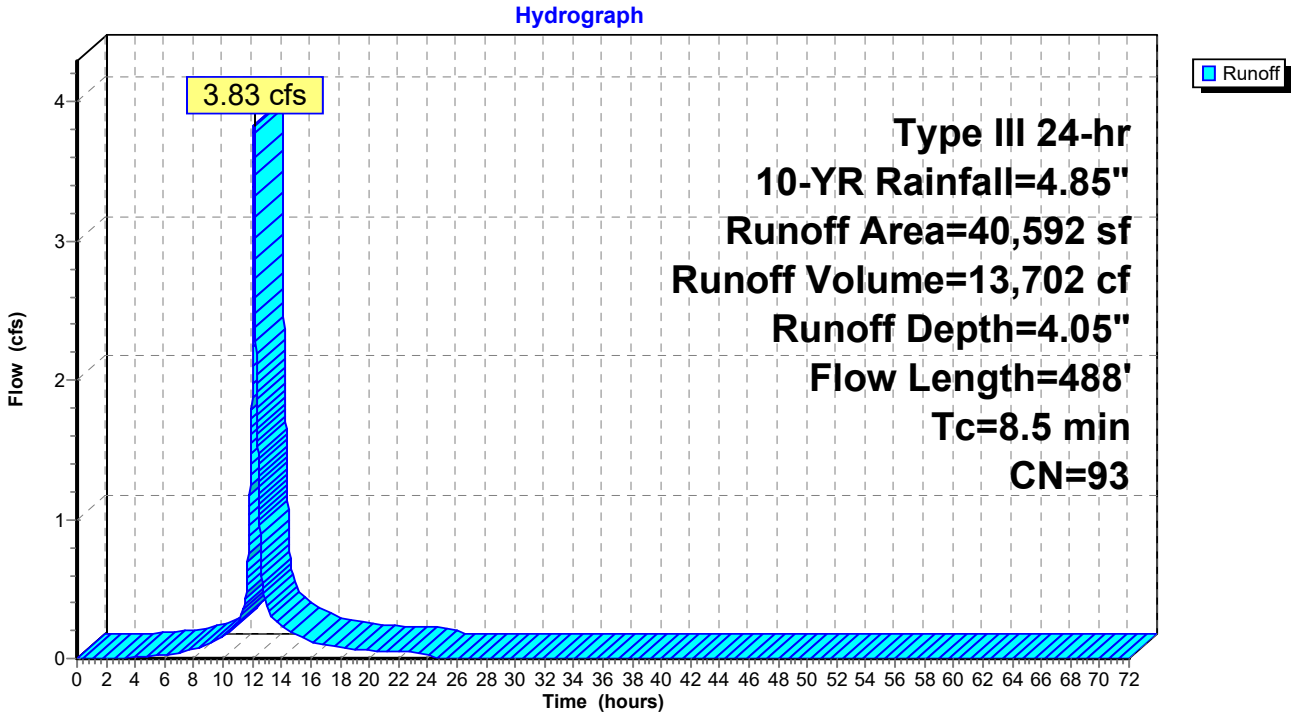
Runoff = 3.83 cfs @ 12.12 hrs, Volume= 13,702 cf, Depth= 4.05"

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-YR Rainfall=4.85"

| Area (sf) | CN | Description |
|---|---|---|
| 25,059 | 98 | Paved parking, HSG D |
| 808 | 96 | Gravel surface, HSG D |
| 298 | 80 | >75% Grass cover, Good, HSG D |
| 14,427 | 84 | 50-75% Grass cover, Fair, HSG D |
| 40,592 | 93 | Weighted Average |
| 15,533 | | 38.27% Pervious Area |
| 25,059 | | 61.73% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.5 | 45 | 0.0150 | 0.14 | | **Sheet Flow, A - B**<br>Grass: Short n= 0.150 P2= 3.50" |
| 1.7 | 181 | 0.0080 | 1.82 | | **Shallow Concentrated Flow, B - C**<br>Paved Kv= 20.3 fps |
| 0.9 | 158 | 0.0050 | 2.98 | 2.34 | **Pipe Channel, C - D**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.014 |
| 0.2 | 32 | 0.0050 | 2.98 | 2.34 | **Pipe Channel, D - E**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.014 |
| 0.2 | 72 | 0.0200 | 5.96 | 4.68 | **Pipe Channel, E - F**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.014 |
| 8.5 | 488 | Total | | | |

## Subcatchment HS-WS-1: HISTORIC WS-1



## Hydrograph for Subcatchment HS-WS-1: HISTORIC WS-1

| Time (hours) | Precip. (inches) | Excess (inches) | Runoff (cfs) |
|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 0.05 | 0.00 | 0.00 |
| 2.00 | 0.10 | 0.00 | 0.00 |
| 3.00 | 0.15 | 0.00 | 0.00 |
| 4.00 | 0.21 | 0.00 | 0.01 |
| 5.00 | 0.28 | 0.02 | 0.02 |
| 6.00 | 0.35 | 0.04 | 0.03 |
| 7.00 | 0.44 | 0.08 | 0.04 |
| 8.00 | 0.55 | 0.14 | 0.07 |
| 9.00 | 0.71 | 0.24 | 0.11 |
| 10.00 | 0.92 | 0.39 | 0.16 |
| 11.00 | 1.21 | 0.62 | 0.26 |
| 12.00 | 2.42 | 1.71 | **2.10** |
| 13.00 | 3.64 | 2.87 | **0.38** |
| 14.00 | 3.93 | 3.16 | 0.23 |
| 15.00 | 4.14 | 3.36 | 0.17 |
| 16.00 | 4.30 | 3.51 | 0.12 |
| 17.00 | 4.41 | 3.62 | 0.10 |
| 18.00 | 4.50 | 3.71 | 0.07 |
| 19.00 | 4.57 | 3.78 | 0.07 |
| 20.00 | 4.64 | 3.85 | 0.06 |
| 21.00 | 4.70 | 3.91 | 0.05 |
| 22.00 | 4.76 | 3.96 | 0.05 |
| 23.00 | 4.81 | 4.01 | 0.04 |
| 24.00 | **4.85** | **4.05** | 0.04 |
| 25.00 | 4.85 | 4.05 | 0.00 |
| 26.00 | 4.85 | 4.05 | 0.00 |
| 27.00 | 4.85 | 4.05 | 0.00 |
| 28.00 | 4.85 | 4.05 | 0.00 |
| 29.00 | 4.85 | 4.05 | 0.00 |
| 30.00 | 4.85 | 4.05 | 0.00 |
| 31.00 | 4.85 | 4.05 | 0.00 |
| 32.00 | 4.85 | 4.05 | 0.00 |
| 33.00 | 4.85 | 4.05 | 0.00 |
| 34.00 | 4.85 | 4.05 | 0.00 |
| 35.00 | 4.85 | 4.05 | 0.00 |
| 36.00 | 4.85 | 4.05 | 0.00 |
| 37.00 | 4.85 | 4.05 | 0.00 |
| 38.00 | 4.85 | 4.05 | 0.00 |
| 39.00 | 4.85 | 4.05 | 0.00 |
| 40.00 | 4.85 | 4.05 | 0.00 |
| 41.00 | 4.85 | 4.05 | 0.00 |
| 42.00 | 4.85 | 4.05 | 0.00 |
| 43.00 | 4.85 | 4.05 | 0.00 |
| 44.00 | 4.85 | 4.05 | 0.00 |
| 45.00 | 4.85 | 4.05 | 0.00 |
| 46.00 | 4.85 | 4.05 | 0.00 |
| 47.00 | 4.85 | 4.05 | 0.00 |
| 48.00 | 4.85 | 4.05 | 0.00 |
| 49.00 | 4.85 | 4.05 | 0.00 |
| 50.00 | 4.85 | 4.05 | 0.00 |
| 51.00 | 4.85 | 4.05 | 0.00 |
| 52.00 | 4.85 | 4.05 | 0.00 |
| 53.00 | 4.85 | 4.05 | 0.00 |
| 54.00 | 4.85 | 4.05 | 0.00 |
| 55.00 | 4.85 | 4.05 | 0.00 |
| 56.00 | 4.85 | 4.05 | 0.00 |
| 57.00 | 4.85 | 4.05 | 0.00 |
| 58.00 | 4.85 | 4.05 | 0.00 |
| 59.00 | 4.85 | 4.05 | 0.00 |
| 60.00 | 4.85 | 4.05 | 0.00 |
| 61.00 | 4.85 | 4.05 | 0.00 |
| 62.00 | 4.85 | 4.05 | 0.00 |
| 63.00 | 4.85 | 4.05 | 0.00 |
| 64.00 | 4.85 | 4.05 | 0.00 |
| 65.00 | 4.85 | 4.05 | 0.00 |
| 66.00 | 4.85 | 4.05 | 0.00 |
| 67.00 | 4.85 | 4.05 | 0.00 |
| 68.00 | 4.85 | 4.05 | 0.00 |
| 69.00 | 4.85 | 4.05 | 0.00 |
| 70.00 | 4.85 | 4.05 | 0.00 |
| 71.00 | 4.85 | 4.05 | 0.00 |
| 72.00 | 4.85 | 4.05 | 0.00 |

## Summary for Subcatchment HS-WS-2: HISTORIC WS-2

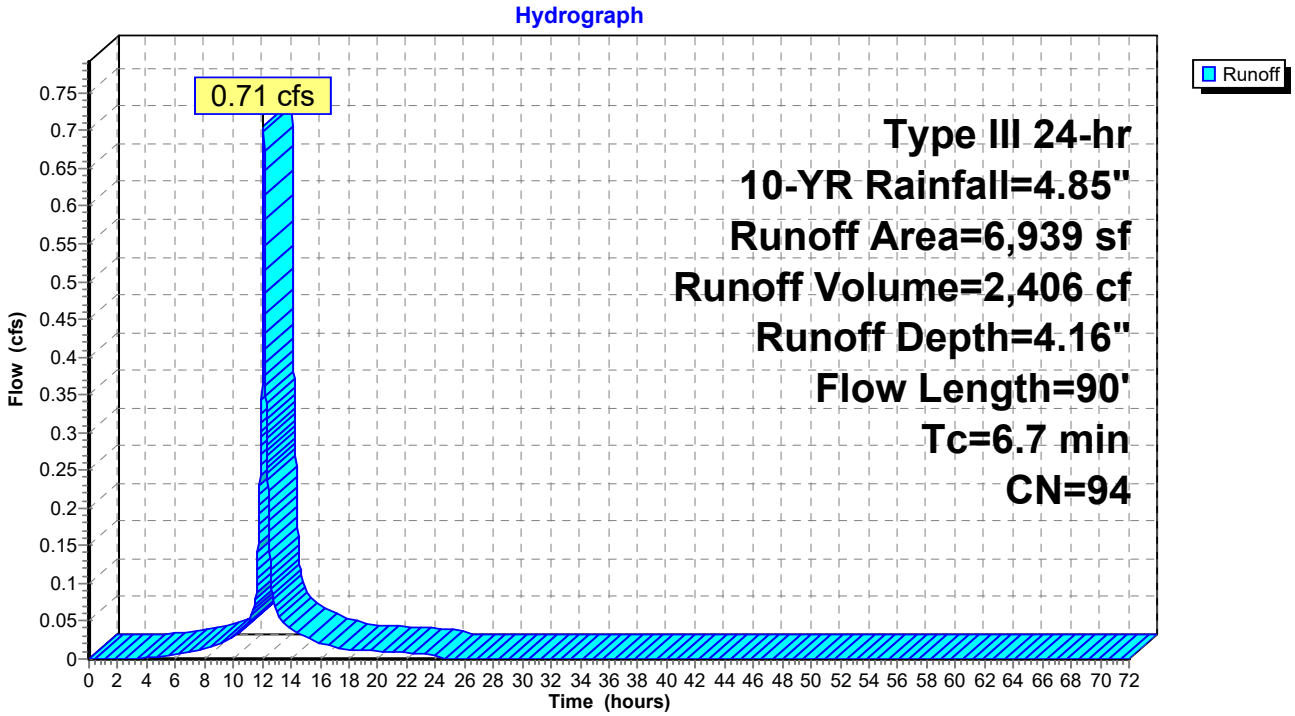
Runoff = 0.71 cfs @ 12.09 hrs, Volume= 2,406 cf, Depth= 4.16"

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-YR Rainfall=4.85"

| Area (sf) | CN | Description |
|---|---|---|
| 5,180 | 98 | Paved parking, HSG D |
| 0 | 96 | Gravel surface, HSG D |
| 591 | 80 | >75% Grass cover, Good, HSG D |
| 1,168 | 84 | 50-75% Grass cover, Fair, HSG D |
| 6,939 | 94 | Weighted Average |
| 1,759 | | 25.35% Pervious Area |
| 5,180 | | 74.65% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.4 | 50 | 0.0130 | 0.13 | | **Sheet Flow, A - B**<br>Grass: Short n= 0.150 P2= 3.50" |
| 0.1 | 16 | 0.0130 | 1.84 | | **Shallow Concentrated Flow, B - C**<br>Unpaved Kv= 16.1 fps |
| 0.2 | 24 | 0.0150 | 2.49 | | **Shallow Concentrated Flow, C - D**<br>Paved Kv= 20.3 fps |
| 6.7 | 90 | Total | | | |

## Subcatchment HS-WS-2: HISTORIC WS-2



## Hydrograph for Subcatchment HS-WS-2: HISTORIC WS-2

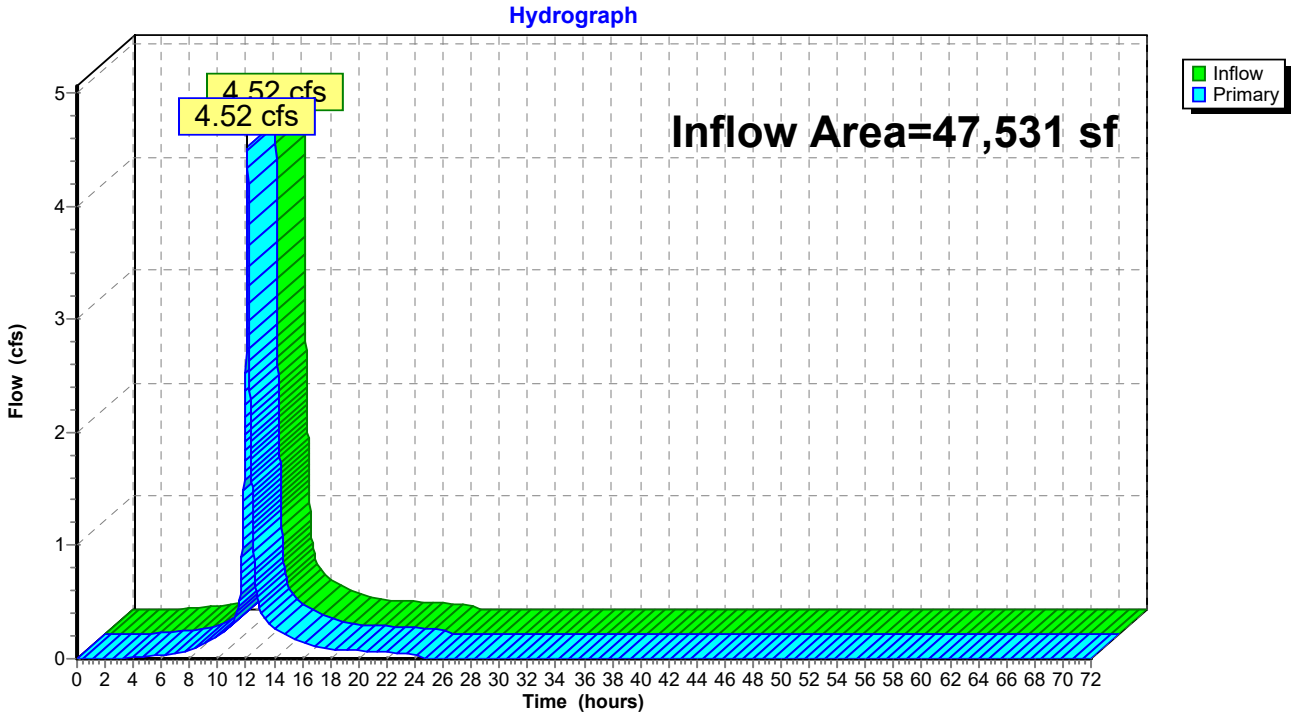
| Time (hours) | Precip. (inches) | Excess (inches) | Runoff (cfs) |
|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 0.05 | 0.00 | 0.00 |
| 2.00 | 0.10 | 0.00 | 0.00 |
| 3.00 | 0.15 | 0.00 | 0.00 |
| 4.00 | 0.21 | 0.01 | 0.00 |
| 5.00 | 0.28 | 0.03 | 0.00 |
| 6.00 | 0.35 | 0.06 | 0.01 |
| 7.00 | 0.44 | 0.10 | 0.01 |
| 8.00 | 0.55 | 0.17 | 0.01 |
| 9.00 | 0.71 | 0.28 | 0.02 |
| 10.00 | 0.92 | 0.44 | 0.03 |
| 11.00 | 1.21 | 0.68 | 0.05 |
| 12.00 | 2.42 | 1.80 | **0.42** |
| 13.00 | 3.64 | 2.97 | **0.06** |
| 14.00 | 3.93 | 3.26 | 0.04 |
| 15.00 | 4.14 | 3.46 | 0.03 |
| 16.00 | 4.30 | 3.62 | 0.02 |
| 17.00 | 4.41 | 3.73 | 0.02 |
| 18.00 | 4.50 | 3.82 | 0.01 |
| 19.00 | 4.57 | 3.89 | 0.01 |
| 20.00 | 4.64 | 3.95 | 0.01 |
| 21.00 | 4.70 | 4.01 | 0.01 |
| 22.00 | 4.76 | 4.07 | 0.01 |
| 23.00 | 4.81 | 4.12 | 0.01 |
| 24.00 | **4.85** | **4.16** | 0.01 |
| 25.00 | 4.85 | 4.16 | 0.00 |
| 26.00 | 4.85 | 4.16 | 0.00 |
| 27.00 | 4.85 | 4.16 | 0.00 |
| 28.00 | 4.85 | 4.16 | 0.00 |
| 29.00 | 4.85 | 4.16 | 0.00 |
| 30.00 | 4.85 | 4.16 | 0.00 |
| 31.00 | 4.85 | 4.16 | 0.00 |
| 32.00 | 4.85 | 4.16 | 0.00 |
| 33.00 | 4.85 | 4.16 | 0.00 |
| 34.00 | 4.85 | 4.16 | 0.00 |
| 35.00 | 4.85 | 4.16 | 0.00 |
| 36.00 | 4.85 | 4.16 | 0.00 |
| 37.00 | 4.85 | 4.16 | 0.00 |
| 38.00 | 4.85 | 4.16 | 0.00 |
| 39.00 | 4.85 | 4.16 | 0.00 |
| 40.00 | 4.85 | 4.16 | 0.00 |
| 41.00 | 4.85 | 4.16 | 0.00 |
| 42.00 | 4.85 | 4.16 | 0.00 |
| 43.00 | 4.85 | 4.16 | 0.00 |
| 44.00 | 4.85 | 4.16 | 0.00 |
| 45.00 | 4.85 | 4.16 | 0.00 |
| 46.00 | 4.85 | 4.16 | 0.00 |
| 47.00 | 4.85 | 4.16 | 0.00 |
| 48.00 | 4.85 | 4.16 | 0.00 |
| 49.00 | 4.85 | 4.16 | 0.00 |
| 50.00 | 4.85 | 4.16 | 0.00 |
| 51.00 | 4.85 | 4.16 | 0.00 |
| 52.00 | 4.85 | 4.16 | 0.00 |
| 53.00 | 4.85 | 4.16 | 0.00 |
| 54.00 | 4.85 | 4.16 | 0.00 |
| 55.00 | 4.85 | 4.16 | 0.00 |
| 56.00 | 4.85 | 4.16 | 0.00 |
| 57.00 | 4.85 | 4.16 | 0.00 |
| 58.00 | 4.85 | 4.16 | 0.00 |
| 59.00 | 4.85 | 4.16 | 0.00 |
| 60.00 | 4.85 | 4.16 | 0.00 |
| 61.00 | 4.85 | 4.16 | 0.00 |
| 62.00 | 4.85 | 4.16 | 0.00 |
| 63.00 | 4.85 | 4.16 | 0.00 |
| 64.00 | 4.85 | 4.16 | 0.00 |
| 65.00 | 4.85 | 4.16 | 0.00 |
| 66.00 | 4.85 | 4.16 | 0.00 |
| 67.00 | 4.85 | 4.16 | 0.00 |
| 68.00 | 4.85 | 4.16 | 0.00 |
| 69.00 | 4.85 | 4.16 | 0.00 |
| 70.00 | 4.85 | 4.16 | 0.00 |
| 71.00 | 4.85 | 4.16 | 0.00 |
| 72.00 | 4.85 | 4.16 | 0.00 |

## Summary for Link POA-1: POA-1

Inflow Area = 47,531 sf, 63.62% Impervious, Inflow Depth = 4.07" for 10-YR event
Inflow = 4.52 cfs @ 12.11 hrs, Volume= 16,108 cf
Primary = 4.52 cfs @ 12.11 hrs, Volume= 16,108 cf, Atten= 0%, Lag= 0.0 min

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

## Link POA-1: POA-1



## Hydrograph for Link POA-1: POA-1

| Time (hours) | Inflow (cfs) | Elevation (feet) | Primary (cfs) | Time (hours) | Inflow (cfs) | Elevation (feet) | Primary (cfs) |
|---|---|---|---|---|---|---|---|
| 0.00 | 0.00 | **0.00** | 0.00 | 53.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 0.00 | 0.00 | 0.00 | 54.00 | 0.00 | 0.00 | 0.00 |
| 2.00 | 0.00 | 0.00 | 0.00 | 55.00 | 0.00 | 0.00 | 0.00 |
| 3.00 | 0.00 | 0.00 | 0.00 | 56.00 | 0.00 | 0.00 | 0.00 |
| 4.00 | 0.01 | 0.00 | 0.01 | 57.00 | 0.00 | 0.00 | 0.00 |
| 5.00 | 0.02 | 0.00 | 0.02 | 58.00 | 0.00 | 0.00 | 0.00 |
| 6.00 | 0.03 | 0.00 | 0.03 | 59.00 | 0.00 | 0.00 | 0.00 |
| 7.00 | 0.05 | 0.00 | 0.05 | 60.00 | 0.00 | 0.00 | 0.00 |
| 8.00 | 0.08 | 0.00 | 0.08 | 61.00 | 0.00 | 0.00 | 0.00 |
| 9.00 | 0.13 | 0.00 | 0.13 | 62.00 | 0.00 | 0.00 | 0.00 |
| 10.00 | 0.19 | 0.00 | 0.19 | 63.00 | 0.00 | 0.00 | 0.00 |
| 11.00 | 0.31 | 0.00 | 0.31 | 64.00 | 0.00 | 0.00 | 0.00 |
| 12.00 | **2.52** | 0.00 | **2.52** | 65.00 | 0.00 | 0.00 | 0.00 |
| 13.00 | **0.44** | 0.00 | **0.44** | 66.00 | 0.00 | 0.00 | 0.00 |
| 14.00 | 0.27 | 0.00 | 0.27 | 67.00 | 0.00 | 0.00 | 0.00 |
| 15.00 | 0.20 | 0.00 | 0.20 | 68.00 | 0.00 | 0.00 | 0.00 |
| 16.00 | 0.14 | 0.00 | 0.14 | 69.00 | 0.00 | 0.00 | 0.00 |
| 17.00 | 0.11 | 0.00 | 0.11 | 70.00 | 0.00 | 0.00 | 0.00 |
| 18.00 | 0.09 | 0.00 | 0.09 | 71.00 | 0.00 | 0.00 | 0.00 |
| 19.00 | 0.08 | 0.00 | 0.08 | 72.00 | 0.00 | 0.00 | 0.00 |
| 20.00 | 0.07 | 0.00 | 0.07 | | | | |
| 21.00 | 0.06 | 0.00 | 0.06 | | | | |
| 22.00 | 0.06 | 0.00 | 0.06 | | | | |
| 23.00 | 0.05 | 0.00 | 0.05 | | | | |
| 24.00 | 0.05 | 0.00 | 0.05 | | | | |
| 25.00 | 0.00 | 0.00 | 0.00 | | | | |
| 26.00 | 0.00 | 0.00 | 0.00 | | | | |
| 27.00 | 0.00 | 0.00 | 0.00 | | | | |
| 28.00 | 0.00 | 0.00 | 0.00 | | | | |
| 29.00 | 0.00 | 0.00 | 0.00 | | | | |
| 30.00 | 0.00 | 0.00 | 0.00 | | | | |
| 31.00 | 0.00 | 0.00 | 0.00 | | | | |
| 32.00 | 0.00 | 0.00 | 0.00 | | | | |
| 33.00 | 0.00 | 0.00 | 0.00 | | | | |
| 34.00 | 0.00 | 0.00 | 0.00 | | | | |
| 35.00 | 0.00 | 0.00 | 0.00 | | | | |
| 36.00 | 0.00 | 0.00 | 0.00 | | | | |
| 37.00 | 0.00 | 0.00 | 0.00 | | | | |
| 38.00 | 0.00 | 0.00 | 0.00 | | | | |
| 39.00 | 0.00 | 0.00 | 0.00 | | | | |
| 40.00 | 0.00 | 0.00 | 0.00 | | | | |
| 41.00 | 0.00 | 0.00 | 0.00 | | | | |
| 42.00 | 0.00 | 0.00 | 0.00 | | | | |
| 43.00 | 0.00 | 0.00 | 0.00 | | | | |
| 44.00 | 0.00 | 0.00 | 0.00 | | | | |
| 45.00 | 0.00 | 0.00 | 0.00 | | | | |
| 46.00 | 0.00 | 0.00 | 0.00 | | | | |
| 47.00 | 0.00 | 0.00 | 0.00 | | | | |
| 48.00 | 0.00 | 0.00 | 0.00 | | | | |
| 49.00 | 0.00 | 0.00 | 0.00 | | | | |
| 50.00 | 0.00 | 0.00 | 0.00 | | | | |
| 51.00 | 0.00 | 0.00 | 0.00 | | | | |
| 52.00 | 0.00 | 0.00 | 0.00 | | | | |

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment HS-WS-1: HISTORIC WS-1** Runoff Area=40,592 sf 61.73% Impervious Runoff Depth=6.32"
Flow Length=488' Tc=8.5 min CN=93 Runoff=5.83 cfs 21,378 cf

**Subcatchment HS-WS-2: HISTORIC WS-2** Runoff Area=6,939 sf 74.65% Impervious Runoff Depth=6.44"
Flow Length=90' Tc=6.7 min CN=94 Runoff=1.07 cfs 3,722 cf

**Link POA-1: POA-1** Inflow=6.87 cfs 25,100 cf
Primary=6.87 cfs 25,100 cf

**Total Runoff Area = 47,531 sf Runoff Volume = 25,100 cf Average Runoff Depth = 6.34"**
**36.38% Pervious = 17,292 sf 63.62% Impervious = 30,239 sf**

## Summary for Subcatchment HS-WS-1: HISTORIC WS-1

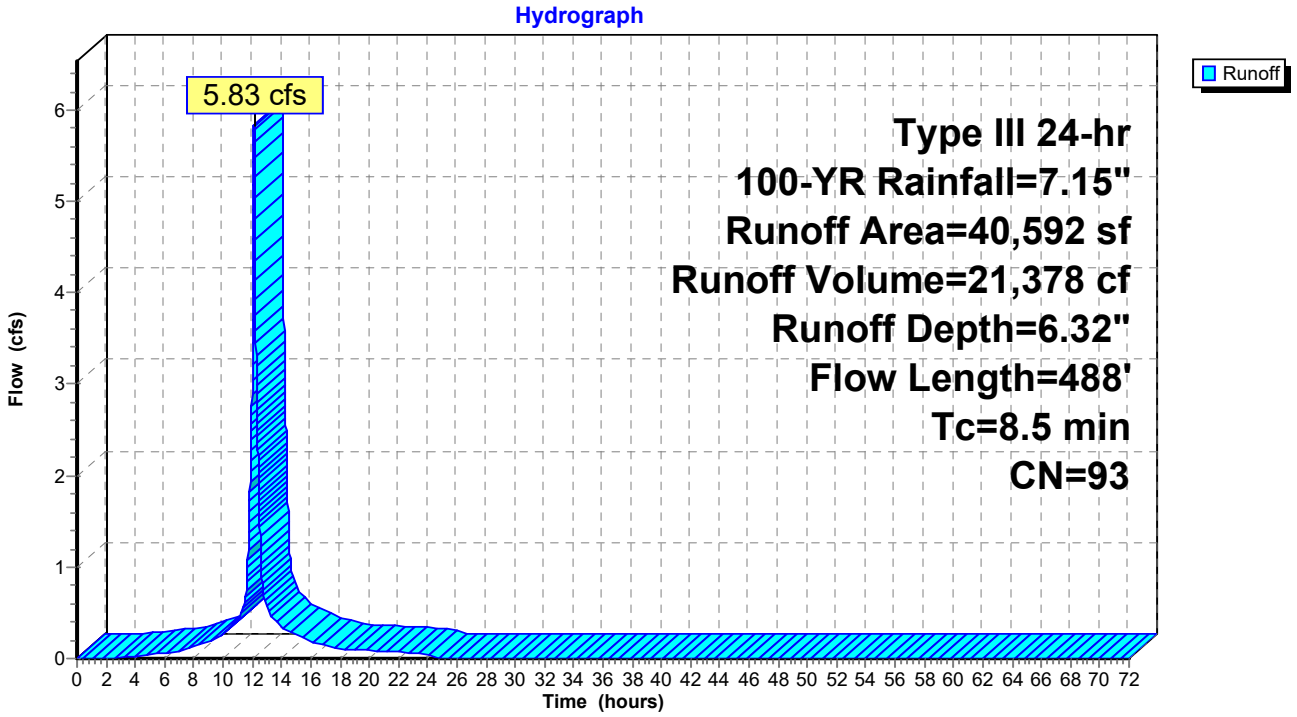
Runoff = 5.83 cfs @ 12.12 hrs, Volume= 21,378 cf, Depth= 6.32"

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-YR Rainfall=7.15"

| Area (sf) | CN | Description |
|---|---|---|
| 25,059 | 98 | Paved parking, HSG D |
| 808 | 96 | Gravel surface, HSG D |
| 298 | 80 | >75% Grass cover, Good, HSG D |
| 14,427 | 84 | 50-75% Grass cover, Fair, HSG D |
| 40,592 | 93 | Weighted Average |
| 15,533 | | 38.27% Pervious Area |
| 25,059 | | 61.73% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 5.5 | 45 | 0.0150 | 0.14 | | **Sheet Flow, A - B**<br>Grass: Short n= 0.150 P2= 3.50" |
| 1.7 | 181 | 0.0080 | 1.82 | | **Shallow Concentrated Flow, B - C**<br>Paved Kv= 20.3 fps |
| 0.9 | 158 | 0.0050 | 2.98 | 2.34 | **Pipe Channel, C - D**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.014 |
| 0.2 | 32 | 0.0050 | 2.98 | 2.34 | **Pipe Channel, D - E**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.014 |
| 0.2 | 72 | 0.0200 | 5.96 | 4.68 | **Pipe Channel, E - F**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.014 |
| 8.5 | 488 | Total | | | |

## Subcatchment HS-WS-1: HISTORIC WS-1



## Hydrograph for Subcatchment HS-WS-1: HISTORIC WS-1

| Time (hours) | Precip. (inches) | Excess (inches) | Runoff (cfs) |
|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 0.07 | 0.00 | 0.00 |
| 2.00 | 0.14 | 0.00 | 0.00 |
| 3.00 | 0.22 | 0.01 | 0.01 |
| 4.00 | 0.31 | 0.03 | 0.03 |
| 5.00 | 0.41 | 0.06 | 0.04 |
| 6.00 | 0.51 | 0.12 | 0.06 |
| 7.00 | 0.65 | 0.20 | 0.09 |
| 8.00 | 0.82 | 0.31 | 0.12 |
| 9.00 | 1.04 | 0.48 | 0.19 |
| 10.00 | 1.35 | 0.74 | 0.27 |
| 11.00 | 1.79 | 1.12 | 0.42 |
| 12.00 | 3.57 | 2.81 | **3.23** |
| 13.00 | 5.36 | 4.55 | **0.56** |
| 14.00 | 5.80 | 4.98 | 0.35 |
| 15.00 | 6.11 | 5.29 | 0.26 |
| 16.00 | 6.33 | 5.51 | 0.18 |
| 17.00 | 6.50 | 5.68 | 0.14 |
| 18.00 | 6.64 | 5.81 | 0.11 |
| 19.00 | 6.74 | 5.92 | 0.10 |
| 20.00 | 6.84 | 6.02 | 0.09 |
| 21.00 | 6.93 | 6.10 | 0.08 |
| 22.00 | 7.01 | 6.18 | 0.07 |
| 23.00 | 7.09 | 6.26 | 0.07 |
| 24.00 | **7.15** | **6.32** | 0.06 |
| 25.00 | 7.15 | 6.32 | 0.00 |
| 26.00 | 7.15 | 6.32 | 0.00 |
| 27.00 | 7.15 | 6.32 | 0.00 |
| 28.00 | 7.15 | 6.32 | 0.00 |
| 29.00 | 7.15 | 6.32 | 0.00 |
| 30.00 | 7.15 | 6.32 | 0.00 |
| 31.00 | 7.15 | 6.32 | 0.00 |
| 32.00 | 7.15 | 6.32 | 0.00 |
| 33.00 | 7.15 | 6.32 | 0.00 |
| 34.00 | 7.15 | 6.32 | 0.00 |
| 35.00 | 7.15 | 6.32 | 0.00 |
| 36.00 | 7.15 | 6.32 | 0.00 |
| 37.00 | 7.15 | 6.32 | 0.00 |
| 38.00 | 7.15 | 6.32 | 0.00 |
| 39.00 | 7.15 | 6.32 | 0.00 |
| 40.00 | 7.15 | 6.32 | 0.00 |
| 41.00 | 7.15 | 6.32 | 0.00 |
| 42.00 | 7.15 | 6.32 | 0.00 |
| 43.00 | 7.15 | 6.32 | 0.00 |
| 44.00 | 7.15 | 6.32 | 0.00 |
| 45.00 | 7.15 | 6.32 | 0.00 |
| 46.00 | 7.15 | 6.32 | 0.00 |
| 47.00 | 7.15 | 6.32 | 0.00 |
| 48.00 | 7.15 | 6.32 | 0.00 |
| 49.00 | 7.15 | 6.32 | 0.00 |
| 50.00 | 7.15 | 6.32 | 0.00 |
| 51.00 | 7.15 | 6.32 | 0.00 |
| 52.00 | 7.15 | 6.32 | 0.00 |
| 53.00 | 7.15 | 6.32 | 0.00 |
| 54.00 | 7.15 | 6.32 | 0.00 |
| 55.00 | 7.15 | 6.32 | 0.00 |
| 56.00 | 7.15 | 6.32 | 0.00 |
| 57.00 | 7.15 | 6.32 | 0.00 |
| 58.00 | 7.15 | 6.32 | 0.00 |
| 59.00 | 7.15 | 6.32 | 0.00 |
| 60.00 | 7.15 | 6.32 | 0.00 |
| 61.00 | 7.15 | 6.32 | 0.00 |
| 62.00 | 7.15 | 6.32 | 0.00 |
| 63.00 | 7.15 | 6.32 | 0.00 |
| 64.00 | 7.15 | 6.32 | 0.00 |
| 65.00 | 7.15 | 6.32 | 0.00 |
| 66.00 | 7.15 | 6.32 | 0.00 |
| 67.00 | 7.15 | 6.32 | 0.00 |
| 68.00 | 7.15 | 6.32 | 0.00 |
| 69.00 | 7.15 | 6.32 | 0.00 |
| 70.00 | 7.15 | 6.32 | 0.00 |
| 71.00 | 7.15 | 6.32 | 0.00 |
| 72.00 | 7.15 | 6.32 | 0.00 |

## Summary for Subcatchment HS-WS-2: HISTORIC WS-2

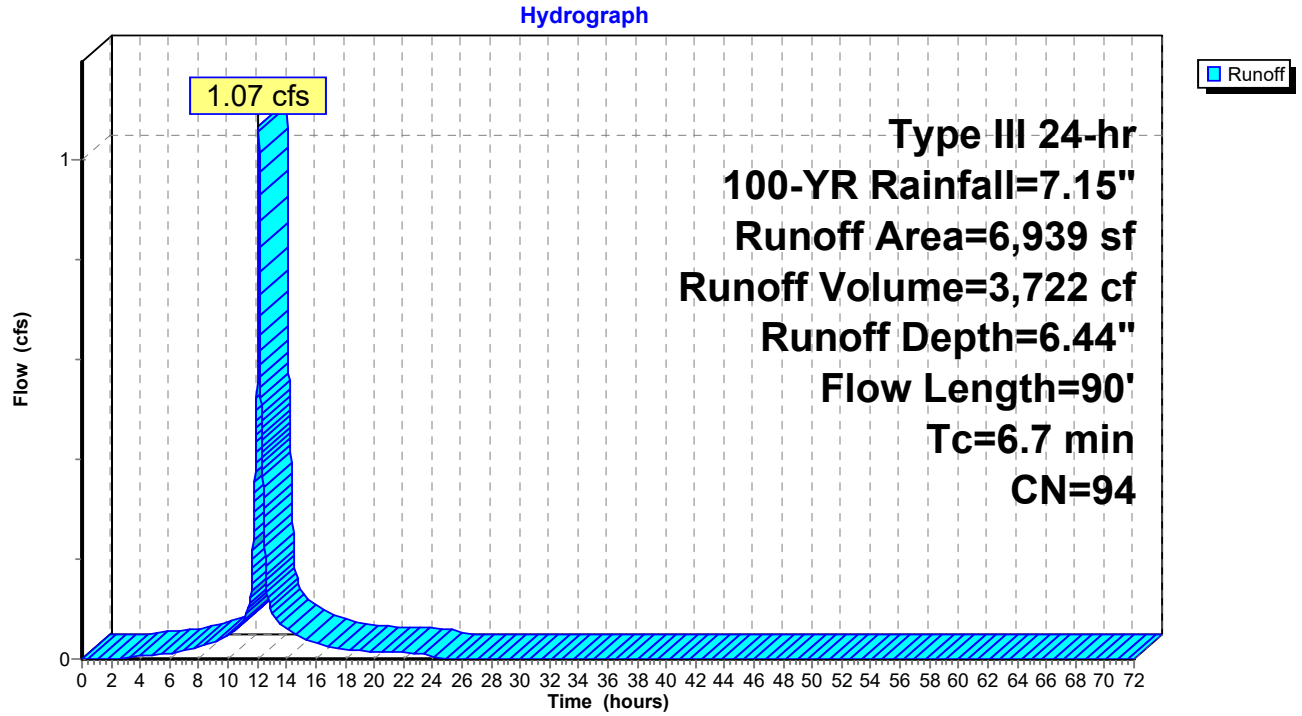
Runoff = 1.07 cfs @ 12.09 hrs, Volume= 3,722 cf, Depth= 6.44"

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-YR Rainfall=7.15"

| Area (sf) | CN | Description |
|---|---|---|
| 5,180 | 98 | Paved parking, HSG D |
| 0 | 96 | Gravel surface, HSG D |
| 591 | 80 | >75% Grass cover, Good, HSG D |
| 1,168 | 84 | 50-75% Grass cover, Fair, HSG D |
| 6,939 | 94 | Weighted Average |
| 1,759 | | 25.35% Pervious Area |
| 5,180 | | 74.65% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.4 | 50 | 0.0130 | 0.13 | | **Sheet Flow, A - B** Grass: Short n= 0.150 P2= 3.50" |
| 0.1 | 16 | 0.0130 | 1.84 | | **Shallow Concentrated Flow, B - C** Unpaved Kv= 16.1 fps |
| 0.2 | 24 | 0.0150 | 2.49 | | **Shallow Concentrated Flow, C - D** Paved Kv= 20.3 fps |
| 6.7 | 90 | Total | | | |

## Subcatchment HS-WS-2: HISTORIC WS-2



## Hydrograph for Subcatchment HS-WS-2: HISTORIC WS-2

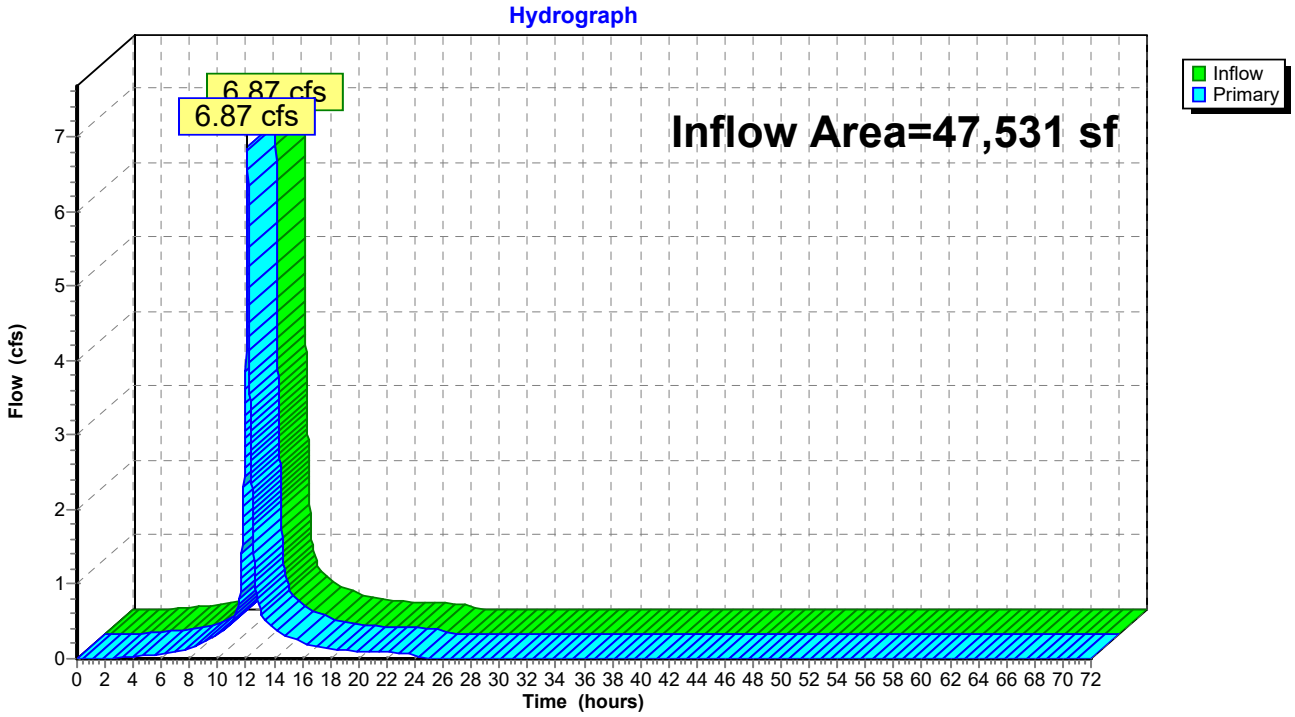
| Time (hours) | Precip. (inches) | Excess (inches) | Runoff (cfs) |
|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 0.07 | 0.00 | 0.00 |
| 2.00 | 0.14 | 0.00 | 0.00 |
| 3.00 | 0.22 | 0.01 | 0.00 |
| 4.00 | 0.31 | 0.04 | 0.01 |
| 5.00 | 0.41 | 0.08 | 0.01 |
| 6.00 | 0.51 | 0.15 | 0.01 |
| 7.00 | 0.65 | 0.23 | 0.02 |
| 8.00 | 0.82 | 0.36 | 0.02 |
| 9.00 | 1.04 | 0.54 | 0.03 |
| 10.00 | 1.35 | 0.80 | 0.05 |
| 11.00 | 1.79 | 1.20 | 0.07 |
| 12.00 | 3.57 | 2.91 | **0.64** |
| 13.00 | 5.36 | 4.67 | **0.09** |
| 14.00 | 5.80 | 5.10 | 0.06 |
| 15.00 | 6.11 | 5.40 | 0.04 |
| 16.00 | 6.33 | 5.63 | 0.03 |
| 17.00 | 6.50 | 5.80 | 0.02 |
| 18.00 | 6.64 | 5.93 | 0.02 |
| 19.00 | 6.74 | 6.03 | 0.02 |
| 20.00 | 6.84 | 6.13 | 0.01 |
| 21.00 | 6.93 | 6.22 | 0.01 |
| 22.00 | 7.01 | 6.30 | 0.01 |
| 23.00 | 7.09 | 6.37 | 0.01 |
| 24.00 | **7.15** | **6.44** | 0.01 |
| 25.00 | 7.15 | 6.44 | 0.00 |
| 26.00 | 7.15 | 6.44 | 0.00 |
| 27.00 | 7.15 | 6.44 | 0.00 |
| 28.00 | 7.15 | 6.44 | 0.00 |
| 29.00 | 7.15 | 6.44 | 0.00 |
| 30.00 | 7.15 | 6.44 | 0.00 |
| 31.00 | 7.15 | 6.44 | 0.00 |
| 32.00 | 7.15 | 6.44 | 0.00 |
| 33.00 | 7.15 | 6.44 | 0.00 |
| 34.00 | 7.15 | 6.44 | 0.00 |
| 35.00 | 7.15 | 6.44 | 0.00 |
| 36.00 | 7.15 | 6.44 | 0.00 |
| 37.00 | 7.15 | 6.44 | 0.00 |
| 38.00 | 7.15 | 6.44 | 0.00 |
| 39.00 | 7.15 | 6.44 | 0.00 |
| 40.00 | 7.15 | 6.44 | 0.00 |
| 41.00 | 7.15 | 6.44 | 0.00 |
| 42.00 | 7.15 | 6.44 | 0.00 |
| 43.00 | 7.15 | 6.44 | 0.00 |
| 44.00 | 7.15 | 6.44 | 0.00 |
| 45.00 | 7.15 | 6.44 | 0.00 |
| 46.00 | 7.15 | 6.44 | 0.00 |
| 47.00 | 7.15 | 6.44 | 0.00 |
| 48.00 | 7.15 | 6.44 | 0.00 |
| 49.00 | 7.15 | 6.44 | 0.00 |
| 50.00 | 7.15 | 6.44 | 0.00 |
| 51.00 | 7.15 | 6.44 | 0.00 |
| 52.00 | 7.15 | 6.44 | 0.00 |
| 53.00 | 7.15 | 6.44 | 0.00 |
| 54.00 | 7.15 | 6.44 | 0.00 |
| 55.00 | 7.15 | 6.44 | 0.00 |
| 56.00 | 7.15 | 6.44 | 0.00 |
| 57.00 | 7.15 | 6.44 | 0.00 |
| 58.00 | 7.15 | 6.44 | 0.00 |
| 59.00 | 7.15 | 6.44 | 0.00 |
| 60.00 | 7.15 | 6.44 | 0.00 |
| 61.00 | 7.15 | 6.44 | 0.00 |
| 62.00 | 7.15 | 6.44 | 0.00 |
| 63.00 | 7.15 | 6.44 | 0.00 |
| 64.00 | 7.15 | 6.44 | 0.00 |
| 65.00 | 7.15 | 6.44 | 0.00 |
| 66.00 | 7.15 | 6.44 | 0.00 |
| 67.00 | 7.15 | 6.44 | 0.00 |
| 68.00 | 7.15 | 6.44 | 0.00 |
| 69.00 | 7.15 | 6.44 | 0.00 |
| 70.00 | 7.15 | 6.44 | 0.00 |
| 71.00 | 7.15 | 6.44 | 0.00 |
| 72.00 | 7.15 | 6.44 | 0.00 |

## Summary for Link POA-1: POA-1

Inflow Area = 47,531 sf, 63.62% Impervious, Inflow Depth = 6.34" for 100-YR event
Inflow = 6.87 cfs @ 12.11 hrs, Volume= 25,100 cf
Primary = 6.87 cfs @ 12.11 hrs, Volume= 25,100 cf, Atten= 0%, Lag= 0.0 min

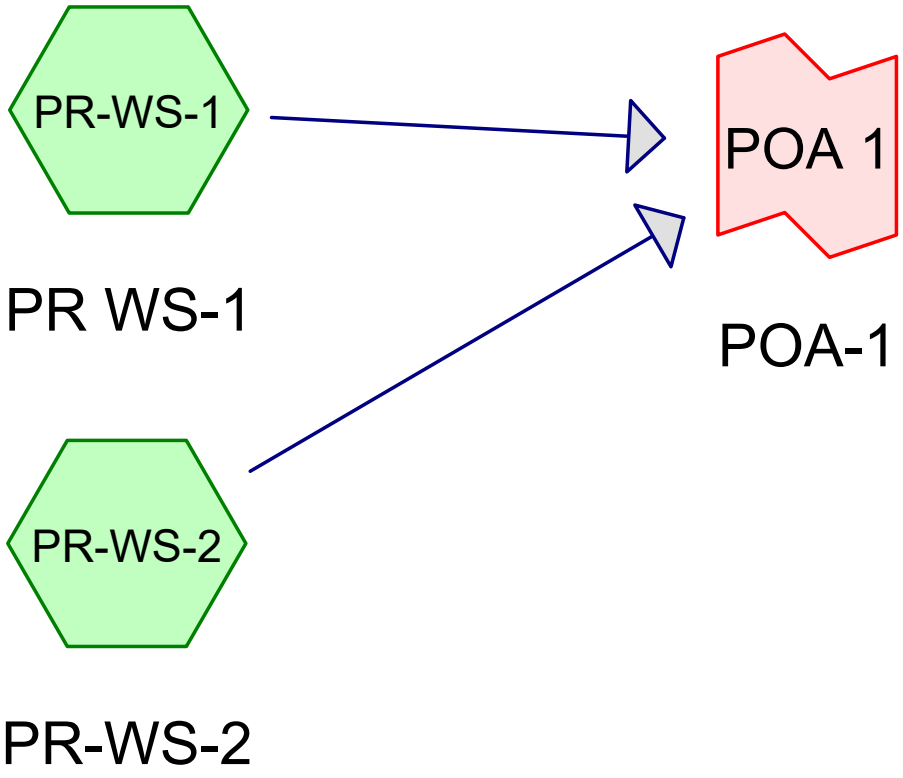
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

## Link POA-1: POA-1



## Hydrograph for Link POA-1: POA-1

| Time (hours) | Inflow (cfs) | Elevation (feet) | Primary (cfs) | Time (hours) | Inflow (cfs) | Elevation (feet) | Primary (cfs) |
|---|---|---|---|---|---|---|---|
| 0.00 | 0.00 | **0.00** | 0.00 | 53.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 0.00 | 0.00 | 0.00 | 54.00 | 0.00 | 0.00 | 0.00 |
| 2.00 | 0.00 | 0.00 | 0.00 | 55.00 | 0.00 | 0.00 | 0.00 |
| 3.00 | 0.01 | 0.00 | 0.01 | 56.00 | 0.00 | 0.00 | 0.00 |
| 4.00 | 0.03 | 0.00 | 0.03 | 57.00 | 0.00 | 0.00 | 0.00 |
| 5.00 | 0.05 | 0.00 | 0.05 | 58.00 | 0.00 | 0.00 | 0.00 |
| 6.00 | 0.07 | 0.00 | 0.07 | 59.00 | 0.00 | 0.00 | 0.00 |
| 7.00 | 0.10 | 0.00 | 0.10 | 60.00 | 0.00 | 0.00 | 0.00 |
| 8.00 | 0.14 | 0.00 | 0.14 | 61.00 | 0.00 | 0.00 | 0.00 |
| 9.00 | 0.22 | 0.00 | 0.22 | 62.00 | 0.00 | 0.00 | 0.00 |
| 10.00 | 0.32 | 0.00 | 0.32 | 63.00 | 0.00 | 0.00 | 0.00 |
| 11.00 | 0.49 | 0.00 | 0.49 | 64.00 | 0.00 | 0.00 | 0.00 |
| 12.00 | **3.87** | 0.00 | **3.87** | 65.00 | 0.00 | 0.00 | 0.00 |
| 13.00 | **0.66** | 0.00 | **0.66** | 66.00 | 0.00 | 0.00 | 0.00 |
| 14.00 | 0.40 | 0.00 | 0.40 | 67.00 | 0.00 | 0.00 | 0.00 |
| 15.00 | 0.30 | 0.00 | 0.30 | 68.00 | 0.00 | 0.00 | 0.00 |
| 16.00 | 0.21 | 0.00 | 0.21 | 69.00 | 0.00 | 0.00 | 0.00 |
| 17.00 | 0.17 | 0.00 | 0.17 | 70.00 | 0.00 | 0.00 | 0.00 |
| 18.00 | 0.13 | 0.00 | 0.13 | 71.00 | 0.00 | 0.00 | 0.00 |
| 19.00 | 0.11 | 0.00 | 0.11 | 72.00 | 0.00 | 0.00 | 0.00 |
| 20.00 | 0.10 | 0.00 | 0.10 | | | | |
| 21.00 | 0.09 | 0.00 | 0.09 | | | | |
| 22.00 | 0.08 | 0.00 | 0.08 | | | | |
| 23.00 | 0.08 | 0.00 | 0.08 | | | | |
| 24.00 | 0.07 | 0.00 | 0.07 | | | | |
| 25.00 | 0.00 | 0.00 | 0.00 | | | | |
| 26.00 | 0.00 | 0.00 | 0.00 | | | | |
| 27.00 | 0.00 | 0.00 | 0.00 | | | | |
| 28.00 | 0.00 | 0.00 | 0.00 | | | | |
| 29.00 | 0.00 | 0.00 | 0.00 | | | | |
| 30.00 | 0.00 | 0.00 | 0.00 | | | | |
| 31.00 | 0.00 | 0.00 | 0.00 | | | | |
| 32.00 | 0.00 | 0.00 | 0.00 | | | | |
| 33.00 | 0.00 | 0.00 | 0.00 | | | | |
| 34.00 | 0.00 | 0.00 | 0.00 | | | | |
| 35.00 | 0.00 | 0.00 | 0.00 | | | | |
| 36.00 | 0.00 | 0.00 | 0.00 | | | | |
| 37.00 | 0.00 | 0.00 | 0.00 | | | | |
| 38.00 | 0.00 | 0.00 | 0.00 | | | | |
| 39.00 | 0.00 | 0.00 | 0.00 | | | | |
| 40.00 | 0.00 | 0.00 | 0.00 | | | | |
| 41.00 | 0.00 | 0.00 | 0.00 | | | | |
| 42.00 | 0.00 | 0.00 | 0.00 | | | | |
| 43.00 | 0.00 | 0.00 | 0.00 | | | | |
| 44.00 | 0.00 | 0.00 | 0.00 | | | | |
| 45.00 | 0.00 | 0.00 | 0.00 | | | | |
| 46.00 | 0.00 | 0.00 | 0.00 | | | | |
| 47.00 | 0.00 | 0.00 | 0.00 | | | | |
| 48.00 | 0.00 | 0.00 | 0.00 | | | | |
| 49.00 | 0.00 | 0.00 | 0.00 | | | | |
| 50.00 | 0.00 | 0.00 | 0.00 | | | | |
| 51.00 | 0.00 | 0.00 | 0.00 | | | | |
| 52.00 | 0.00 | 0.00 | 0.00 | | | | |




Subcat Reach Pond Link

**Routing Diagram for 20047_POST**
Prepared by {enter your company name here}, Printed 2/10/2021

Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment PR-WS-1: PR WS-1** Runoff Area=44,492 sf 64.34% Impervious Runoff Depth=2.73"
Flow Length=407' Tc=8.0 min CN=93 Runoff=2.95 cfs 10,140 cf

**Subcatchment PR-WS-2: PR-WS-2** Runoff Area=2,741 sf 4.78% Impervious Runoff Depth=1.86"
Flow Length=90' Tc=6.7 min CN=83 Runoff=0.13 cfs 425 cf

**Link POA 1: POA-1** Inflow=3.08 cfs 10,565 cf
Primary=3.08 cfs 10,565 cf

**Total Runoff Area = 47,233 sf Runoff Volume = 10,565 cf Average Runoff Depth = 2.68"**
**39.11% Pervious = 18,474 sf 60.89% Impervious = 28,759 sf**

## Summary for Subcatchment PR-WS-1: PR WS-1

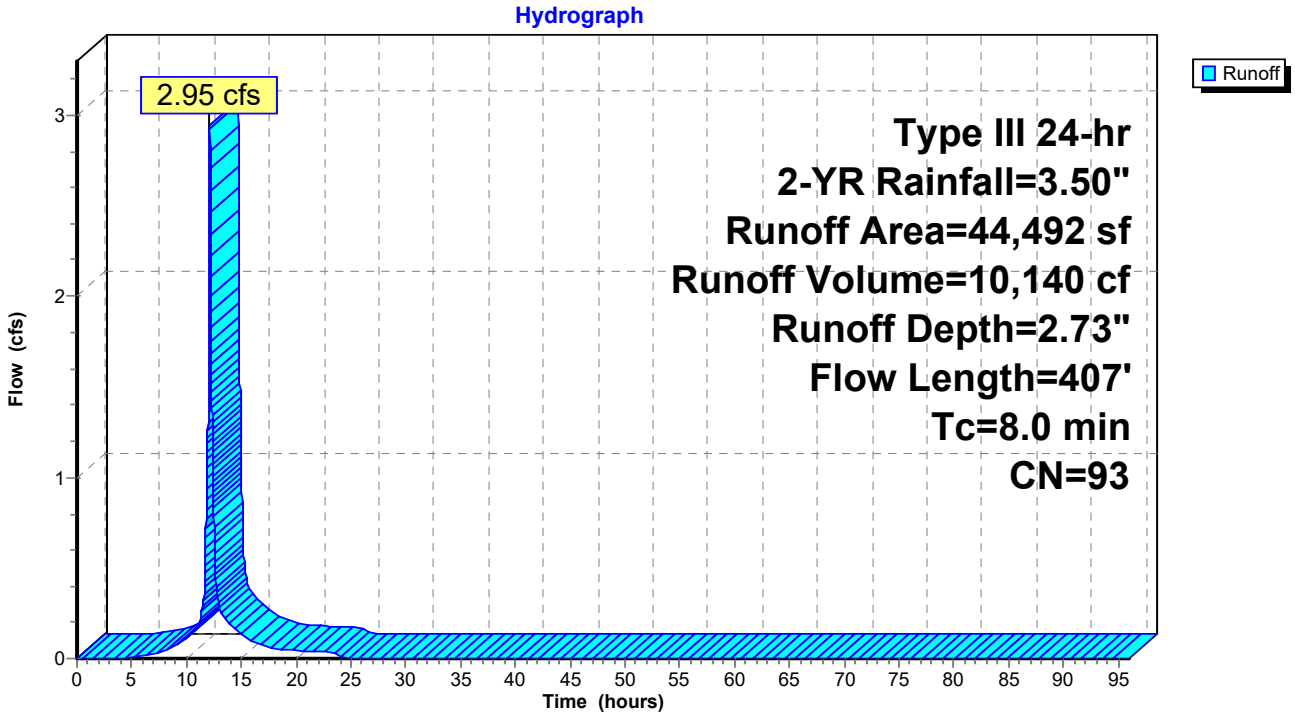
Runoff = 2.95 cfs @ 12.11 hrs, Volume= 10,140 cf, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.50"

| Area (sf) | CN | Description |
|---|---|---|
| 28,628 | 98 | Paved parking, HSG D |
| 799 | 96 | Gravel surface, HSG D |
| 12,861 | 84 | 50-75% Grass cover, Fair, HSG D |
| 2,204 | 80 | >75% Grass cover, Good, HSG D |
| 44,492 | 93 | Weighted Average |
| 15,864 | | 35.66% Pervious Area |
| 28,628 | | 64.34% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | 50 | 0.0150 | 0.14 | | **Sheet Flow, A - B**<br>Grass: Short n= 0.150 P2= 3.50" |
| 0.2 | 17 | 0.0100 | 1.61 | | **Shallow Concentrated Flow, B - C**<br>Unpaved Kv= 16.1 fps |
| 0.5 | 79 | 0.0170 | 2.65 | | **Shallow Concentrated Flow, C - D**<br>Paved Kv= 20.3 fps |
| 0.9 | 157 | 0.0050 | 2.98 | 2.34 | **Pipe Channel, D - E**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014 |
| 0.2 | 32 | 0.0050 | 2.98 | 2.34 | **Pipe Channel, E - F**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014 |
| 0.2 | 72 | 0.0200 | 5.96 | 4.68 | **Pipe Channel, F - G**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014 |
| 8.0 | 407 | Total | | | |

## Subcatchment PR-WS-1: PR WS-1



## Hydrograph for Subcatchment PR-WS-1: PR WS-1

| Time (hours) | Precip. (inches) | Excess (inches) | Runoff (cfs) |
|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 0.04 | 0.00 | 0.00 |
| 2.00 | 0.07 | 0.00 | 0.00 |
| 3.00 | 0.11 | 0.00 | 0.00 |
| 4.00 | 0.15 | 0.00 | 0.00 |
| 5.00 | 0.20 | 0.00 | 0.01 |
| 6.00 | 0.25 | 0.01 | 0.01 |
| 7.00 | 0.32 | 0.03 | 0.02 |
| 8.00 | 0.40 | 0.06 | 0.04 |
| 9.00 | 0.51 | 0.12 | 0.07 |
| 10.00 | 0.66 | 0.21 | 0.11 |
| 11.00 | 0.88 | 0.36 | 0.18 |
| 12.00 | 1.75 | 1.09 | **1.62** |
| 13.00 | 2.62 | 1.90 | **0.29** |
| 14.00 | 2.84 | 2.10 | 0.18 |
| 15.00 | 2.99 | 2.24 | 0.13 |
| 16.00 | 3.10 | 2.35 | 0.09 |
| 17.00 | 3.18 | 2.43 | 0.07 |
| 18.00 | 3.25 | 2.49 | 0.06 |
| 19.00 | 3.30 | 2.54 | 0.05 |
| 20.00 | 3.35 | 2.59 | 0.05 |
| 21.00 | 3.39 | 2.63 | 0.04 |
| 22.00 | 3.43 | 2.67 | 0.04 |
| 23.00 | 3.47 | 2.70 | 0.03 |
| 24.00 | **3.50** | **2.73** | 0.03 |
| 25.00 | 3.50 | 2.73 | 0.00 |
| 26.00 | 3.50 | 2.73 | 0.00 |
| 27.00 | 3.50 | 2.73 | 0.00 |
| 28.00 | 3.50 | 2.73 | 0.00 |
| 29.00 | 3.50 | 2.73 | 0.00 |
| 30.00 | 3.50 | 2.73 | 0.00 |
| 31.00 | 3.50 | 2.73 | 0.00 |
| 32.00 | 3.50 | 2.73 | 0.00 |
| 33.00 | 3.50 | 2.73 | 0.00 |
| 34.00 | 3.50 | 2.73 | 0.00 |
| 35.00 | 3.50 | 2.73 | 0.00 |
| 36.00 | 3.50 | 2.73 | 0.00 |
| 37.00 | 3.50 | 2.73 | 0.00 |
| 38.00 | 3.50 | 2.73 | 0.00 |
| 39.00 | 3.50 | 2.73 | 0.00 |
| 40.00 | 3.50 | 2.73 | 0.00 |
| 41.00 | 3.50 | 2.73 | 0.00 |
| 42.00 | 3.50 | 2.73 | 0.00 |
| 43.00 | 3.50 | 2.73 | 0.00 |
| 44.00 | 3.50 | 2.73 | 0.00 |
| 45.00 | 3.50 | 2.73 | 0.00 |
| 46.00 | 3.50 | 2.73 | 0.00 |
| 47.00 | 3.50 | 2.73 | 0.00 |
| 48.00 | 3.50 | 2.73 | 0.00 |
| 49.00 | 3.50 | 2.73 | 0.00 |
| 50.00 | 3.50 | 2.73 | 0.00 |
| 51.00 | 3.50 | 2.73 | 0.00 |
| 52.00 | 3.50 | 2.73 | 0.00 |
| 53.00 | 3.50 | 2.73 | 0.00 |
| 54.00 | 3.50 | 2.73 | 0.00 |
| 55.00 | 3.50 | 2.73 | 0.00 |
| 56.00 | 3.50 | 2.73 | 0.00 |
| 57.00 | 3.50 | 2.73 | 0.00 |
| 58.00 | 3.50 | 2.73 | 0.00 |
| 59.00 | 3.50 | 2.73 | 0.00 |
| 60.00 | 3.50 | 2.73 | 0.00 |
| 61.00 | 3.50 | 2.73 | 0.00 |
| 62.00 | 3.50 | 2.73 | 0.00 |
| 63.00 | 3.50 | 2.73 | 0.00 |
| 64.00 | 3.50 | 2.73 | 0.00 |
| 65.00 | 3.50 | 2.73 | 0.00 |
| 66.00 | 3.50 | 2.73 | 0.00 |
| 67.00 | 3.50 | 2.73 | 0.00 |
| 68.00 | 3.50 | 2.73 | 0.00 |
| 69.00 | 3.50 | 2.73 | 0.00 |
| 70.00 | 3.50 | 2.73 | 0.00 |
| 71.00 | 3.50 | 2.73 | 0.00 |
| 72.00 | 3.50 | 2.73 | 0.00 |
| 73.00 | 3.50 | 2.73 | 0.00 |
| 74.00 | 3.50 | 2.73 | 0.00 |
| 75.00 | 3.50 | 2.73 | 0.00 |
| 76.00 | 3.50 | 2.73 | 0.00 |
| 77.00 | 3.50 | 2.73 | 0.00 |
| 78.00 | 3.50 | 2.73 | 0.00 |
| 79.00 | 3.50 | 2.73 | 0.00 |
| 80.00 | 3.50 | 2.73 | 0.00 |
| 81.00 | 3.50 | 2.73 | 0.00 |
| 82.00 | 3.50 | 2.73 | 0.00 |
| 83.00 | 3.50 | 2.73 | 0.00 |
| 84.00 | 3.50 | 2.73 | 0.00 |
| 85.00 | 3.50 | 2.73 | 0.00 |
| 86.00 | 3.50 | 2.73 | 0.00 |
| 87.00 | 3.50 | 2.73 | 0.00 |
| 88.00 | 3.50 | 2.73 | 0.00 |
| 89.00 | 3.50 | 2.73 | 0.00 |
| 90.00 | 3.50 | 2.73 | 0.00 |
| 91.00 | 3.50 | 2.73 | 0.00 |
| 92.00 | 3.50 | 2.73 | 0.00 |
| 93.00 | 3.50 | 2.73 | 0.00 |
| 94.00 | 3.50 | 2.73 | 0.00 |
| 95.00 | 3.50 | 2.73 | 0.00 |
| 96.00 | 3.50 | 2.73 | 0.00 |

## Summary for Subcatchment PR-WS-2: PR-WS-2

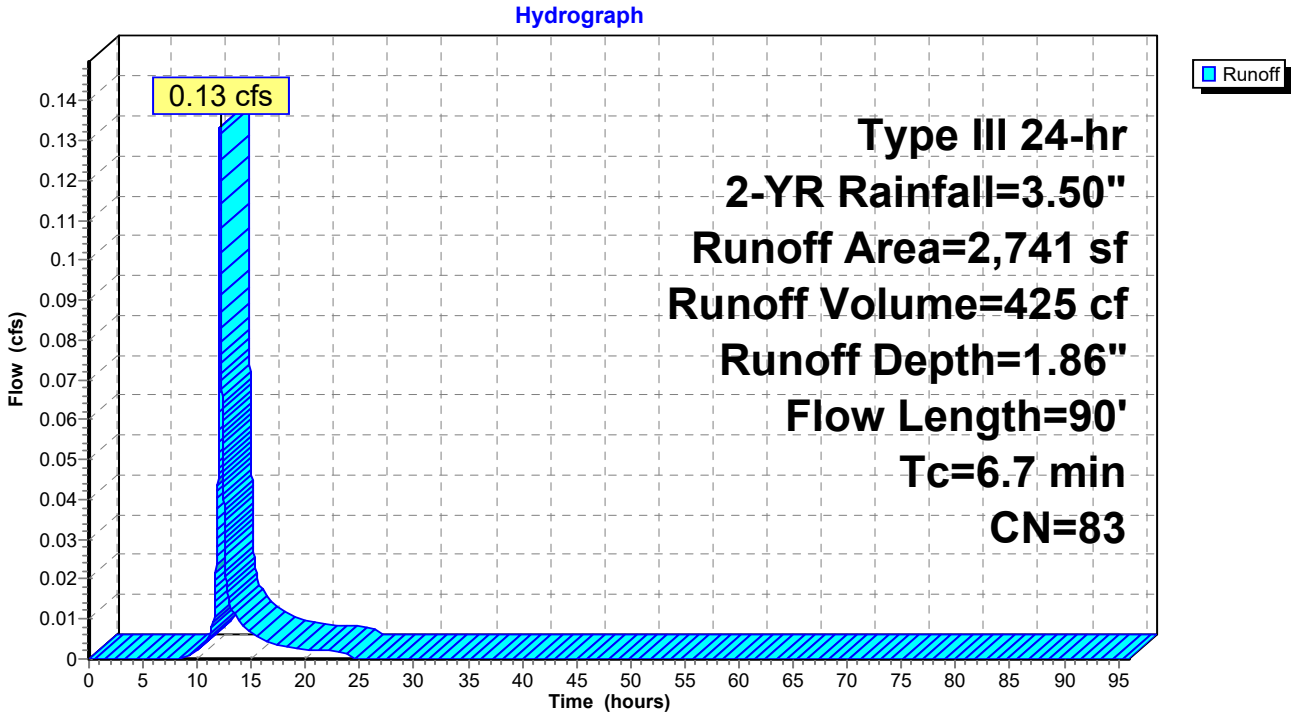
Runoff = 0.13 cfs @ 12.10 hrs, Volume= 425 cf, Depth= 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.50"

| Area (sf) | CN | Description |
|---|---|---|
| 131 | 98 | Paved parking, HSG D |
| 0 | 96 | Gravel surface, HSG D |
| 1,124 | 84 | 50-75% Grass cover, Fair, HSG D |
| 1,486 | 80 | >75% Grass cover, Good, HSG D |
| 2,741 | 83 | Weighted Average |
| 2,610 | | 95.22% Pervious Area |
| 131 | | 4.78% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.4 | 50 | 0.0130 | 0.13 | | **Sheet Flow, A - B**<br>Grass: Short n= 0.150 P2= 3.50" |
| 0.1 | 16 | 0.0130 | 1.84 | | **Shallow Concentrated Flow, B - C**<br>Unpaved Kv= 16.1 fps |
| 0.2 | 24 | 0.0150 | 2.49 | | **Shallow Concentrated Flow, C - D**<br>Paved Kv= 20.3 fps |
| 6.7 | 90 | Total | | | |

## Subcatchment PR-WS-2: PR-WS-2



## Hydrograph for Subcatchment PR-WS-2: PR-WS-2

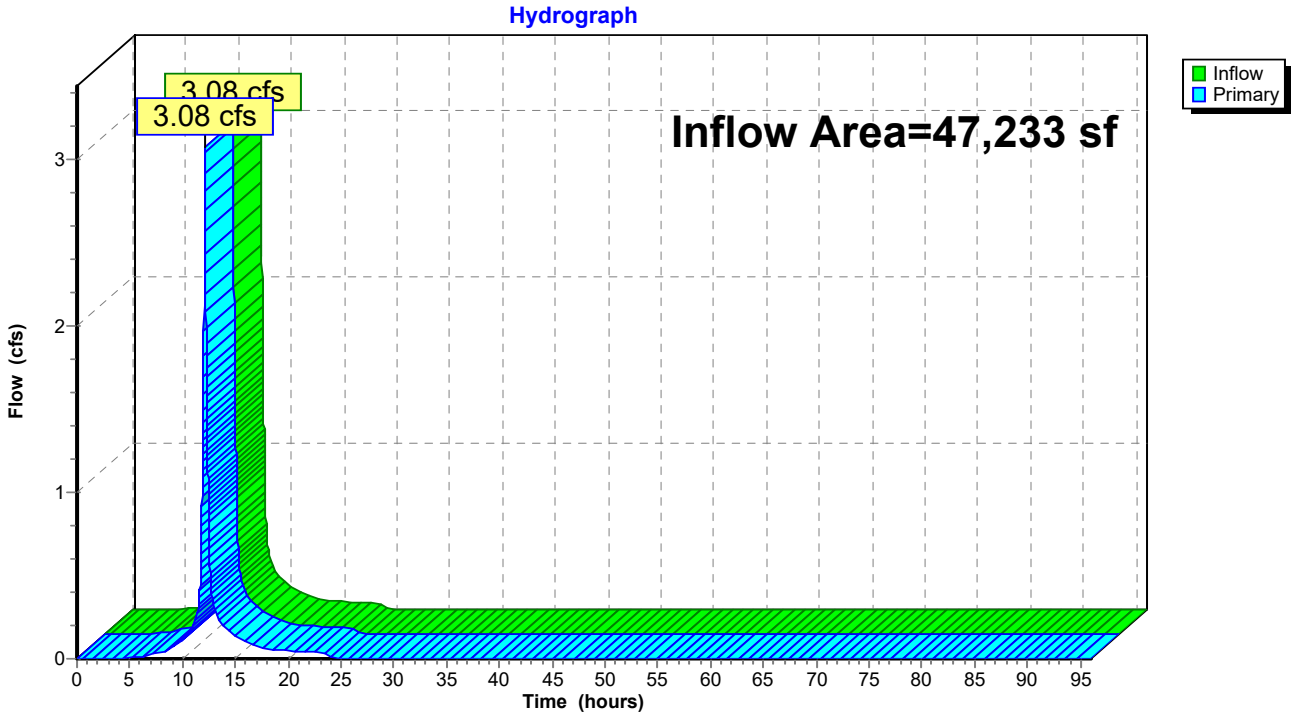
| Time (hours) | Precip. (inches) | Excess (inches) | Runoff (cfs) |
|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 0.04 | 0.00 | 0.00 |
| 2.00 | 0.07 | 0.00 | 0.00 |
| 3.00 | 0.11 | 0.00 | 0.00 |
| 4.00 | 0.15 | 0.00 | 0.00 |
| 5.00 | 0.20 | 0.00 | 0.00 |
| 6.00 | 0.25 | 0.00 | 0.00 |
| 7.00 | 0.32 | 0.00 | 0.00 |
| 8.00 | 0.40 | 0.00 | 0.00 |
| 9.00 | 0.51 | 0.00 | 0.00 |
| 10.00 | 0.66 | 0.03 | 0.00 |
| 11.00 | 0.88 | 0.09 | 0.01 |
| 12.00 | 1.75 | 0.53 | **0.07** |
| 13.00 | 2.62 | 1.15 | **0.01** |
| 14.00 | 2.84 | 1.32 | 0.01 |
| 15.00 | 2.99 | 1.44 | 0.01 |
| 16.00 | 3.10 | 1.53 | 0.00 |
| 17.00 | 3.18 | 1.60 | 0.00 |
| 18.00 | 3.25 | 1.65 | 0.00 |
| 19.00 | 3.30 | 1.69 | 0.00 |
| 20.00 | 3.35 | 1.73 | 0.00 |
| 21.00 | 3.39 | 1.77 | 0.00 |
| 22.00 | 3.43 | 1.80 | 0.00 |
| 23.00 | 3.47 | 1.83 | 0.00 |
| 24.00 | **3.50** | **1.86** | 0.00 |
| 25.00 | 3.50 | 1.86 | 0.00 |
| 26.00 | 3.50 | 1.86 | 0.00 |
| 27.00 | 3.50 | 1.86 | 0.00 |
| 28.00 | 3.50 | 1.86 | 0.00 |
| 29.00 | 3.50 | 1.86 | 0.00 |
| 30.00 | 3.50 | 1.86 | 0.00 |
| 31.00 | 3.50 | 1.86 | 0.00 |
| 32.00 | 3.50 | 1.86 | 0.00 |
| 33.00 | 3.50 | 1.86 | 0.00 |
| 34.00 | 3.50 | 1.86 | 0.00 |
| 35.00 | 3.50 | 1.86 | 0.00 |
| 36.00 | 3.50 | 1.86 | 0.00 |
| 37.00 | 3.50 | 1.86 | 0.00 |
| 38.00 | 3.50 | 1.86 | 0.00 |
| 39.00 | 3.50 | 1.86 | 0.00 |
| 40.00 | 3.50 | 1.86 | 0.00 |
| 41.00 | 3.50 | 1.86 | 0.00 |
| 42.00 | 3.50 | 1.86 | 0.00 |
| 43.00 | 3.50 | 1.86 | 0.00 |
| 44.00 | 3.50 | 1.86 | 0.00 |
| 45.00 | 3.50 | 1.86 | 0.00 |
| 46.00 | 3.50 | 1.86 | 0.00 |
| 47.00 | 3.50 | 1.86 | 0.00 |
| 48.00 | 3.50 | 1.86 | 0.00 |
| 49.00 | 3.50 | 1.86 | 0.00 |
| 50.00 | 3.50 | 1.86 | 0.00 |
| 51.00 | 3.50 | 1.86 | 0.00 |
| 52.00 | 3.50 | 1.86 | 0.00 |
| 53.00 | 3.50 | 1.86 | 0.00 |
| 54.00 | 3.50 | 1.86 | 0.00 |
| 55.00 | 3.50 | 1.86 | 0.00 |
| 56.00 | 3.50 | 1.86 | 0.00 |
| 57.00 | 3.50 | 1.86 | 0.00 |
| 58.00 | 3.50 | 1.86 | 0.00 |
| 59.00 | 3.50 | 1.86 | 0.00 |
| 60.00 | 3.50 | 1.86 | 0.00 |
| 61.00 | 3.50 | 1.86 | 0.00 |
| 62.00 | 3.50 | 1.86 | 0.00 |
| 63.00 | 3.50 | 1.86 | 0.00 |
| 64.00 | 3.50 | 1.86 | 0.00 |
| 65.00 | 3.50 | 1.86 | 0.00 |
| 66.00 | 3.50 | 1.86 | 0.00 |
| 67.00 | 3.50 | 1.86 | 0.00 |
| 68.00 | 3.50 | 1.86 | 0.00 |
| 69.00 | 3.50 | 1.86 | 0.00 |
| 70.00 | 3.50 | 1.86 | 0.00 |
| 71.00 | 3.50 | 1.86 | 0.00 |
| 72.00 | 3.50 | 1.86 | 0.00 |
| 73.00 | 3.50 | 1.86 | 0.00 |
| 74.00 | 3.50 | 1.86 | 0.00 |
| 75.00 | 3.50 | 1.86 | 0.00 |
| 76.00 | 3.50 | 1.86 | 0.00 |
| 77.00 | 3.50 | 1.86 | 0.00 |
| 78.00 | 3.50 | 1.86 | 0.00 |
| 79.00 | 3.50 | 1.86 | 0.00 |
| 80.00 | 3.50 | 1.86 | 0.00 |
| 81.00 | 3.50 | 1.86 | 0.00 |
| 82.00 | 3.50 | 1.86 | 0.00 |
| 83.00 | 3.50 | 1.86 | 0.00 |
| 84.00 | 3.50 | 1.86 | 0.00 |
| 85.00 | 3.50 | 1.86 | 0.00 |
| 86.00 | 3.50 | 1.86 | 0.00 |
| 87.00 | 3.50 | 1.86 | 0.00 |
| 88.00 | 3.50 | 1.86 | 0.00 |
| 89.00 | 3.50 | 1.86 | 0.00 |
| 90.00 | 3.50 | 1.86 | 0.00 |
| 91.00 | 3.50 | 1.86 | 0.00 |
| 92.00 | 3.50 | 1.86 | 0.00 |
| 93.00 | 3.50 | 1.86 | 0.00 |
| 94.00 | 3.50 | 1.86 | 0.00 |
| 95.00 | 3.50 | 1.86 | 0.00 |
| 96.00 | 3.50 | 1.86 | 0.00 |

## Summary for Link POA 1: POA-1

Inflow Area = 47,233 sf, 60.89% Impervious, Inflow Depth = 2.68" for 2-YR event
Inflow = 3.08 cfs @ 12.11 hrs, Volume= 10,565 cf
Primary = 3.08 cfs @ 12.11 hrs, Volume= 10,565 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

## Link POA 1: POA-1



## Hydrograph for Link POA 1: POA-1

| Time (hours) | Inflow (cfs) | Elevation (feet) | Primary (cfs) | Time (hours) | Inflow (cfs) | Elevation (feet) | Primary (cfs) |
|---|---|---|---|---|---|---|---|
| 0.00 | 0.00 | **0.00** | 0.00 | 53.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 0.00 | 0.00 | 0.00 | 54.00 | 0.00 | 0.00 | 0.00 |
| 2.00 | 0.00 | 0.00 | 0.00 | 55.00 | 0.00 | 0.00 | 0.00 |
| 3.00 | 0.00 | 0.00 | 0.00 | 56.00 | 0.00 | 0.00 | 0.00 |
| 4.00 | 0.00 | 0.00 | 0.00 | 57.00 | 0.00 | 0.00 | 0.00 |
| 5.00 | 0.01 | 0.00 | 0.01 | 58.00 | 0.00 | 0.00 | 0.00 |
| 6.00 | 0.01 | 0.00 | 0.01 | 59.00 | 0.00 | 0.00 | 0.00 |
| 7.00 | 0.02 | 0.00 | 0.02 | 60.00 | 0.00 | 0.00 | 0.00 |
| 8.00 | 0.04 | 0.00 | 0.04 | 61.00 | 0.00 | 0.00 | 0.00 |
| 9.00 | 0.07 | 0.00 | 0.07 | 62.00 | 0.00 | 0.00 | 0.00 |
| 10.00 | 0.11 | 0.00 | 0.11 | 63.00 | 0.00 | 0.00 | 0.00 |
| 11.00 | 0.19 | 0.00 | 0.19 | 64.00 | 0.00 | 0.00 | 0.00 |
| 12.00 | **1.70** | 0.00 | **1.70** | 65.00 | 0.00 | 0.00 | 0.00 |
| 13.00 | **0.30** | 0.00 | **0.30** | 66.00 | 0.00 | 0.00 | 0.00 |
| 14.00 | 0.19 | 0.00 | 0.19 | 67.00 | 0.00 | 0.00 | 0.00 |
| 15.00 | 0.14 | 0.00 | 0.14 | 68.00 | 0.00 | 0.00 | 0.00 |
| 16.00 | 0.10 | 0.00 | 0.10 | 69.00 | 0.00 | 0.00 | 0.00 |
| 17.00 | 0.08 | 0.00 | 0.08 | 70.00 | 0.00 | 0.00 | 0.00 |
| 18.00 | 0.06 | 0.00 | 0.06 | 71.00 | 0.00 | 0.00 | 0.00 |
| 19.00 | 0.05 | 0.00 | 0.05 | 72.00 | 0.00 | 0.00 | 0.00 |
| 20.00 | 0.05 | 0.00 | 0.05 | 73.00 | 0.00 | 0.00 | 0.00 |
| 21.00 | 0.04 | 0.00 | 0.04 | 74.00 | 0.00 | 0.00 | 0.00 |
| 22.00 | 0.04 | 0.00 | 0.04 | 75.00 | 0.00 | 0.00 | 0.00 |
| 23.00 | 0.04 | 0.00 | 0.04 | 76.00 | 0.00 | 0.00 | 0.00 |
| 24.00 | 0.03 | 0.00 | 0.03 | 77.00 | 0.00 | 0.00 | 0.00 |
| 25.00 | 0.00 | 0.00 | 0.00 | 78.00 | 0.00 | 0.00 | 0.00 |
| 26.00 | 0.00 | 0.00 | 0.00 | 79.00 | 0.00 | 0.00 | 0.00 |
| 27.00 | 0.00 | 0.00 | 0.00 | 80.00 | 0.00 | 0.00 | 0.00 |
| 28.00 | 0.00 | 0.00 | 0.00 | 81.00 | 0.00 | 0.00 | 0.00 |
| 29.00 | 0.00 | 0.00 | 0.00 | 82.00 | 0.00 | 0.00 | 0.00 |
| 30.00 | 0.00 | 0.00 | 0.00 | 83.00 | 0.00 | 0.00 | 0.00 |
| 31.00 | 0.00 | 0.00 | 0.00 | 84.00 | 0.00 | 0.00 | 0.00 |
| 32.00 | 0.00 | 0.00 | 0.00 | 85.00 | 0.00 | 0.00 | 0.00 |
| 33.00 | 0.00 | 0.00 | 0.00 | 86.00 | 0.00 | 0.00 | 0.00 |
| 34.00 | 0.00 | 0.00 | 0.00 | 87.00 | 0.00 | 0.00 | 0.00 |
| 35.00 | 0.00 | 0.00 | 0.00 | 88.00 | 0.00 | 0.00 | 0.00 |
| 36.00 | 0.00 | 0.00 | 0.00 | 89.00 | 0.00 | 0.00 | 0.00 |
| 37.00 | 0.00 | 0.00 | 0.00 | 90.00 | 0.00 | 0.00 | 0.00 |
| 38.00 | 0.00 | 0.00 | 0.00 | 91.00 | 0.00 | 0.00 | 0.00 |
| 39.00 | 0.00 | 0.00 | 0.00 | 92.00 | 0.00 | 0.00 | 0.00 |
| 40.00 | 0.00 | 0.00 | 0.00 | 93.00 | 0.00 | 0.00 | 0.00 |
| 41.00 | 0.00 | 0.00 | 0.00 | 94.00 | 0.00 | 0.00 | 0.00 |
| 42.00 | 0.00 | 0.00 | 0.00 | 95.00 | 0.00 | 0.00 | 0.00 |
| 43.00 | 0.00 | 0.00 | 0.00 | 96.00 | 0.00 | 0.00 | 0.00 |
| 44.00 | 0.00 | 0.00 | 0.00 | | | | |
| 45.00 | 0.00 | 0.00 | 0.00 | | | | |
| 46.00 | 0.00 | 0.00 | 0.00 | | | | |
| 47.00 | 0.00 | 0.00 | 0.00 | | | | |
| 48.00 | 0.00 | 0.00 | 0.00 | | | | |
| 49.00 | 0.00 | 0.00 | 0.00 | | | | |
| 50.00 | 0.00 | 0.00 | 0.00 | | | | |
| 51.00 | 0.00 | 0.00 | 0.00 | | | | |
| 52.00 | 0.00 | 0.00 | 0.00 | | | | |

Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment PR-WS-1: PR WS-1** Runoff Area=44,492 sf 64.34% Impervious Runoff Depth=4.05"
Flow Length=407' Tc=8.0 min CN=93 Runoff=4.27 cfs 15,019 cf

**Subcatchment PR-WS-2: PR-WS-2** Runoff Area=2,741 sf 4.78% Impervious Runoff Depth=3.04"
Flow Length=90' Tc=6.7 min CN=83 Runoff=0.22 cfs 694 cf

**Link POA 1: POA-1** Inflow=4.49 cfs 15,713 cf
Primary=4.49 cfs 15,713 cf

**Total Runoff Area = 47,233 sf Runoff Volume = 15,713 cf Average Runoff Depth = 3.99"**
**39.11% Pervious = 18,474 sf 60.89% Impervious = 28,759 sf**

## Summary for Subcatchment PR-WS-1: PR WS-1

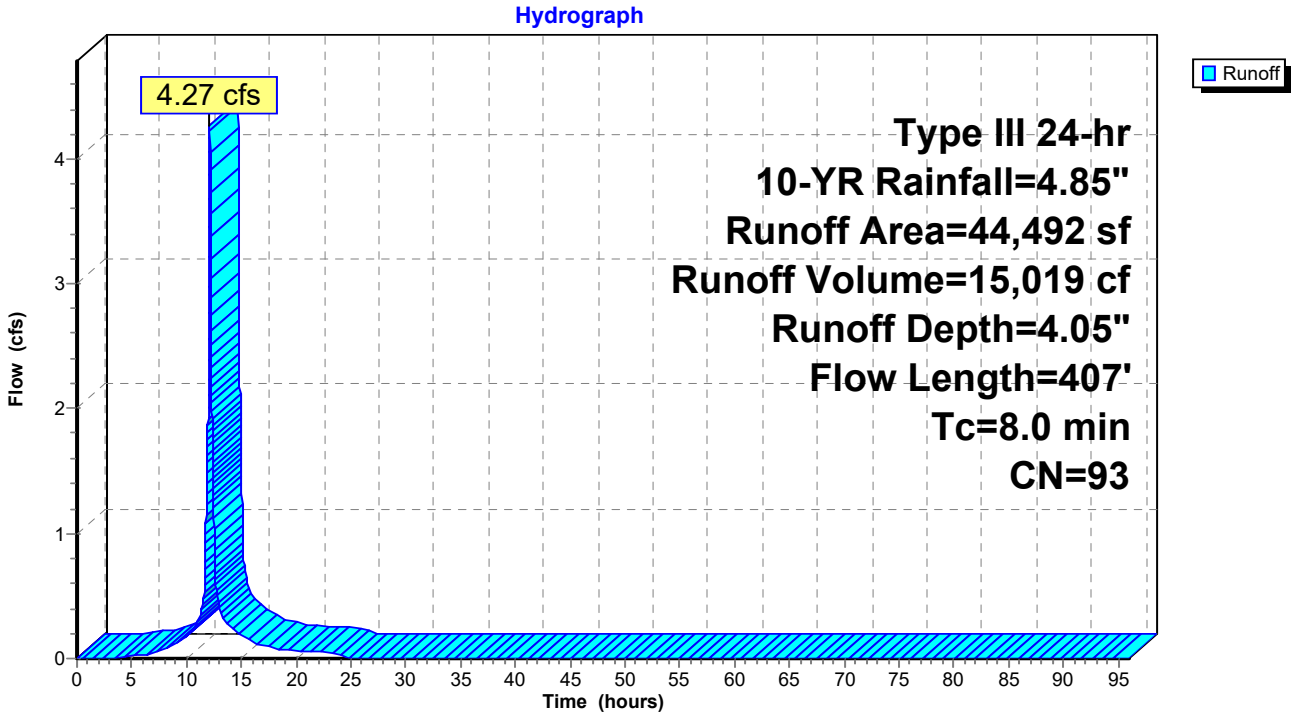
Runoff = 4.27 cfs @ 12.11 hrs, Volume= 15,019 cf, Depth= 4.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.85"

| Area (sf) | CN | Description |
|---|---|---|
| 28,628 | 98 | Paved parking, HSG D |
| 799 | 96 | Gravel surface, HSG D |
| 12,861 | 84 | 50-75% Grass cover, Fair, HSG D |
| 2,204 | 80 | >75% Grass cover, Good, HSG D |
| 44,492 | 93 | Weighted Average |
| 15,864 | | 35.66% Pervious Area |
| 28,628 | | 64.34% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | 50 | 0.0150 | 0.14 | | **Sheet Flow, A - B**<br>Grass: Short n= 0.150 P2= 3.50" |
| 0.2 | 17 | 0.0100 | 1.61 | | **Shallow Concentrated Flow, B - C**<br>Unpaved Kv= 16.1 fps |
| 0.5 | 79 | 0.0170 | 2.65 | | **Shallow Concentrated Flow, C - D**<br>Paved Kv= 20.3 fps |
| 0.9 | 157 | 0.0050 | 2.98 | 2.34 | **Pipe Channel, D - E**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014 |
| 0.2 | 32 | 0.0050 | 2.98 | 2.34 | **Pipe Channel, E - F**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014 |
| 0.2 | 72 | 0.0200 | 5.96 | 4.68 | **Pipe Channel, F - G**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014 |
| 8.0 | 407 | Total | | | |

## Subcatchment PR-WS-1: PR WS-1



## Hydrograph for Subcatchment PR-WS-1: PR WS-1

| Time (hours) | Precip. (inches) | Excess (inches) | Runoff (cfs) |
|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 0.05 | 0.00 | 0.00 |
| 2.00 | 0.10 | 0.00 | 0.00 |
| 3.00 | 0.15 | 0.00 | 0.00 |
| 4.00 | 0.21 | 0.00 | 0.01 |
| 5.00 | 0.28 | 0.02 | 0.02 |
| 6.00 | 0.35 | 0.04 | 0.03 |
| 7.00 | 0.44 | 0.08 | 0.05 |
| 8.00 | 0.55 | 0.14 | 0.07 |
| 9.00 | 0.71 | 0.24 | 0.12 |
| 10.00 | 0.92 | 0.39 | 0.18 |
| 11.00 | 1.21 | 0.62 | 0.29 |
| 12.00 | 2.42 | 1.71 | **2.38** |
| 13.00 | 3.64 | 2.87 | **0.41** |
| 14.00 | 3.93 | 3.16 | 0.25 |
| 15.00 | 4.14 | 3.36 | 0.19 |
| 16.00 | 4.30 | 3.51 | 0.13 |
| 17.00 | 4.41 | 3.62 | 0.11 |
| 18.00 | 4.50 | 3.71 | 0.08 |
| 19.00 | 4.57 | 3.78 | 0.07 |
| 20.00 | 4.64 | 3.85 | 0.06 |
| 21.00 | 4.70 | 3.91 | 0.06 |
| 22.00 | 4.76 | 3.96 | 0.05 |
| 23.00 | 4.81 | 4.01 | 0.05 |
| 24.00 | **4.85** | **4.05** | 0.04 |
| 25.00 | 4.85 | 4.05 | 0.00 |
| 26.00 | 4.85 | 4.05 | 0.00 |
| 27.00 | 4.85 | 4.05 | 0.00 |
| 28.00 | 4.85 | 4.05 | 0.00 |
| 29.00 | 4.85 | 4.05 | 0.00 |
| 30.00 | 4.85 | 4.05 | 0.00 |
| 31.00 | 4.85 | 4.05 | 0.00 |
| 32.00 | 4.85 | 4.05 | 0.00 |
| 33.00 | 4.85 | 4.05 | 0.00 |
| 34.00 | 4.85 | 4.05 | 0.00 |
| 35.00 | 4.85 | 4.05 | 0.00 |
| 36.00 | 4.85 | 4.05 | 0.00 |
| 37.00 | 4.85 | 4.05 | 0.00 |
| 38.00 | 4.85 | 4.05 | 0.00 |
| 39.00 | 4.85 | 4.05 | 0.00 |
| 40.00 | 4.85 | 4.05 | 0.00 |
| 41.00 | 4.85 | 4.05 | 0.00 |
| 42.00 | 4.85 | 4.05 | 0.00 |
| 43.00 | 4.85 | 4.05 | 0.00 |
| 44.00 | 4.85 | 4.05 | 0.00 |
| 45.00 | 4.85 | 4.05 | 0.00 |
| 46.00 | 4.85 | 4.05 | 0.00 |
| 47.00 | 4.85 | 4.05 | 0.00 |
| 48.00 | 4.85 | 4.05 | 0.00 |
| 49.00 | 4.85 | 4.05 | 0.00 |
| 50.00 | 4.85 | 4.05 | 0.00 |
| 51.00 | 4.85 | 4.05 | 0.00 |
| 52.00 | 4.85 | 4.05 | 0.00 |
| 53.00 | 4.85 | 4.05 | 0.00 |
| 54.00 | 4.85 | 4.05 | 0.00 |
| 55.00 | 4.85 | 4.05 | 0.00 |
| 56.00 | 4.85 | 4.05 | 0.00 |
| 57.00 | 4.85 | 4.05 | 0.00 |
| 58.00 | 4.85 | 4.05 | 0.00 |
| 59.00 | 4.85 | 4.05 | 0.00 |
| 60.00 | 4.85 | 4.05 | 0.00 |
| 61.00 | 4.85 | 4.05 | 0.00 |
| 62.00 | 4.85 | 4.05 | 0.00 |
| 63.00 | 4.85 | 4.05 | 0.00 |
| 64.00 | 4.85 | 4.05 | 0.00 |
| 65.00 | 4.85 | 4.05 | 0.00 |
| 66.00 | 4.85 | 4.05 | 0.00 |
| 67.00 | 4.85 | 4.05 | 0.00 |
| 68.00 | 4.85 | 4.05 | 0.00 |
| 69.00 | 4.85 | 4.05 | 0.00 |
| 70.00 | 4.85 | 4.05 | 0.00 |
| 71.00 | 4.85 | 4.05 | 0.00 |
| 72.00 | 4.85 | 4.05 | 0.00 |
| 73.00 | 4.85 | 4.05 | 0.00 |
| 74.00 | 4.85 | 4.05 | 0.00 |
| 75.00 | 4.85 | 4.05 | 0.00 |
| 76.00 | 4.85 | 4.05 | 0.00 |
| 77.00 | 4.85 | 4.05 | 0.00 |
| 78.00 | 4.85 | 4.05 | 0.00 |
| 79.00 | 4.85 | 4.05 | 0.00 |
| 80.00 | 4.85 | 4.05 | 0.00 |
| 81.00 | 4.85 | 4.05 | 0.00 |
| 82.00 | 4.85 | 4.05 | 0.00 |
| 83.00 | 4.85 | 4.05 | 0.00 |
| 84.00 | 4.85 | 4.05 | 0.00 |
| 85.00 | 4.85 | 4.05 | 0.00 |
| 86.00 | 4.85 | 4.05 | 0.00 |
| 87.00 | 4.85 | 4.05 | 0.00 |
| 88.00 | 4.85 | 4.05 | 0.00 |
| 89.00 | 4.85 | 4.05 | 0.00 |
| 90.00 | 4.85 | 4.05 | 0.00 |
| 91.00 | 4.85 | 4.05 | 0.00 |
| 92.00 | 4.85 | 4.05 | 0.00 |
| 93.00 | 4.85 | 4.05 | 0.00 |
| 94.00 | 4.85 | 4.05 | 0.00 |
| 95.00 | 4.85 | 4.05 | 0.00 |
| 96.00 | 4.85 | 4.05 | 0.00 |

## Summary for Subcatchment PR-WS-2: PR-WS-2

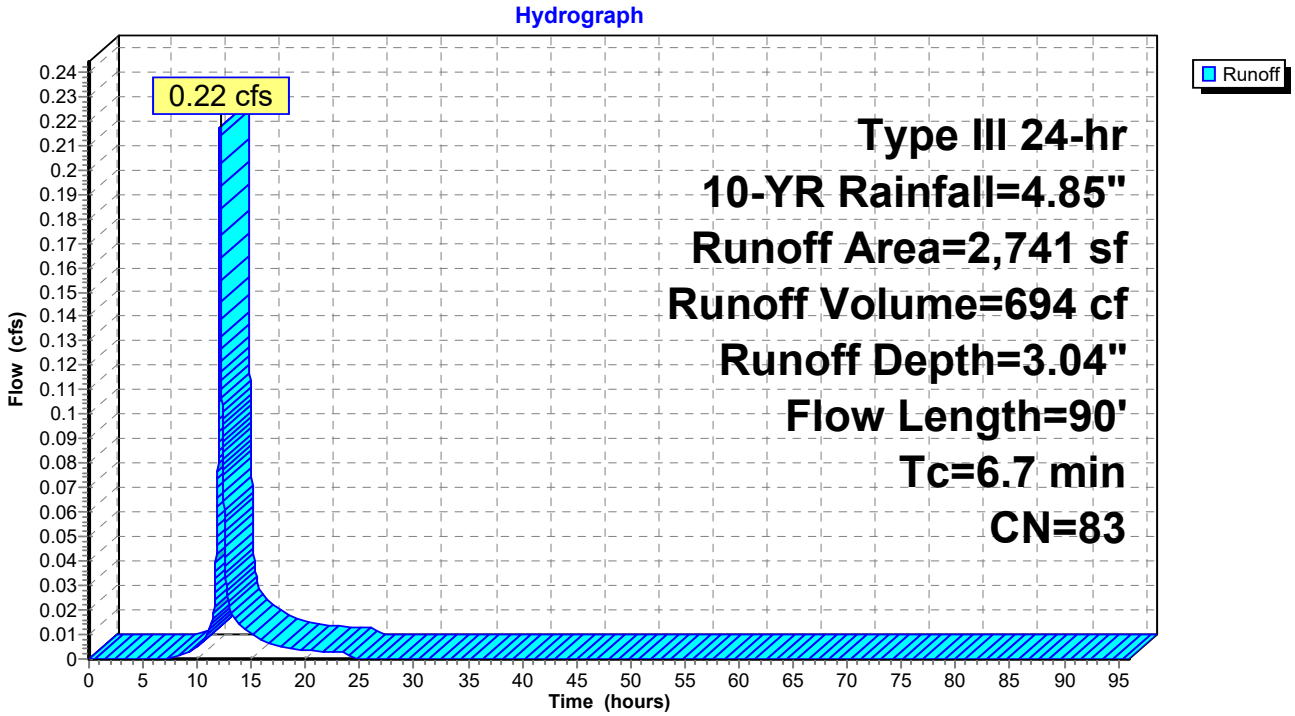
Runoff = 0.22 cfs @ 12.10 hrs, Volume= 694 cf, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=4.85"

| Area (sf) | CN | Description |
|---|---|---|
| 131 | 98 | Paved parking, HSG D |
| 0 | 96 | Gravel surface, HSG D |
| 1,124 | 84 | 50-75% Grass cover, Fair, HSG D |
| 1,486 | 80 | >75% Grass cover, Good, HSG D |
| 2,741 | 83 | Weighted Average |
| 2,610 | | 95.22% Pervious Area |
| 131 | | 4.78% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.4 | 50 | 0.0130 | 0.13 | | **Sheet Flow, A - B**<br>Grass: Short n= 0.150 P2= 3.50" |
| 0.1 | 16 | 0.0130 | 1.84 | | **Shallow Concentrated Flow, B - C**<br>Unpaved Kv= 16.1 fps |
| 0.2 | 24 | 0.0150 | 2.49 | | **Shallow Concentrated Flow, C - D**<br>Paved Kv= 20.3 fps |
| 6.7 | 90 | Total | | | |

## Subcatchment PR-WS-2: PR-WS-2



## Hydrograph for Subcatchment PR-WS-2: PR-WS-2

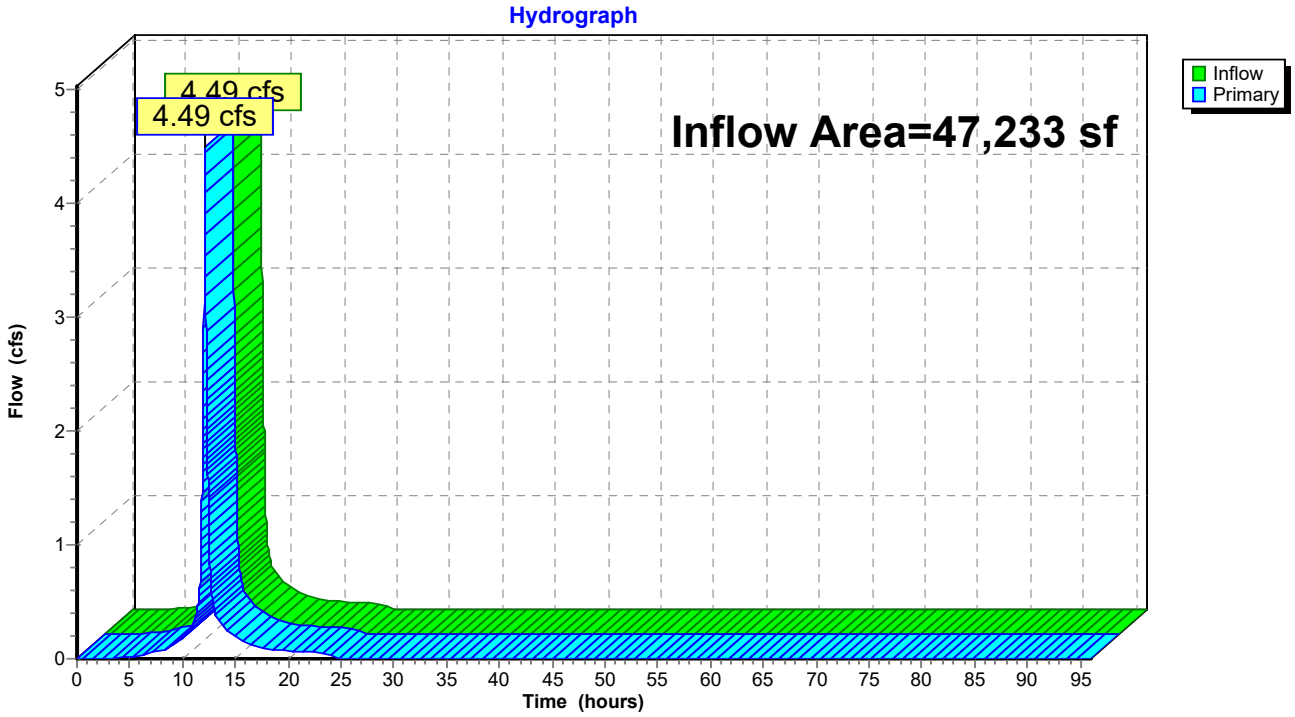
| Time (hours) | Precip. (inches) | Excess (inches) | Runoff (cfs) | Time (hours) | Precip. (inches) | Excess (inches) | Runoff (cfs) |
|---|---|---|---|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 | 53.00 | 4.85 | 3.04 | 0.00 |
| 1.00 | 0.05 | 0.00 | 0.00 | 54.00 | 4.85 | 3.04 | 0.00 |
| 2.00 | 0.10 | 0.00 | 0.00 | 55.00 | 4.85 | 3.04 | 0.00 |
| 3.00 | 0.15 | 0.00 | 0.00 | 56.00 | 4.85 | 3.04 | 0.00 |
| 4.00 | 0.21 | 0.00 | 0.00 | 57.00 | 4.85 | 3.04 | 0.00 |
| 5.00 | 0.28 | 0.00 | 0.00 | 58.00 | 4.85 | 3.04 | 0.00 |
| 6.00 | 0.35 | 0.00 | 0.00 | 59.00 | 4.85 | 3.04 | 0.00 |
| 7.00 | 0.44 | 0.00 | 0.00 | 60.00 | 4.85 | 3.04 | 0.00 |
| 8.00 | 0.55 | 0.01 | 0.00 | 61.00 | 4.85 | 3.04 | 0.00 |
| 9.00 | 0.71 | 0.04 | 0.00 | 62.00 | 4.85 | 3.04 | 0.00 |
| 10.00 | 0.92 | 0.10 | 0.01 | 63.00 | 4.85 | 3.04 | 0.00 |
| 11.00 | 1.21 | 0.23 | 0.01 | 64.00 | 4.85 | 3.04 | 0.00 |
| 12.00 | 2.42 | 1.00 | **0.12** | 65.00 | 4.85 | 3.04 | 0.00 |
| 13.00 | 3.64 | 1.97 | **0.02** | 66.00 | 4.85 | 3.04 | 0.00 |
| 14.00 | 3.93 | 2.23 | 0.01 | 67.00 | 4.85 | 3.04 | 0.00 |
| 15.00 | 4.14 | 2.41 | 0.01 | 68.00 | 4.85 | 3.04 | 0.00 |
| 16.00 | 4.30 | 2.55 | 0.01 | 69.00 | 4.85 | 3.04 | 0.00 |
| 17.00 | 4.41 | 2.65 | 0.01 | 70.00 | 4.85 | 3.04 | 0.00 |
| 18.00 | 4.50 | 2.73 | 0.00 | 71.00 | 4.85 | 3.04 | 0.00 |
| 19.00 | 4.57 | 2.79 | 0.00 | 72.00 | 4.85 | 3.04 | 0.00 |
| 20.00 | 4.64 | 2.85 | 0.00 | 73.00 | 4.85 | 3.04 | 0.00 |
| 21.00 | 4.70 | 2.91 | 0.00 | 74.00 | 4.85 | 3.04 | 0.00 |
| 22.00 | 4.76 | 2.95 | 0.00 | 75.00 | 4.85 | 3.04 | 0.00 |
| 23.00 | 4.81 | 3.00 | 0.00 | 76.00 | 4.85 | 3.04 | 0.00 |
| 24.00 | **4.85** | **3.04** | 0.00 | 77.00 | 4.85 | 3.04 | 0.00 |
| 25.00 | 4.85 | 3.04 | 0.00 | 78.00 | 4.85 | 3.04 | 0.00 |
| 26.00 | 4.85 | 3.04 | 0.00 | 79.00 | 4.85 | 3.04 | 0.00 |
| 27.00 | 4.85 | 3.04 | 0.00 | 80.00 | 4.85 | 3.04 | 0.00 |
| 28.00 | 4.85 | 3.04 | 0.00 | 81.00 | 4.85 | 3.04 | 0.00 |
| 29.00 | 4.85 | 3.04 | 0.00 | 82.00 | 4.85 | 3.04 | 0.00 |
| 30.00 | 4.85 | 3.04 | 0.00 | 83.00 | 4.85 | 3.04 | 0.00 |
| 31.00 | 4.85 | 3.04 | 0.00 | 84.00 | 4.85 | 3.04 | 0.00 |
| 32.00 | 4.85 | 3.04 | 0.00 | 85.00 | 4.85 | 3.04 | 0.00 |
| 33.00 | 4.85 | 3.04 | 0.00 | 86.00 | 4.85 | 3.04 | 0.00 |
| 34.00 | 4.85 | 3.04 | 0.00 | 87.00 | 4.85 | 3.04 | 0.00 |
| 35.00 | 4.85 | 3.04 | 0.00 | 88.00 | 4.85 | 3.04 | 0.00 |
| 36.00 | 4.85 | 3.04 | 0.00 | 89.00 | 4.85 | 3.04 | 0.00 |
| 37.00 | 4.85 | 3.04 | 0.00 | 90.00 | 4.85 | 3.04 | 0.00 |
| 38.00 | 4.85 | 3.04 | 0.00 | 91.00 | 4.85 | 3.04 | 0.00 |
| 39.00 | 4.85 | 3.04 | 0.00 | 92.00 | 4.85 | 3.04 | 0.00 |
| 40.00 | 4.85 | 3.04 | 0.00 | 93.00 | 4.85 | 3.04 | 0.00 |
| 41.00 | 4.85 | 3.04 | 0.00 | 94.00 | 4.85 | 3.04 | 0.00 |
| 42.00 | 4.85 | 3.04 | 0.00 | 95.00 | 4.85 | 3.04 | 0.00 |
| 43.00 | 4.85 | 3.04 | 0.00 | 96.00 | 4.85 | 3.04 | 0.00 |
| 44.00 | 4.85 | 3.04 | 0.00 | | | | |
| 45.00 | 4.85 | 3.04 | 0.00 | | | | |
| 46.00 | 4.85 | 3.04 | 0.00 | | | | |
| 47.00 | 4.85 | 3.04 | 0.00 | | | | |
| 48.00 | 4.85 | 3.04 | 0.00 | | | | |
| 49.00 | 4.85 | 3.04 | 0.00 | | | | |
| 50.00 | 4.85 | 3.04 | 0.00 | | | | |
| 51.00 | 4.85 | 3.04 | 0.00 | | | | |
| 52.00 | 4.85 | 3.04 | 0.00 | | | | |

## Summary for Link POA 1: POA-1

Inflow Area = 47,233 sf, 60.89% Impervious, Inflow Depth = 3.99" for 10-YR event
Inflow = 4.49 cfs @ 12.11 hrs, Volume= 15,713 cf
Primary = 4.49 cfs @ 12.11 hrs, Volume= 15,713 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

## Link POA 1: POA-1



## Hydrograph for Link POA 1: POA-1

| Time (hours) | Inflow (cfs) | Elevation (feet) | Primary (cfs) | Time (hours) | Inflow (cfs) | Elevation (feet) | Primary (cfs) |
|---|---|---|---|---|---|---|---|
| 0.00 | 0.00 | **0.00** | 0.00 | 53.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 0.00 | 0.00 | 0.00 | 54.00 | 0.00 | 0.00 | 0.00 |
| 2.00 | 0.00 | 0.00 | 0.00 | 55.00 | 0.00 | 0.00 | 0.00 |
| 3.00 | 0.00 | 0.00 | 0.00 | 56.00 | 0.00 | 0.00 | 0.00 |
| 4.00 | 0.01 | 0.00 | 0.01 | 57.00 | 0.00 | 0.00 | 0.00 |
| 5.00 | 0.02 | 0.00 | 0.02 | 58.00 | 0.00 | 0.00 | 0.00 |
| 6.00 | 0.03 | 0.00 | 0.03 | 59.00 | 0.00 | 0.00 | 0.00 |
| 7.00 | 0.05 | 0.00 | 0.05 | 60.00 | 0.00 | 0.00 | 0.00 |
| 8.00 | 0.07 | 0.00 | 0.07 | 61.00 | 0.00 | 0.00 | 0.00 |
| 9.00 | 0.12 | 0.00 | 0.12 | 62.00 | 0.00 | 0.00 | 0.00 |
| 10.00 | 0.18 | 0.00 | 0.18 | 63.00 | 0.00 | 0.00 | 0.00 |
| 11.00 | 0.30 | 0.00 | 0.30 | 64.00 | 0.00 | 0.00 | 0.00 |
| 12.00 | **2.51** | 0.00 | **2.51** | 65.00 | 0.00 | 0.00 | 0.00 |
| 13.00 | **0.43** | 0.00 | **0.43** | 66.00 | 0.00 | 0.00 | 0.00 |
| 14.00 | 0.27 | 0.00 | 0.27 | 67.00 | 0.00 | 0.00 | 0.00 |
| 15.00 | 0.20 | 0.00 | 0.20 | 68.00 | 0.00 | 0.00 | 0.00 |
| 16.00 | 0.14 | 0.00 | 0.14 | 69.00 | 0.00 | 0.00 | 0.00 |
| 17.00 | 0.11 | 0.00 | 0.11 | 70.00 | 0.00 | 0.00 | 0.00 |
| 18.00 | 0.09 | 0.00 | 0.09 | 71.00 | 0.00 | 0.00 | 0.00 |
| 19.00 | 0.08 | 0.00 | 0.08 | 72.00 | 0.00 | 0.00 | 0.00 |
| 20.00 | 0.07 | 0.00 | 0.07 | 73.00 | 0.00 | 0.00 | 0.00 |
| 21.00 | 0.06 | 0.00 | 0.06 | 74.00 | 0.00 | 0.00 | 0.00 |
| 22.00 | 0.06 | 0.00 | 0.06 | 75.00 | 0.00 | 0.00 | 0.00 |
| 23.00 | 0.05 | 0.00 | 0.05 | 76.00 | 0.00 | 0.00 | 0.00 |
| 24.00 | 0.04 | 0.00 | 0.04 | 77.00 | 0.00 | 0.00 | 0.00 |
| 25.00 | 0.00 | 0.00 | 0.00 | 78.00 | 0.00 | 0.00 | 0.00 |
| 26.00 | 0.00 | 0.00 | 0.00 | 79.00 | 0.00 | 0.00 | 0.00 |
| 27.00 | 0.00 | 0.00 | 0.00 | 80.00 | 0.00 | 0.00 | 0.00 |
| 28.00 | 0.00 | 0.00 | 0.00 | 81.00 | 0.00 | 0.00 | 0.00 |
| 29.00 | 0.00 | 0.00 | 0.00 | 82.00 | 0.00 | 0.00 | 0.00 |
| 30.00 | 0.00 | 0.00 | 0.00 | 83.00 | 0.00 | 0.00 | 0.00 |
| 31.00 | 0.00 | 0.00 | 0.00 | 84.00 | 0.00 | 0.00 | 0.00 |
| 32.00 | 0.00 | 0.00 | 0.00 | 85.00 | 0.00 | 0.00 | 0.00 |
| 33.00 | 0.00 | 0.00 | 0.00 | 86.00 | 0.00 | 0.00 | 0.00 |
| 34.00 | 0.00 | 0.00 | 0.00 | 87.00 | 0.00 | 0.00 | 0.00 |
| 35.00 | 0.00 | 0.00 | 0.00 | 88.00 | 0.00 | 0.00 | 0.00 |
| 36.00 | 0.00 | 0.00 | 0.00 | 89.00 | 0.00 | 0.00 | 0.00 |
| 37.00 | 0.00 | 0.00 | 0.00 | 90.00 | 0.00 | 0.00 | 0.00 |
| 38.00 | 0.00 | 0.00 | 0.00 | 91.00 | 0.00 | 0.00 | 0.00 |
| 39.00 | 0.00 | 0.00 | 0.00 | 92.00 | 0.00 | 0.00 | 0.00 |
| 40.00 | 0.00 | 0.00 | 0.00 | 93.00 | 0.00 | 0.00 | 0.00 |
| 41.00 | 0.00 | 0.00 | 0.00 | 94.00 | 0.00 | 0.00 | 0.00 |
| 42.00 | 0.00 | 0.00 | 0.00 | 95.00 | 0.00 | 0.00 | 0.00 |
| 43.00 | 0.00 | 0.00 | 0.00 | 96.00 | 0.00 | 0.00 | 0.00 |
| 44.00 | 0.00 | 0.00 | 0.00 | | | | |
| 45.00 | 0.00 | 0.00 | 0.00 | | | | |
| 46.00 | 0.00 | 0.00 | 0.00 | | | | |
| 47.00 | 0.00 | 0.00 | 0.00 | | | | |
| 48.00 | 0.00 | 0.00 | 0.00 | | | | |
| 49.00 | 0.00 | 0.00 | 0.00 | | | | |
| 50.00 | 0.00 | 0.00 | 0.00 | | | | |
| 51.00 | 0.00 | 0.00 | 0.00 | | | | |
| 52.00 | 0.00 | 0.00 | 0.00 | | | | |

Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment PR-WS-1: PR WS-1** Runoff Area=44,492 sf 64.34% Impervious Runoff Depth=6.32"
Flow Length=407' Tc=8.0 min CN=93 Runoff=6.50 cfs 23,432 cf

**Subcatchment PR-WS-2: PR-WS-2** Runoff Area=2,741 sf 4.78% Impervious Runoff Depth=5.17"
Flow Length=90' Tc=6.7 min CN=83 Runoff=0.36 cfs 1,181 cf

**Link POA 1: POA-1** Inflow=6.86 cfs 24,613 cf
Primary=6.86 cfs 24,613 cf

**Total Runoff Area = 47,233 sf Runoff Volume = 24,613 cf Average Runoff Depth = 6.25"**
**39.11% Pervious = 18,474 sf 60.89% Impervious = 28,759 sf**

## Summary for Subcatchment PR-WS-1: PR WS-1

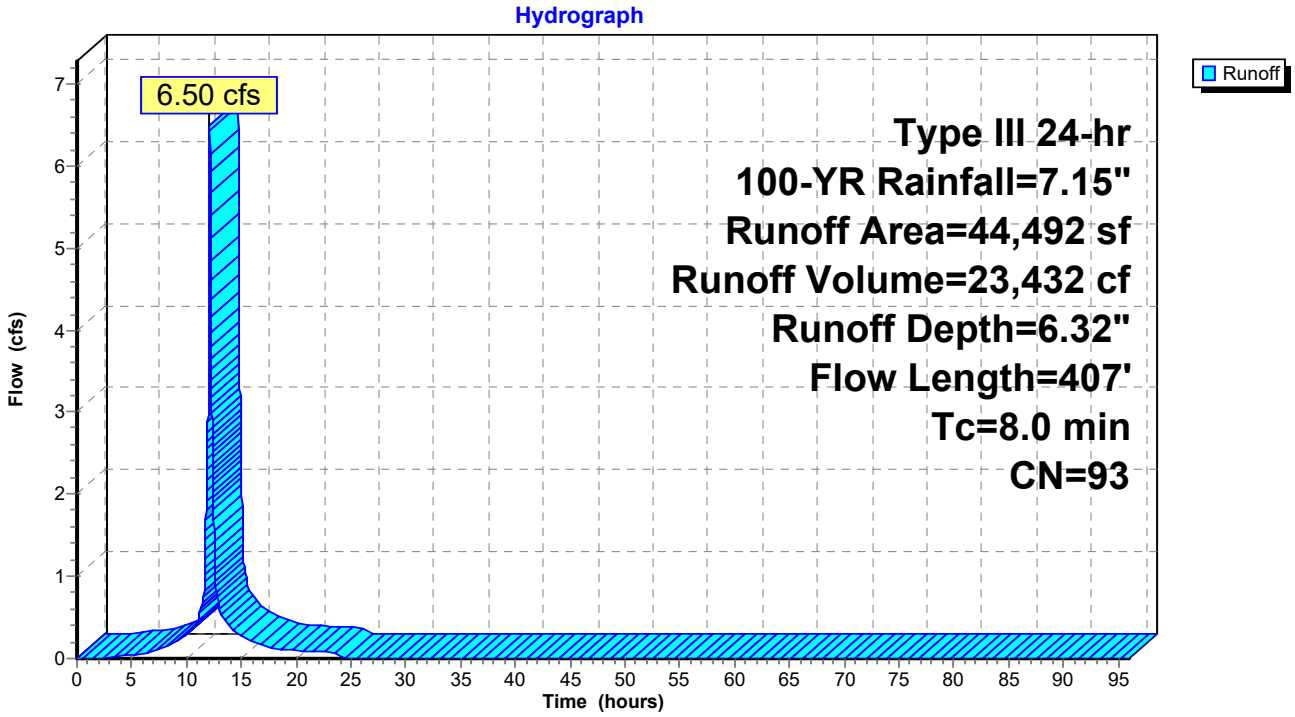
Runoff = 6.50 cfs @ 12.11 hrs, Volume= 23,432 cf, Depth= 6.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=7.15"

| Area (sf) | CN | Description |
|---|---|---|
| 28,628 | 98 | Paved parking, HSG D |
| 799 | 96 | Gravel surface, HSG D |
| 12,861 | 84 | 50-75% Grass cover, Fair, HSG D |
| 2,204 | 80 | >75% Grass cover, Good, HSG D |
| 44,492 | 93 | Weighted Average |
| 15,864 | | 35.66% Pervious Area |
| 28,628 | | 64.34% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | 50 | 0.0150 | 0.14 | | **Sheet Flow, A - B**<br>Grass: Short n= 0.150 P2= 3.50" |
| 0.2 | 17 | 0.0100 | 1.61 | | **Shallow Concentrated Flow, B - C**<br>Unpaved Kv= 16.1 fps |
| 0.5 | 79 | 0.0170 | 2.65 | | **Shallow Concentrated Flow, C - D**<br>Paved Kv= 20.3 fps |
| 0.9 | 157 | 0.0050 | 2.98 | 2.34 | **Pipe Channel, D - E**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014 |
| 0.2 | 32 | 0.0050 | 2.98 | 2.34 | **Pipe Channel, E - F**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014 |
| 0.2 | 72 | 0.0200 | 5.96 | 4.68 | **Pipe Channel, F - G**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.014 |
| 8.0 | 407 | Total | | | |

## Subcatchment PR-WS-1: PR WS-1



## Hydrograph for Subcatchment PR-WS-1: PR WS-1

| Time (hours) | Precip. (inches) | Excess (inches) | Runoff (cfs) |
|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 0.07 | 0.00 | 0.00 |
| 2.00 | 0.14 | 0.00 | 0.00 |
| 3.00 | 0.22 | 0.01 | 0.01 |
| 4.00 | 0.31 | 0.03 | 0.03 |
| 5.00 | 0.41 | 0.06 | 0.05 |
| 6.00 | 0.51 | 0.12 | 0.06 |
| 7.00 | 0.65 | 0.20 | 0.09 |
| 8.00 | 0.82 | 0.31 | 0.13 |
| 9.00 | 1.04 | 0.48 | 0.21 |
| 10.00 | 1.35 | 0.74 | 0.30 |
| 11.00 | 1.79 | 1.12 | 0.46 |
| 12.00 | 3.57 | 2.81 | **3.66** |
| 13.00 | 5.36 | 4.55 | **0.61** |
| 14.00 | 5.80 | 4.98 | 0.38 |
| 15.00 | 6.11 | 5.29 | 0.28 |
| 16.00 | 6.33 | 5.51 | 0.20 |
| 17.00 | 6.50 | 5.68 | 0.16 |
| 18.00 | 6.64 | 5.81 | 0.12 |
| 19.00 | 6.74 | 5.92 | 0.11 |
| 20.00 | 6.84 | 6.02 | 0.10 |
| 21.00 | 6.93 | 6.10 | 0.09 |
| 22.00 | 7.01 | 6.18 | 0.08 |
| 23.00 | 7.09 | 6.26 | 0.07 |
| 24.00 | **7.15** | **6.32** | 0.06 |
| 25.00 | 7.15 | 6.32 | 0.00 |
| 26.00 | 7.15 | 6.32 | 0.00 |
| 27.00 | 7.15 | 6.32 | 0.00 |
| 28.00 | 7.15 | 6.32 | 0.00 |
| 29.00 | 7.15 | 6.32 | 0.00 |
| 30.00 | 7.15 | 6.32 | 0.00 |
| 31.00 | 7.15 | 6.32 | 0.00 |
| 32.00 | 7.15 | 6.32 | 0.00 |
| 33.00 | 7.15 | 6.32 | 0.00 |
| 34.00 | 7.15 | 6.32 | 0.00 |
| 35.00 | 7.15 | 6.32 | 0.00 |
| 36.00 | 7.15 | 6.32 | 0.00 |
| 37.00 | 7.15 | 6.32 | 0.00 |
| 38.00 | 7.15 | 6.32 | 0.00 |
| 39.00 | 7.15 | 6.32 | 0.00 |
| 40.00 | 7.15 | 6.32 | 0.00 |
| 41.00 | 7.15 | 6.32 | 0.00 |
| 42.00 | 7.15 | 6.32 | 0.00 |
| 43.00 | 7.15 | 6.32 | 0.00 |
| 44.00 | 7.15 | 6.32 | 0.00 |
| 45.00 | 7.15 | 6.32 | 0.00 |
| 46.00 | 7.15 | 6.32 | 0.00 |
| 47.00 | 7.15 | 6.32 | 0.00 |
| 48.00 | 7.15 | 6.32 | 0.00 |
| 49.00 | 7.15 | 6.32 | 0.00 |
| 50.00 | 7.15 | 6.32 | 0.00 |
| 51.00 | 7.15 | 6.32 | 0.00 |
| 52.00 | 7.15 | 6.32 | 0.00 |
| 53.00 | 7.15 | 6.32 | 0.00 |
| 54.00 | 7.15 | 6.32 | 0.00 |
| 55.00 | 7.15 | 6.32 | 0.00 |
| 56.00 | 7.15 | 6.32 | 0.00 |
| 57.00 | 7.15 | 6.32 | 0.00 |
| 58.00 | 7.15 | 6.32 | 0.00 |
| 59.00 | 7.15 | 6.32 | 0.00 |
| 60.00 | 7.15 | 6.32 | 0.00 |
| 61.00 | 7.15 | 6.32 | 0.00 |
| 62.00 | 7.15 | 6.32 | 0.00 |
| 63.00 | 7.15 | 6.32 | 0.00 |
| 64.00 | 7.15 | 6.32 | 0.00 |
| 65.00 | 7.15 | 6.32 | 0.00 |
| 66.00 | 7.15 | 6.32 | 0.00 |
| 67.00 | 7.15 | 6.32 | 0.00 |
| 68.00 | 7.15 | 6.32 | 0.00 |
| 69.00 | 7.15 | 6.32 | 0.00 |
| 70.00 | 7.15 | 6.32 | 0.00 |
| 71.00 | 7.15 | 6.32 | 0.00 |
| 72.00 | 7.15 | 6.32 | 0.00 |
| 73.00 | 7.15 | 6.32 | 0.00 |
| 74.00 | 7.15 | 6.32 | 0.00 |
| 75.00 | 7.15 | 6.32 | 0.00 |
| 76.00 | 7.15 | 6.32 | 0.00 |
| 77.00 | 7.15 | 6.32 | 0.00 |
| 78.00 | 7.15 | 6.32 | 0.00 |
| 79.00 | 7.15 | 6.32 | 0.00 |
| 80.00 | 7.15 | 6.32 | 0.00 |
| 81.00 | 7.15 | 6.32 | 0.00 |
| 82.00 | 7.15 | 6.32 | 0.00 |
| 83.00 | 7.15 | 6.32 | 0.00 |
| 84.00 | 7.15 | 6.32 | 0.00 |
| 85.00 | 7.15 | 6.32 | 0.00 |
| 86.00 | 7.15 | 6.32 | 0.00 |
| 87.00 | 7.15 | 6.32 | 0.00 |
| 88.00 | 7.15 | 6.32 | 0.00 |
| 89.00 | 7.15 | 6.32 | 0.00 |
| 90.00 | 7.15 | 6.32 | 0.00 |
| 91.00 | 7.15 | 6.32 | 0.00 |
| 92.00 | 7.15 | 6.32 | 0.00 |
| 93.00 | 7.15 | 6.32 | 0.00 |
| 94.00 | 7.15 | 6.32 | 0.00 |
| 95.00 | 7.15 | 6.32 | 0.00 |
| 96.00 | 7.15 | 6.32 | 0.00 |

## Summary for Subcatchment PR-WS-2: PR-WS-2

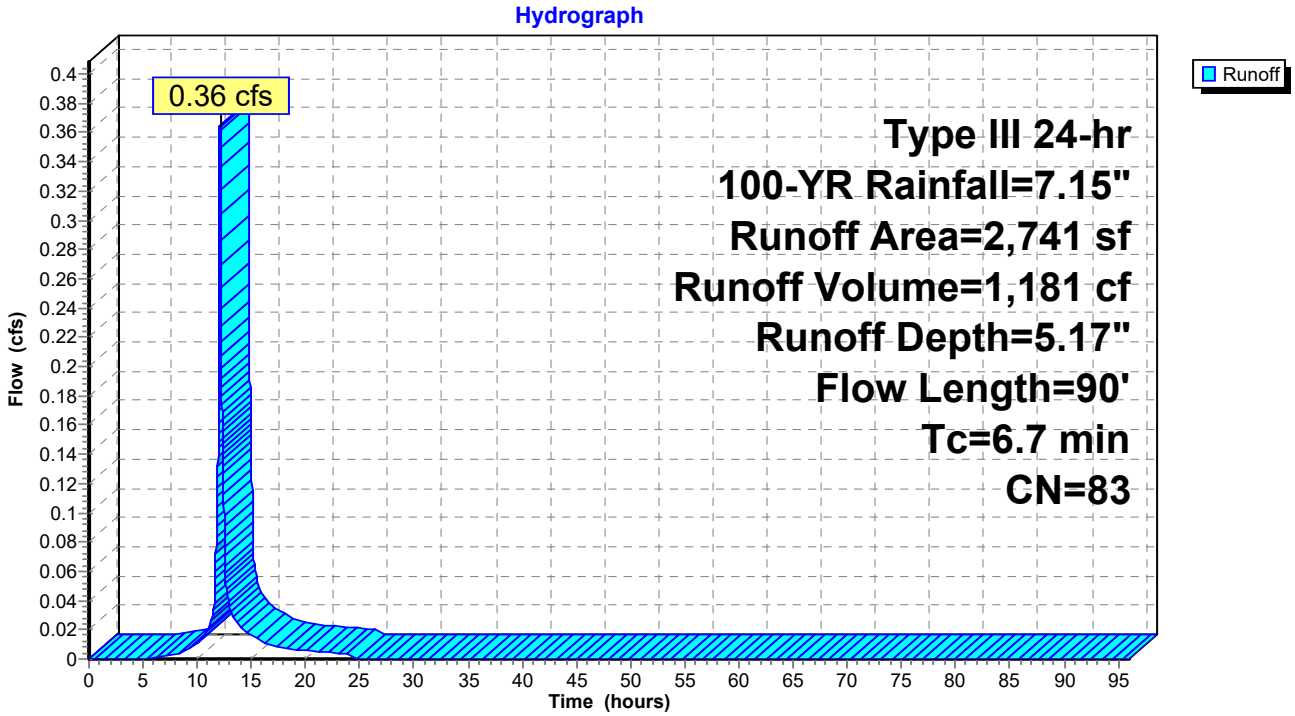
Runoff = 0.36 cfs @ 12.10 hrs, Volume= 1,181 cf, Depth= 5.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=7.15"

| Area (sf) | CN | Description |
|---|---|---|
| 131 | 98 | Paved parking, HSG D |
| 0 | 96 | Gravel surface, HSG D |
| 1,124 | 84 | 50-75% Grass cover, Fair, HSG D |
| 1,486 | 80 | >75% Grass cover, Good, HSG D |
| 2,741 | 83 | Weighted Average |
| 2,610 | | 95.22% Pervious Area |
| 131 | | 4.78% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.4 | 50 | 0.0130 | 0.13 | | **Sheet Flow, A - B** Grass: Short n= 0.150 P2= 3.50" |
| 0.1 | 16 | 0.0130 | 1.84 | | **Shallow Concentrated Flow, B - C** Unpaved Kv= 16.1 fps |
| 0.2 | 24 | 0.0150 | 2.49 | | **Shallow Concentrated Flow, C - D** Paved Kv= 20.3 fps |
| 6.7 | 90 | Total | | | |

## Subcatchment PR-WS-2: PR-WS-2



## Hydrograph for Subcatchment PR-WS-2: PR-WS-2

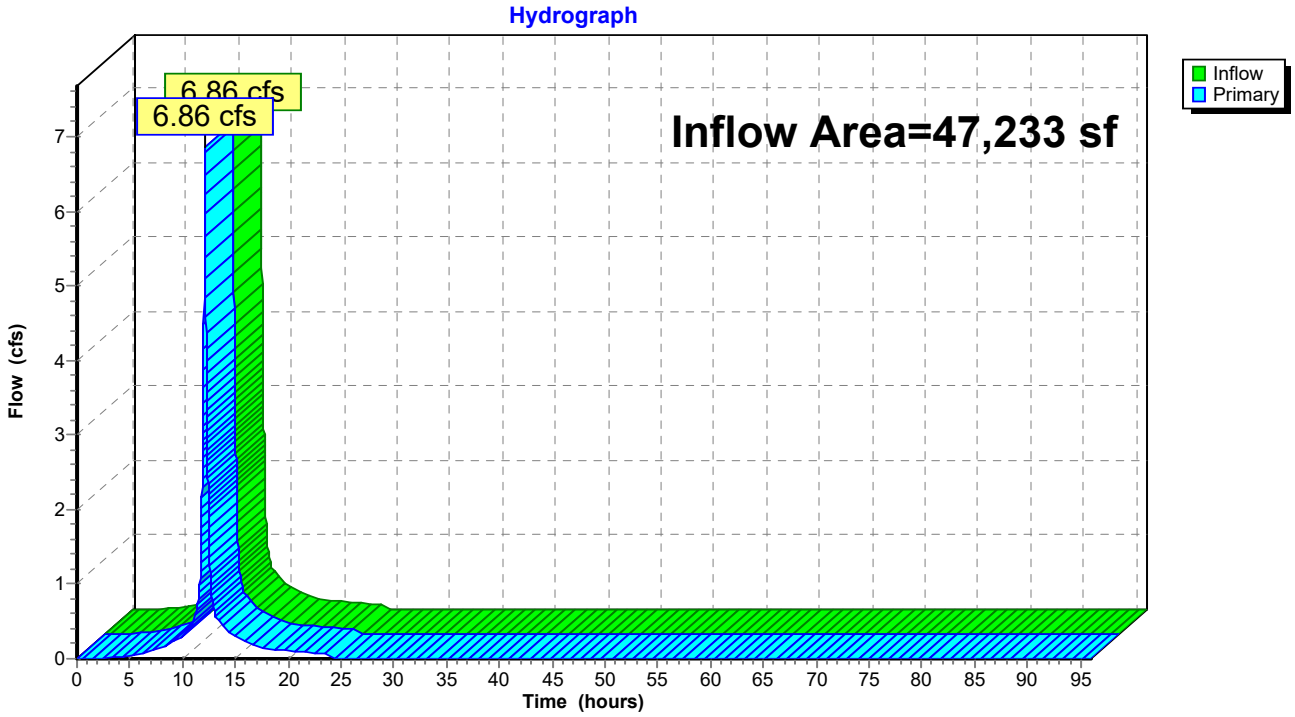
| Time (hours) | Precip. (inches) | Excess (inches) | Runoff (cfs) |
|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 0.07 | 0.00 | 0.00 |
| 2.00 | 0.14 | 0.00 | 0.00 |
| 3.00 | 0.22 | 0.00 | 0.00 |
| 4.00 | 0.31 | 0.00 | 0.00 |
| 5.00 | 0.41 | 0.00 | 0.00 |
| 6.00 | 0.51 | 0.01 | 0.00 |
| 7.00 | 0.65 | 0.02 | 0.00 |
| 8.00 | 0.82 | 0.07 | 0.00 |
| 9.00 | 1.04 | 0.15 | 0.01 |
| 10.00 | 1.35 | 0.30 | 0.01 |
| 11.00 | 1.79 | 0.55 | 0.02 |
| 12.00 | 3.57 | 1.92 | **0.21** |
| 13.00 | 5.36 | 3.50 | **0.03** |
| 14.00 | 5.80 | 3.90 | 0.02 |
| 15.00 | 6.11 | 4.19 | 0.02 |
| 16.00 | 6.33 | 4.40 | 0.01 |
| 17.00 | 6.50 | 4.56 | 0.01 |
| 18.00 | 6.64 | 4.68 | 0.01 |
| 19.00 | 6.74 | 4.79 | 0.01 |
| 20.00 | 6.84 | 4.88 | 0.01 |
| 21.00 | 6.93 | 4.96 | 0.01 |
| 22.00 | 7.01 | 5.04 | 0.00 |
| 23.00 | 7.09 | 5.11 | 0.00 |
| 24.00 | **7.15** | **5.17** | 0.00 |
| 25.00 | 7.15 | 5.17 | 0.00 |
| 26.00 | 7.15 | 5.17 | 0.00 |
| 27.00 | 7.15 | 5.17 | 0.00 |
| 28.00 | 7.15 | 5.17 | 0.00 |
| 29.00 | 7.15 | 5.17 | 0.00 |
| 30.00 | 7.15 | 5.17 | 0.00 |
| 31.00 | 7.15 | 5.17 | 0.00 |
| 32.00 | 7.15 | 5.17 | 0.00 |
| 33.00 | 7.15 | 5.17 | 0.00 |
| 34.00 | 7.15 | 5.17 | 0.00 |
| 35.00 | 7.15 | 5.17 | 0.00 |
| 36.00 | 7.15 | 5.17 | 0.00 |
| 37.00 | 7.15 | 5.17 | 0.00 |
| 38.00 | 7.15 | 5.17 | 0.00 |
| 39.00 | 7.15 | 5.17 | 0.00 |
| 40.00 | 7.15 | 5.17 | 0.00 |
| 41.00 | 7.15 | 5.17 | 0.00 |
| 42.00 | 7.15 | 5.17 | 0.00 |
| 43.00 | 7.15 | 5.17 | 0.00 |
| 44.00 | 7.15 | 5.17 | 0.00 |
| 45.00 | 7.15 | 5.17 | 0.00 |
| 46.00 | 7.15 | 5.17 | 0.00 |
| 47.00 | 7.15 | 5.17 | 0.00 |
| 48.00 | 7.15 | 5.17 | 0.00 |
| 49.00 | 7.15 | 5.17 | 0.00 |
| 50.00 | 7.15 | 5.17 | 0.00 |
| 51.00 | 7.15 | 5.17 | 0.00 |
| 52.00 | 7.15 | 5.17 | 0.00 |
| 53.00 | 7.15 | 5.17 | 0.00 |
| 54.00 | 7.15 | 5.17 | 0.00 |
| 55.00 | 7.15 | 5.17 | 0.00 |
| 56.00 | 7.15 | 5.17 | 0.00 |
| 57.00 | 7.15 | 5.17 | 0.00 |
| 58.00 | 7.15 | 5.17 | 0.00 |
| 59.00 | 7.15 | 5.17 | 0.00 |
| 60.00 | 7.15 | 5.17 | 0.00 |
| 61.00 | 7.15 | 5.17 | 0.00 |
| 62.00 | 7.15 | 5.17 | 0.00 |
| 63.00 | 7.15 | 5.17 | 0.00 |
| 64.00 | 7.15 | 5.17 | 0.00 |
| 65.00 | 7.15 | 5.17 | 0.00 |
| 66.00 | 7.15 | 5.17 | 0.00 |
| 67.00 | 7.15 | 5.17 | 0.00 |
| 68.00 | 7.15 | 5.17 | 0.00 |
| 69.00 | 7.15 | 5.17 | 0.00 |
| 70.00 | 7.15 | 5.17 | 0.00 |
| 71.00 | 7.15 | 5.17 | 0.00 |
| 72.00 | 7.15 | 5.17 | 0.00 |
| 73.00 | 7.15 | 5.17 | 0.00 |
| 74.00 | 7.15 | 5.17 | 0.00 |
| 75.00 | 7.15 | 5.17 | 0.00 |
| 76.00 | 7.15 | 5.17 | 0.00 |
| 77.00 | 7.15 | 5.17 | 0.00 |
| 78.00 | 7.15 | 5.17 | 0.00 |
| 79.00 | 7.15 | 5.17 | 0.00 |
| 80.00 | 7.15 | 5.17 | 0.00 |
| 81.00 | 7.15 | 5.17 | 0.00 |
| 82.00 | 7.15 | 5.17 | 0.00 |
| 83.00 | 7.15 | 5.17 | 0.00 |
| 84.00 | 7.15 | 5.17 | 0.00 |
| 85.00 | 7.15 | 5.17 | 0.00 |
| 86.00 | 7.15 | 5.17 | 0.00 |
| 87.00 | 7.15 | 5.17 | 0.00 |
| 88.00 | 7.15 | 5.17 | 0.00 |
| 89.00 | 7.15 | 5.17 | 0.00 |
| 90.00 | 7.15 | 5.17 | 0.00 |
| 91.00 | 7.15 | 5.17 | 0.00 |
| 92.00 | 7.15 | 5.17 | 0.00 |
| 93.00 | 7.15 | 5.17 | 0.00 |
| 94.00 | 7.15 | 5.17 | 0.00 |
| 95.00 | 7.15 | 5.17 | 0.00 |
| 96.00 | 7.15 | 5.17 | 0.00 |

## Summary for Link POA 1: POA-1

Inflow Area = 47,233 sf, 60.89% Impervious, Inflow Depth = 6.25" for 100-YR event
Inflow = 6.86 cfs @ 12.11 hrs, Volume= 24,613 cf
Primary = 6.86 cfs @ 12.11 hrs, Volume= 24,613 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

## Link POA 1: POA-1



## Hydrograph for Link POA 1: POA-1

| Time (hours) | Inflow (cfs) | Elevation (feet) | Primary (cfs) | Time (hours) | Inflow (cfs) | Elevation (feet) | Primary (cfs) |
|---|---|---|---|---|---|---|---|
| 0.00 | 0.00 | **0.00** | 0.00 | 53.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 0.00 | 0.00 | 0.00 | 54.00 | 0.00 | 0.00 | 0.00 |
| 2.00 | 0.00 | 0.00 | 0.00 | 55.00 | 0.00 | 0.00 | 0.00 |
| 3.00 | 0.01 | 0.00 | 0.01 | 56.00 | 0.00 | 0.00 | 0.00 |
| 4.00 | 0.03 | 0.00 | 0.03 | 57.00 | 0.00 | 0.00 | 0.00 |
| 5.00 | 0.05 | 0.00 | 0.05 | 58.00 | 0.00 | 0.00 | 0.00 |
| 6.00 | 0.06 | 0.00 | 0.06 | 59.00 | 0.00 | 0.00 | 0.00 |
| 7.00 | 0.10 | 0.00 | 0.10 | 60.00 | 0.00 | 0.00 | 0.00 |
| 8.00 | 0.14 | 0.00 | 0.14 | 61.00 | 0.00 | 0.00 | 0.00 |
| 9.00 | 0.21 | 0.00 | 0.21 | 62.00 | 0.00 | 0.00 | 0.00 |
| 10.00 | 0.31 | 0.00 | 0.31 | 63.00 | 0.00 | 0.00 | 0.00 |
| 11.00 | 0.48 | 0.00 | 0.48 | 64.00 | 0.00 | 0.00 | 0.00 |
| 12.00 | **3.87** | 0.00 | **3.87** | 65.00 | 0.00 | 0.00 | 0.00 |
| 13.00 | **0.65** | 0.00 | **0.65** | 66.00 | 0.00 | 0.00 | 0.00 |
| 14.00 | 0.40 | 0.00 | 0.40 | 67.00 | 0.00 | 0.00 | 0.00 |
| 15.00 | 0.30 | 0.00 | 0.30 | 68.00 | 0.00 | 0.00 | 0.00 |
| 16.00 | 0.21 | 0.00 | 0.21 | 69.00 | 0.00 | 0.00 | 0.00 |
| 17.00 | 0.17 | 0.00 | 0.17 | 70.00 | 0.00 | 0.00 | 0.00 |
| 18.00 | 0.13 | 0.00 | 0.13 | 71.00 | 0.00 | 0.00 | 0.00 |
| 19.00 | 0.11 | 0.00 | 0.11 | 72.00 | 0.00 | 0.00 | 0.00 |
| 20.00 | 0.10 | 0.00 | 0.10 | 73.00 | 0.00 | 0.00 | 0.00 |
| 21.00 | 0.09 | 0.00 | 0.09 | 74.00 | 0.00 | 0.00 | 0.00 |
| 22.00 | 0.08 | 0.00 | 0.08 | 75.00 | 0.00 | 0.00 | 0.00 |
| 23.00 | 0.08 | 0.00 | 0.08 | 76.00 | 0.00 | 0.00 | 0.00 |
| 24.00 | 0.07 | 0.00 | 0.07 | 77.00 | 0.00 | 0.00 | 0.00 |
| 25.00 | 0.00 | 0.00 | 0.00 | 78.00 | 0.00 | 0.00 | 0.00 |
| 26.00 | 0.00 | 0.00 | 0.00 | 79.00 | 0.00 | 0.00 | 0.00 |
| 27.00 | 0.00 | 0.00 | 0.00 | 80.00 | 0.00 | 0.00 | 0.00 |
| 28.00 | 0.00 | 0.00 | 0.00 | 81.00 | 0.00 | 0.00 | 0.00 |
| 29.00 | 0.00 | 0.00 | 0.00 | 82.00 | 0.00 | 0.00 | 0.00 |
| 30.00 | 0.00 | 0.00 | 0.00 | 83.00 | 0.00 | 0.00 | 0.00 |
| 31.00 | 0.00 | 0.00 | 0.00 | 84.00 | 0.00 | 0.00 | 0.00 |
| 32.00 | 0.00 | 0.00 | 0.00 | 85.00 | 0.00 | 0.00 | 0.00 |
| 33.00 | 0.00 | 0.00 | 0.00 | 86.00 | 0.00 | 0.00 | 0.00 |
| 34.00 | 0.00 | 0.00 | 0.00 | 87.00 | 0.00 | 0.00 | 0.00 |
| 35.00 | 0.00 | 0.00 | 0.00 | 88.00 | 0.00 | 0.00 | 0.00 |
| 36.00 | 0.00 | 0.00 | 0.00 | 89.00 | 0.00 | 0.00 | 0.00 |
| 37.00 | 0.00 | 0.00 | 0.00 | 90.00 | 0.00 | 0.00 | 0.00 |
| 38.00 | 0.00 | 0.00 | 0.00 | 91.00 | 0.00 | 0.00 | 0.00 |
| 39.00 | 0.00 | 0.00 | 0.00 | 92.00 | 0.00 | 0.00 | 0.00 |
| 40.00 | 0.00 | 0.00 | 0.00 | 93.00 | 0.00 | 0.00 | 0.00 |
| 41.00 | 0.00 | 0.00 | 0.00 | 94.00 | 0.00 | 0.00 | 0.00 |
| 42.00 | 0.00 | 0.00 | 0.00 | 95.00 | 0.00 | 0.00 | 0.00 |
| 43.00 | 0.00 | 0.00 | 0.00 | 96.00 | 0.00 | 0.00 | 0.00 |
| 44.00 | 0.00 | 0.00 | 0.00 | | | | |
| 45.00 | 0.00 | 0.00 | 0.00 | | | | |
| 46.00 | 0.00 | 0.00 | 0.00 | | | | |
| 47.00 | 0.00 | 0.00 | 0.00 | | | | |
| 48.00 | 0.00 | 0.00 | 0.00 | | | | |
| 49.00 | 0.00 | 0.00 | 0.00 | | | | |
| 50.00 | 0.00 | 0.00 | 0.00 | | | | |
| 51.00 | 0.00 | 0.00 | 0.00 | | | | |
| 52.00 | 0.00 | 0.00 | 0.00 | | | | |

# APPENDIX B

## Hydraulic Calculations

HIGHPOINT ENGINEERING, INC.
45 DAN ROAD, SUITE 140
CANTON, MASSACHUSETTS 02021

**Location:** 55 Wamsutta Street
**Development:** Parking Lot Expansion
**Project No.:** 20047
**Storm Frequency:** 10-Year Storm Event
**Run:** **5 Runs**

**Date:** 10-Feb-21
**Revised:**
**Computed By:** BSR
**Checked By:** ND

| From | To | Drainage Area (s.f.) | C | Total C x A (acres) | Tc (min) | I(10) (in/hr) | Q = (CIA) (cfs) | Flow from others (cfs) | Total Q (cfs) | Min. Slope (ft/ft) | Pipe Material | Manning's n | Dia (in) | Q (full) (cfs) | V (full) (fps) | Q/Q(full) < 1? | INV. IN (ft) | INV. OUT (ft) | Length (ft) | Hydraulic Pipe Rad. (ft) | Hydraulic Radius (ft) | Area (ft2) | Perimeter (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **RUN #1** | | | | | | | | | | | | | | | | | | | | | | | |
| Subcat CB #1 | CB #1 | 0 | 0.20 | | | | | | | | | | | | | | | | | | | | |
| | | 4442 | 0.30 | | | | | | | | | | | | | | | | | | | | |
| | | 7188 | 0.90 | | | | | | | | | | | | | | | | | | | | |
| | | | | 0.18 | 5 | 4.85 | 0.87 | 0.00 | 0.87 | | | | | | | | | | | | | | |
| CB #1 | DMH-1 | 0 | 0.20 | | | | | | | | | | | | | | | | | | | | |
| | | 0 | 0.30 | | | | | | | | | | | | | | | | | | | | |
| | | 0 | 0.90 | | | | | | | | | | | | | | | | | | | | |
| | | | | 0.00 | 5 | 4.85 | 0.00 | 0.87 | 0.87 | 0.005 | HDPE | 0.013 | 12 | 2.48 | 3.16 | 0.35 | 3.6 | 3.9 | 62 | 0.5 | 0.25 | 0.785 | 3.142 |
| Subcat CB #2 | CB #2 | 0 | 0.20 | | | | | | | | | | | | | | | | | | | | |
| | | 114 | 0.30 | | | | | | | | | | | | | | | | | | | | |
| | | 1036 | 0.90 | | | | | | | | | | | | | | | | | | | | |
| | | | | 0.02 | 5 | 4.85 | 0.11 | 0.00 | 0.11 | | | | | | | | | | | | | | |
| CB #2 | DMH-1 | 0 | 0.20 | | | | | | | | | | | | | | | | | | | | |
| | | 0 | 0.30 | | | | | | | | | | | | | | | | | | | | |
| | | 0 | 0.90 | | | | | | | | | | | | | | | | | | | | |
| | | | | 0.00 | 5 | 4.85 | 0.00 | 0.11 | 0.11 | 0.005 | HDPE | 0.013 | 12 | 2.53 | 3.22 | 0.04 | 3.6 | 3.7 | 20 | 0.5 | 0.25 | 0.785 | 3.142 |
| DMH-1 | DMH-5 | 0 | 0.20 | | | | | | | | | | | | | | | | | | | | |
| | | 0 | 0.30 | | | | | | | | | | | | | | | | | | | | |
| | | 0 | 0.90 | | | | | | | | | | | | | | | | | | | | |
| | | | | 0.00 | 5 | 4.85 | 0.00 | 0.98 | 0.98 | 0.005 | HDPE | 0.013 | 12 | 2.53 | 3.22 | 0.39 | 3.35 | 3.5 | 30 | 0.5 | 0.25 | 0.785 | 3.142 |
| Subcat EX CB1 | EX CB1 | 754 | 0.20 | | | | | | | | | | | | | | | | | | | | |
| | | 10557 | 0.30 | | | | | | | | | | | | | | | | | | | | |
| | | 20402 | 0.90 | | | | | | | | | | | | | | | | | | | | |
| | | | | 0.50 | 5 | 4.85 | 2.41 | 0.00 | 2.41 | | | | | | | | | | | | | | |
| EX CB1 | DMH-5 | 0 | 0.20 | | | | | | | | | | | | | | | | | | | | |
| | | 0 | 0.30 | | | | | | | | | | | | | | | | | | | | |
| | | 0 | 0.90 | | | | | | | | | | | | | | | | | | | | |
| | | | | 0.00 | 5 | 4.85 | 0.00 | 2.41 | 2.41 | 0.005 | HDPE | 0.013 | 12 | 2.48 | 3.15 | 0.97 | 3.25 | 4 | 156 | 0.5 | 0.25 | 0.785 | 3.142 |
| Subcat EX CB5 | EX CB5 | 0 | 0.20 | | | | | | | | | | | | | | | | | | | | |
| | | 1788 | 0.30 | | | | | | | | | | | | | | | | | | | | |
| | | 4108 | 0.90 | | | | | | | | | | | | | | | | | | | | |
| | | | | 0.10 | 5 | 4.85 | 0.47 | 0.00 | 0.47 | | | | | | | | | | | | | | |

| From | To | Drainage Area (s.f.) | C | Total C x A (acres) | Tc (min) | I(10) (in/hr) | Q = (CIA) (cfs) | Flow from others (cfs) | Total Q (cfs) | Min. Slope (ft/ft) | Pipe Material | Manning's n | Dia (in) | Q (full) (cfs) | V (full) (fps) | Q/Q(full) < 1? | INV. IN (ft) | INV. OUT (ft) | Length (ft) | Pipe Rad. (ft) | Hydraulic Radius (ft) | Area (ft2) | Perimeter (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EX CB5 | DMH-5 | 0 | 0.20 | | | | | | | | | | | | | | | | | | | | |
| | | 0 | 0.30 | | | | | | | | | | | | | | | | | | | | |
| | | 0 | 0.90 | | | | | | | | | | | | | | | | | | | | |
| | | | | 0.00 | 5 | 4.85 | 0.00 | 0.47 | 0.47 | 0.014 | HDPE | 0.013 | 12 | 4.16 | 5.30 | 0.11 | 3.25 | 3.78 | 39 | 0.5 | 0.25 | 0.785 | 3.142 |
| Subcat Roof | Roof | 0 | 0.20 | | | | | | | | | | | | | | | | | | | | |
| | | 0 | 0.30 | | | | | | | | | | | | | | | | | | | | |
| | | 15353 | 0.90 | | | | | | | | | | | | | | | | | | | | |
| | | | | 0.32 | 5 | 4.85 | 1.54 | 0.00 | 1.54 | | | | | | | | | | | | | | |
| DMH-5 | WQS-1 | 0 | 0.20 | | | | | | | | | | | | | | | | | | | | |
| | | 0 | 0.30 | | | | | | | | | | | | | | | | | | | | |
| | | 0 | 0.90 | | | | | | | | | | | | | | | | | | | | |
| | | | | 0.00 | 5 | 4.85 | 0.00 | 3.86 | 5.40 | 0.005 | HDPE | 0.013 | 15 | 4.66 | 3.80 | 1.16 | 3.1 | 3.25 | 29 | 0.625 | 0.3125 | 1.227 | 3.927 |
| Subcat EX CB6 | EX CB6 | 0 | 0.20 | | | | | | | | | | | | | | | | | | | | |
| | | 421 | 0.30 | | | | | | | | | | | | | | | | | | | | |
| | | 7673 | 0.90 | | | | | | | | | | | | | | | | | | | | |
| | | | | 0.16 | 5 | 4.85 | 0.78 | 0.00 | 0.78 | | | | | | | | | | | | | | |
| EX CB6 | WQS-1 | 0 | 0.20 | | | | | | | | | | | | | | | | | | | | |
| | | 0 | 0.30 | | | | | | | | | | | | | | | | | | | | |
| | | 0 | 0.90 | | | | | | | | | | | | | | | | | | | | |
| | | | | 0.00 | 5 | 4.85 | 0.00 | 0.78 | 0.78 | 0.009 | HDPE | 0.013 | 12 | 3.44 | 4.38 | 0.23 | 3.25 | 3.51 | 28 | 0.5 | 0.25 | 0.785 | 3.142 |
| WQS-1 | DMH-8 | 0 | 0.20 | | | | | | | | | | | | | | | | | | | | |
| | | 0 | 0.30 | | | | | | | | | | | | | | | | | | | | |
| | | 0 | 0.90 | | | | | | | | | | | | | | | | | | | | |
| | | | | 0.00 | 5 | 4.85 | 0.00 | 4.64 | 4.64 | 0.020 | HDPE | 0.013 | 12 | 5.07 | 6.46 | 0.92 | 1.69 | 3.1 | 70 | 0.5 | 0.25 | 0.785 | 3.142 |

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

*Version 1, Automated: Mar. 4, 2008*

Location: 55 Wamsutta Street, New Bedford, MA

## TSS Removal Calculation Worksheet

| B<br>BMP[1] | C<br>TSS Removal Rate[1] | D<br>Starting TSS Load* | E<br>Amount Removed (C*D) | F<br>Remaining Load (D-E) |
|---|---|---|---|---|
| **Deep Sump and Hooded Catch Basin** | **0.25** | **1.00** | **0.25** | **0.75** |
| **Infiltration Basin** | **0.80** | **0.75** | **0.60** | **0.15** |
| | **0.00** | **0.15** | **0.00** | **0.15** |
| | **0.00** | **0.15** | **0.00** | **0.15** |
| | **0.00** | **0.15** | **0.00** | **0.15** |

**Total TSS Removal =** **85%**

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

Project: **55 Wamsutta Street**
Prepared By: **BSR**
Date: **2/10/2021**

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

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

# Standard Method to Convert Required Water Quality Volume to a Discharge Rate for Sizing Flow Based Manufactured Proprietary Stormwater Treatment Practices

Parking Lot Expansion
55 Wamsutta Street
New Bedford, Massachusetts

## Converting Required Water Quality Volume (WQV) to a Discharge Rate (Q)

The existing drainage system will collect runoff from the existing project site and the proposed additional parking lot. Prior to discharge, the required WQV of 0.5" from the contributing impervious areas will enter the existing Hydro International 4' First Defense® Vortex Separator Water Quality Unit (WQS-1) for pre-treatment. Total impervious area to be treated is 40,521 sf. (25,771 sf from existing site, 14,750 sf from proposed parking lot)

Since manufactured proprietary stormwater separators are designed with respect to discharge rates and not volume, MassDEP requires a standardized method be used to convert the required WQV to a discharge rate (Q).

**Mass DEP Requirement**

**Q = (qu)(A)(WQV), where;**

**Q = Peak Flow associated with first 0.5" of runoff, cfs**
**qu = Unit Peak Discharge = 773 csm/in**
**(From Figure 4, related to Tc)**
**Tc = Time of Concentration = 5.0 min = 0.083 hours**
**A = Impervious Surface Drainage Area = 0.00145 $mi^2$**
**WQV = 0.5"**

**Q = (773 csm/in)(0.00145 $mi^2$)(0.5")**
**Q = 0.56 cfs**

The existing Hydro International 4' First Defense® Vortex Separator Water Quality Unit is designed to achieve >80% TSS removal of F-60, medium range sand range for a max discharge rate of 1.03 cfs. Refer to attached documentation of the TSS removal rate of the 4' First Defense® Vortex Separator Water Quality Unit. The Water Quality Unit provides more than enough treatment capacity required for the existing impervious area and proposed future parking lot expansion.

**Figure 2: For First ½-inch of Runoff, Table of qu values for Ia/P Curve = 0.0.058, listed by tc, for Type III Storm Distribution**

| Tc (Hours) | qu (csm/in) |
|---|---|
| 0.01 | 821 |
| 0.03 | 821 |
| 0.05 | 813 |
| 0.067 | 794 |
| 0.083 | 773 |
| 0.1 | 752 |
| 0.116 | 733 |
| 0.133 | 713 |
| 0.15 | 694 |
| 0.167 | 677 |
| 0.183 | 662 |
| 0.2 | 646 |
| 0.217 | 632 |
| 0.233 | 619 |
| 0.25 | 606 |
| 0.3 | 572 |
| 0.333 | 552 |
| 0.35 | 542 |
| 0.4 | 516 |
| 0.416 | 508 |
| 0.5 | 472 |
| 0.583 | 443 |
| 0.6 | 437 |
| 0.667 | 417 |
| 0.7 | 408 |
| 0.8 | 383 |
| 0.9 | 361 |
| 1 | 342 |
| 1.1 | 325 |
| 1.2 | 311 |
| 1.3 | 297 |
| 1.4 | 285 |
| 1.5 | 274 |
| 1.6 | 264 |
| 1.7 | 254 |

| Tc (Hours) | qu (csm/in) |
|---|---|
| 1.8 | 246 |
| 1.9 | 238 |
| 2 | 230 |
| 2.1 | 223 |
| 2.2 | 217 |
| 2.3 | 211 |
| 2.4 | 205 |
| 2.5 | 200 |
| 2.6 | 194 |
| 2.7 | 190 |
| 2.8 | 185 |
| 2.9 | 181 |
| 3 | 176 |
| 3.1 | 173 |
| 3.2 | 169 |
| 3.3 | 165 |
| 3.4 | 162 |
| 3.5 | 158 |
| 3.6 | 155 |
| 3.7 | 152 |
| 3.8 | 149 |
| 3.9 | 147 |
| 4 | 144 |
| 4.1 | 141 |
| 4.2 | 139 |
| 4.3 | 136 |
| 4.4 | 134 |
| 4.5 | 132 |
| 4.6 | 130 |
| 4.7 | 128 |
| 4.8 | 126 |
| 4.9 | 124 |
| 5 | 122 |
| 5.1 | 120 |
| 5.2 | 118 |

| Tc (Hours) | qu (csm/in) |
|---|---|
| 5.3 | 116 |
| 5.4 | 115 |
| 5.5 | 113 |
| 5.6 | 112 |
| 5.7 | 110 |
| 5.8 | 109 |
| 5.9 | 107 |
| 6 | 106 |
| 6.1 | 104 |
| 6.2 | 103 |
| 6.3 | 102 |
| 6.4 | 100 |
| 6.5 | 99 |
| 6.6 | 98 |
| 6.7 | 97 |
| 6.8 | 96 |
| 6.9 | 94 |
| 7 | 93 |
| 7.1 | 92 |
| 7.2 | 91 |
| 7.3 | 90 |
| 7.4 | 89 |
| 7.5 | 88 |
| 7.6 | 87 |
| 7.7 | 86 |
| 7.8 | 85 |
| 7.9 | 84 |
| 8 | 84 |
| 8.1 | 83 |
| 8.2 | 82 |
| 8.3 | 81 |
| 8.4 | 80 |
| 8.5 | 79 |
| 8.6 | 79 |
| 8.7 | 78 |

| Tc (Hours) | qu (csm/in) |
|---|---|
| 8.8 | 77 |
| 8.9 | 76 |
| 9 | 76 |
| 9.1 | 75 |
| 9.2 | 74 |
| 9.3 | 74 |
| 9.4 | 73 |
| 9.5 | 72 |
| 9.6 | 72 |
| 9.7 | 71 |
| 9.8 | 70 |
| 9.9 | 70 |
| 10 | 69 |

# Design Data

# First Defense®

## Vortex Separator

**The First Defense® is an economical hydrodynamic vortex separator for effective removal of sediment, litter and oil from surface water runoff. Captured pollutants are kept safely within the device keeping public areas free from harmful pollutants.**

Suitable for at-source pollution control in small to medium size catchments, the First Defense® provides space-saving, easy-to-install surface water treatment in a standard size manhole.

1. Inlet chute.
2. Inlet pipe (optional).
3. Floatables draw off slot.
4. Precast chamber.
5. Internal bypass.
6. Outlet chute.
7. Outlet pipe.
8. Oil and floatables storage.
9. Sediment storage sump.

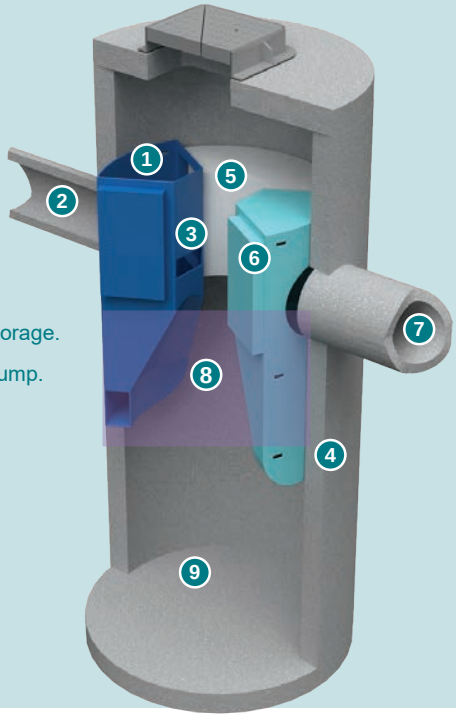



*Figure 1 - The First Defense® Vortex Separator*

## Components

The First Defense® has been designed with flexibility and ease of installation in mind. It consists of a standard, structural concrete chamber with integral sealing system and factory fitted internal components.

It uses the principals of rotational flow to provide improved pollutant capture compared to linear or simple gravity sedimentation chambers.

An integral bypass chute, adaptable to meet site requirements, directs exceedance flows through the chamber without disturbing previously captured pollutants.

Watch a short video showing the First Defense® components and operation at:

https://www.hydro-int.com/en-gb/products/first-defense-0

## Repeatable, Reliable Performance

The First Defense® internal components have been carefully designed to create a low energy rotational flow within the chamber to encourage removal of a number of common pollutants, including:

### Coarse particles

Greater than 80% removal of medium-fine sand particles.

See Technical Abstract: Performance Verification of Sediment Removal with F-60 Silica Sand.

### Gross Pollutants

Observational data from testing shows good retention of gross pollutants, including litter and leaf debris.

### Liquid and Sediment Bound Hydrocarbons

Greater than 40% removal of various forms of hydrocarbons, including polycyclic aromatic hydrocarbons (PAHs). Other pollutants such as nutrients and metals attached to sediment particles will also be removed.

See Technical Abstract: Pollutant Removal Through Association with Sediments.

## Avoids Pollutant Wash Out

The First Defense® contains an integral bypass that conveys large, infrequent rainfall event flows directly to the outlet chute. This prevents turbulence in the chamber and hinders wash out of the captured pollutants.

See Technical Abstract: The Importance of Wash Out Protection.

Tel: +44 (0)1275 337955
stormtrain@hydro-int.com

# Design Data
# First Defense®
## Vortex Separator

## Sizing

For design purposes, the selected model's Treatment Flow Rate should be greater or equal to the site's Water Quality Flow Rate.

The hydraulic capacity of the chamber should be considered with respect to the peak discharge flow rate form the site or the pipe full flow rate.

| Model Diameter (m) | Treatment Flow Rate (l/s) a) | Hydraulic Capacity (l/s) b) | Oil Storage Capacity (l) | Sediment Storage Capacity ($m^3$) |
|---|---|---|---|---|
| 1.2 | 29 | 120 | 681 | 1.04 |
| 1.8 | 90 | 510 | 1,590 | 3.34 |

**Notes:**

a) Treatment flow rates based on 80% removal of F-60, medium-fine sand. Sizing based on removal of finer or coarser sediment ranges or for free oil removal can be provided if required.

b) Maximum flow rate that can pass through the chamber without surcharge to the upstream network. Based on a single bypass chute. A secondary bypass chute can be added to increase the hydraulic capacity.

Headloss is dependent on the number and size of pipe connections, but is typically below 250 mm at the treatment flow rate.

*Table 1 - First Defense® design information.*

The First Defense® can be sized for different treatment goals and objectives.

## Expert Design Service

Hydro's professional engineers are on hand to provide free support with the correct sizing and application of the First Defense® within in each drainage design.

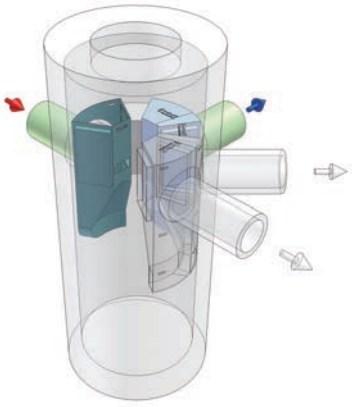
We can also provide estimated maintenance intervals, whole life cost estimates and predicted pollutant removal performance.

**Call the StormTrain® Hotline on: 01275 337955 or email stormtrain@hydro-int.com**

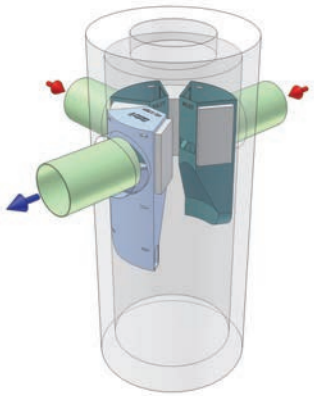
## Adaptable

The First Defense® has been specifically designed to be adaptable to site conditions, whilst also delivering effective treatment of surface water runoff.

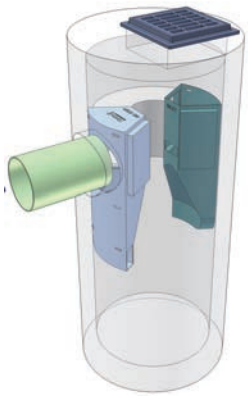
For maximum flexibility, First Defense® inlet, outlet and internal bypass arrangements are available in several configurations:



Variable Inlet / Outlet Angle



Dual Inlet Pipes



Surface Inlet Grate

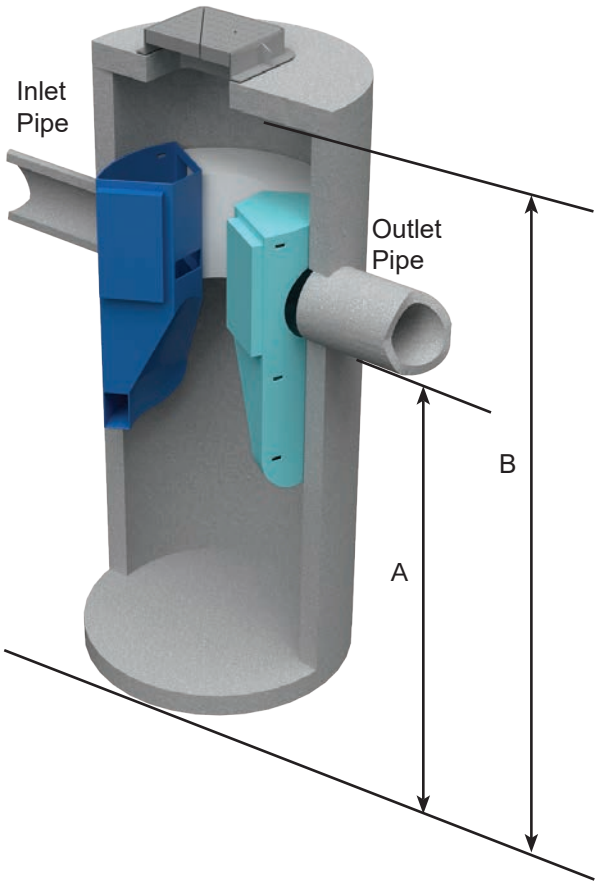
Dual Internal Bypass

# Design Data
## First Defense®
### Vortex Separator

## Saves on Construction Costs

The First Defense® is typically delivered to site as a pre-cast concrete manhole, complete with an innovative manhole sealing system and internal components already installed. Installation is therefore similar to any other manhole installation on site. Full installation guidelines are available.

Lightweight High Density Polyethylene (HDPE) chambers can be provided where installation of a concrete manhole is not practical.




## Dimensions and Weights

The dimensions in Table 2 are given as a guide.

| Unit | External Diameter of Unit (mm) | Inlet & Outlet Pipe Diameter (mm) | Depth (m) | | | Lift Weight (t) |
|---|---|---|---|---|---|---|
| | | | A | B | Component Depth [a] | |
| **1.2 m Sealed Manhole System with HD Cover Slab** | 1460 | 300 | 2.135 | 2.827 | 3.150 | |
| HD Cover Slab [b] | | | | | 0.230 | 0.6 |
| Base Section | | | | | 0.900 | 1.5 |
| Top Section | | | | | 2.075 | 2.5 |
| **1.8 m Sealed Manhole System with HD Cover Slab** | 2160 | 600 | 2.841 | 3.740 | 4.050 | |
| HD Cover Slab [b] | | | | | 0.290 | 1.4 |
| Base Section | | | | | 1.370 | 5.0 |
| Top Section | | | | | 2.600 | 8.0 |

**Notes:**
a) Base and Top Section component depths are shown as the total height during transportation / before assembly on site. The total depth is the depth of the assembled unit.
b) Cover slabs are heavy duty, suited for highways loading and are supplied with one or two access openings for maintenance.

*Table 2 - First Defense® dimensions and weights.*

Tel: +44 (0)1275 337955
stormtrain@hydro-int.com

# Design Data
# First Defense®
## Vortex Separator

## Easy to Maintain

Maintenance of the First Defense® is simple, safe and cost-effective. Maintenance is carried out from the surface using a standard vacuum tanker and personnel are not required to enter the device.

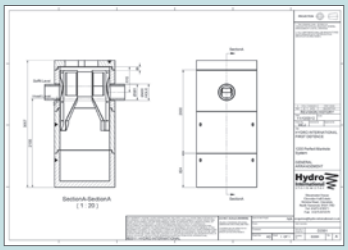
With a large capacity to store sediments and oils (see Table 1) and with a proven ability to prevent wash out, maintenance intervals can be years rather than months - depending on site conditions.

Additional pollutant storage capacity can be build into the chamber to extend maintenance intervals if required.

## First Defense® Technical Guidance


Case Studies

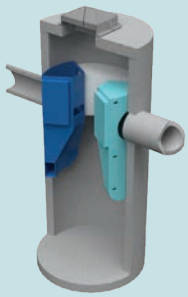

Installation and Maintenance Guidelines



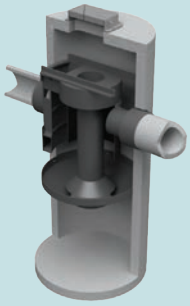
General Arrangement Drawings

## The Hydro StormTrain® Series of Surface Water Treatment Devices

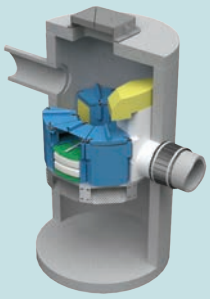
The First Defense® is one of the Hydro StormTrain® Series of surface water treatment devices. Each device delivers proven, measureable and repeatable surface water treatment performance. Each can be used independently to meet the specific needs of a site or combined to form a management train. They can be used alongside natural SuDS features to protect, enable or enhance them.



First Defense®
Vortex Separator



Downstream Defender®
Advanced Hydrodynamic Vortex Separator



Up-Flo™ Filter
Fluidised Bed Up Flow Filtration System

Hydro Biofilter™
Biofiltration System

Patent: www.hydro-int.com/patents

Tel: +44 (0)1275 337955 stormtrain@hydro-int.com

Hydro International
Shearwater House, Clevedon Hall Estate, Victoria Road, Clevedon, BS21 7RD

hydro-int.com/stormtrain

# APPENDIX C

## Supporting Information

HIGHPOINT

**CONSTRUCTION PHASE STORMWATER OPERATION AND MAINTENANCE PLAN**

**55 Wamsutta Street**
**New Bedford, Massachusetts**

**Dated:** February 10, 2021

**I. OWNER:**

Wamsutta II LLC
c/o Acorn, Inc
25 Braintree Hill Office Park, Suite 104
Braintree, MA 02184

**II. RESPONSIBLE PARTY:**

Wamsutta II LLC
c/o Acorn, Inc
25 Braintree Hill Office Park, Suite 104
Braintree, MA 02184

## III. PROJECT OVERVIEW:

Prevention of offsite flooding and improvement to water quality prior to leaving the site are the main priorities of the project with respect to stormwater management. The project will improve water quality within the property by installing and re-utilizing Best Management Practices (BMPs) within the stormwater treatment train prior to being released into the municipal drainage system. Water quality BMPs to address the runoff generated by the new paved surfaces include the existing 4' First Defense® Vortex Separator water quality unit and new deep-sump catch basin.

It is the intent of the stormwater management design to achieve the required 80% Total Suspended Solids (TSS) removal efficiency prior to being discharged into the municipal drainage system. In addition to the water quality BMPs, the drainage conveyance system will consist of traditional stormwater design components such as schedule 40 polyvinyl chloride (PVC) smooth interior wall pipe.

The BMPs used in this design were selected for their effectiveness and ease of maintenance with respect to developed site conditions. Providing for maintenance requirements that are practical is essential to achieve the desired result of improved water quality of on-site stormwater runoff generated by the new impervious areas. This plan will be provided to the property owner or manager to educate them on the recommendations of this plan and the DEP Stormwater Management Guidelines.

## IV. CONSTRUCTION PERIOD – BEST MANAGEMENT PRACTICES:

### a) MONITORING

During clearing and grading of the property, the existing stormwater maintenance system and roadways will be inspected at least once every seven (7) calendar days or once every fourteen (14) calendar days and within twenty-four (24) hours after a storm event of one quarter inch (0.25") or greater. Sediment accumulation shall be removed once a depth of one-third the height of the erosion control device is achieved. Damaged erosion controls shall be replaced immediately.

### b) WASTE DISPOSAL

Metal dumpster type waste disposal receptacles will be located on-site. The project site will be policed daily by a person appointed by the general contractor to be kept free of construction debris.

### c) DUST MONITORING PLAN

A dust monitoring plan will be established prior to the start of construction to be kept on site at all times. This will reduce the amount of particulates in the air and reduce impacts to the surrounding area and to wetland resource areas adjacent to the site. Some recommended methods for controlling dust include:

- Provide a vegetative cover to disturbed areas at the end of earth disturbing activities as soon as practical, but no longer than 14 days.
- Apply a mulch layer to disturbed areas at the end of earth disturbing activities as soon as practical, but no longer than 14 days.
- Cover or sod stockpiles unused for a maximum of 7 days.
- Watering surface materials and soil stockpiles.
- Use covered trucks.
- Minimize spoils stockpiled on site.
- Monitor construction practices to minimize unnecessary disturbance and transfer of soil materials.
- Conduct periodic street cleaning along the site frontage during excavation and hauling of materials.
- Pave driveways and parking surfaces (where applicable and feasible).
- Assign a person to remove windblown debris daily.
- Limit the idling of engines or stopped vehicles (with the exception of asphalt and cement concrete mixing trucks and equipment) to five minutes.

### d) STATE & LOCAL SANITARY LAWS

Portable sanitary units will be placed on-site during construction and will be serviced weekly.

## V. STRUCTURAL BEST MANAGEMENT PRACTICES

Structural BMPs are those physical facilities that are designed to manage both stormwater quantity and quality. Proper maintenance of the existing structural BMPs will ensure design performance and promote longevity of the structure and may decrease operator maintenance costs. The structural BMPs utilized for the construction phase of the proposed site development include: compost filter socks, straw bales and silt fence, siltsacks, deep-sump catch basins and the existing 4' First Defense® Vortex Separator water quality unit.

### a) COMPOST FILTER SOCKS

Compost filter socks shall be installed as specified on the Soil Erosion & Sedimentation Control Plan", Sheet C100, dated February 10, 2021, prior to commencing construction activities. The compost filter socks shall be inspected daily and maintained throughout construction. Sediment shall be removed before it has accumulated to one-half of the above ground height. Any breach in the barrier shall be repaired within 24 hours. Compost filter socks to remain in place for the duration of construction.

### b) DEEP SUMP AND HOODED CATCH BASIN

All proposed catch basins are to be a minimum of four feet in diameter and equipped with four-foot deep sumps to trap sediments and any debris/trash. The pipe outlets shall be hooded to prevent floating debris and oils from entering the subsurface drainage conveyance system. The actual removal of sediments, trash, and associated pollutants only occurs when the deep sumps are cleaned out; therefore, frequent maintenance is required. The more frequent the cleaning, the less likely sediments will be re-suspended and subsequently discharged. In addition, frequent cleaning also results in more volume available for future storms and enhances overall performance.

### c) STRAW BALES AND SILT FENCE

A straw bale and silt fence barrier will be installed as shown on the "Soil Erosion & Sedimentation Control Plan", Sheet C100, dated February 10, 2021, prior to commencing construction activities. The straw bale/silt fence barrier shall be inspected daily and maintained throughout construction. Sediment shall be removed before it has accumulated to one-half of the above ground height. Any breach in the barrier shall be repaired within 24 hours. The straw bale/silt fence barrier to remain in place for the duration of construction.

### d) SILTSACKS®INLET PROTECTION DEVICES

Existing catch basins within 55 Wamsutta Street and any new catch basins as they are installed will be equipped with Siltsack® inlet protection devices as shown on the "Soil Erosion and Sedimentation Control Plan", Sheet C100, dated February 10, 2021, prior to commencing construction activities.

Siltsacks® are to remain in place until the end of the construction and the site is stabilized. During construction all catch basins and Siltsacks® should be inspected every fourteen (14) calendar days and after a storm of a quarter inch (0.25") or greater. Sediment accumulation shall be removed once a depth of six inches (6") is accumulated in the silt sack. Damaged Siltsacks® shall be replace immediately. Disposal of accumulated sediment and trash is to be in accordance with applicable local, state and federal guidelines and regulations. Upon completion of the work, contractor is responsible for inspection and cleaning of drainage units to ensure delivery of clean units to owner prior to completion of project.

e) **HYDRO INTERNATIONAL FIRST DEFENSE® VORTEX SEPARATOR WATER QUALITY UNIT**

The water quality unit is existing and was installed to prevent sediments and oils from entering the municipal drainage system when released from the property. The actual removal of sediments, trash, and associated pollutants only occurs when the structures are cleaned; therefore, frequent maintenance is required. The more frequent the cleaning, the less likely sediments will be re-suspended and subsequently discharged. In addition, frequent cleaning also results in more volume available for future storms and enhances overall performance. The structures are an approved means of BMP for storm water management. See the TSS Removal Calculation Worksheet included in the Appendix B for the specific TSS removal rates of the water quality unit chosen for the project.

During construction, the unit is to be inspected once every fourteen (14) calendar days and after the occurrence of a storm event of a quarter inch (0.25") or greater. The units shall be cleaned by full pump out when 15% of the unit volume is filled with solids. Maintenance is performed by conventional vacuum truck. Disposal of accumulated sediment, trash, and hydrocarbons shall be in accordance with applicable local, state, and federal guidelines and regulations.

End

HIGHPOINT

**LONG-TERM STORMWATER OPERATION AND MAINTENANCE PLAN**

**55 Wamsutta Street**
**New Bedford, Massachusetts**

**Dated:** February 10, 2021

**I. OWNER:**

Wamsutta II LLC
c/o Acorn, Inc
25 Braintree Hill Office Park, Suite 104
Braintree, MA 02184

**II. RESPONSIBLE PARTY:**

Wamsutta II LLC
c/o Acorn, Inc
25 Braintree Hill Office Park, Suite 104
Braintree, MA 02184

**III. PROJECT OVERVIEW:**

Prevention of offsite flooding and improvement to water quality prior to leaving the site are the main priorities of the project with respect to stormwater management. The project will improve water quality within the property by installing and re-utilizing Best Management Practices (BMPs) within the stormwater treatment train prior to being released into the municipal drainage system. Water quality BMPs to address the runoff generated by the new paved surfaces include the existing 4' First Defense® Vortex Separator water quality unit and new deep-sump catch basin.

It is the intent of the stormwater management design to achieve the required 80% Total Suspended Solids (TSS) removal efficiency prior to being discharged into the municipal drainage system. In addition to the water quality BMPs, the drainage conveyance system will consist of traditional stormwater design components such as schedule 40 polyvinyl chloride (PVC) smooth interior wall pipe.

The BMP used in this design was re-utilized for its effectiveness and ease of maintenance with respect to developed site conditions. Providing for maintenance requirements that are practical is essential to achieve the desired result of improved water quality of on-site stormwater runoff generated by the new impervious areas. This plan will be provided to the property owner or manager to educate them on the recommendations of this plan and the DEP Stormwater Management Guidelines.

## IV. POST CONSTRUCTION - BEST MANAGEMENT PRACTICES:

### a) NON-STRUCTURAL BEST MANAGEMENT PRACTICES

Implementing source controls can aid in reducing the types and concentrations of contaminants in stormwater runoff, which in turn can result in improved water quality. This principle for pollution prevention and non-structural controls, or BMPs, is to minimize the volume of runoff and to minimize contact of stormwater with potential pollutants. Measures such as street sweeping, managing snow removal, and educating the owner/operator of good maintenance practices are examples of non-structural BMPs.

#### i. PUBLIC AWARENESS

The responsible party shall issue periodic reminders to the building tenants to avoid dumping or releasing pollutants into the storm drains and onto the ground.

#### ii. STREET SWEEPING

Drive aisles and parking lot sweeping is an integral part of the stormwater management plan as a fundamental component of source reduction efforts. Typically, parking lot and roadway sweeping activities will begin around April 1. However, sweeping may be done after winter thaw and the onset of early spring. It is critical to remove the accumulated sediment in the parking areas from the winter months as soon as possible before heavy and frequent spring precipitation.

Parking lot sweeping should be performed a minimum of two times annually (April 1 and September 1).

#### iii. SNOW AND SNOWMELT MANAGEMENT

It is suggested that during snowfall events, the snow be stockpiled in designated areas to the south of the property. The final designated areas shall be determined by the owner or property manager.

Possible snow storage locations include:

- Off the southeast edge of the proposed parking lot in the lawn area.
- Off the southwest edge of the proposed parking lot in the lawn area.

The removal contractor shall avoid stockpiling snow directly on top of the catch basins and stockpiled snow shall not extend more than 6 feet from the edge of pavement to allow normal vehicular maneuverability.

It is the responsibility of the owner to make sure the snow removal contractor utilizes the designated areas according to the procedures described herein. The owner shall remove sediment from snow storage areas every spring.

It is suggested that no de-icing compounds, such as calcium chloride ($CaCl_2$), calcium magnesium acetate (CMA) or the like be used on the site. The snow removal contractor shall store all sand off-site. No quantities of sand compounds shall be stored on site.

**iv. PUBLIC SAFETY FEATURES**

The project has been designed with consideration for public safety and does not require any specific features as part of the stormwater management system.

**b) STRUCTURAL BEST MANAGEMENT PRACTICES:**

Structural BMPs are those physical facilities that are designed to manage both stormwater quantity and quality. Proper maintenance of the existing structural BMP will ensure design performance and promote longevity of the structure and may decrease operator maintenance costs. The structural BMPs utilized for the construction phase of the proposed site development include: deep-sump catch basins and the existing 4' First Defense® High Capacity water quality unit.

**i. DEEP SUMP HOODED CATCH BASINS**

All proposed catch basins are to be a minimum of four feet in diameter and equipped with four-foot deep sumps to trap sediments and any debris/trash. The pipe outlets shall be hooded to prevent floating debris and oils from entering the subsurface drainage conveyance system. The actual removal of sediments, trash, and associated pollutants only occurs when the deep sumps are cleaned out; therefore, frequent maintenance is required. The more frequent the cleaning, the less likely sediments will be re-suspended and subsequently discharged. In addition, frequent cleaning also results in more volume available for future storms and enhances overall performance.

The recommended inspection frequency of the deep sumps is every three months, and cleaning two to three times per year, if necessary, post-construction. Disposal of accumulated sediment and trash is to be in accordance with applicable local, state and federal guidelines and regulations.

**i. HYDRO INTERNATIONAL FIRST DEFENSE® VORTEX SEPARATOR WATER QUALITY UNIT**

Hydro International First Defense® water quality unit is existing and was installed to prevent sediments and oils from entering the underground infiltration/detention basin & detention basin and being released off-site. The actual removal of sediments, trash, and associated pollutants only occurs when the structures are cleaned out; therefore, frequent

maintenance is required. The more frequent the cleaning, the less likely sediments will be re-suspended and subsequently discharged. In addition, frequent cleaning also results in more volume available for future storms and enhances overall performance. Hydro International First Defense® structures are an approved means of BMP for storm water management. See the TSS Removal Calculation Worksheet included in the Appendix B for the specific TSS removal rate of the water quality units for the project.

Post-construction, the unit shall be inspected every six months for the first year of operation to determine the oil and sediment accumulation rate. After the first year, inspections can be based on the first-year observations or local requirements. Cleaning, by full pump out, is recommended on an annual basis or when 75% of the unit unit's storage capacity is filled with solids, if sooner. Inspect the unit immediately after an oil, fuel or chemical spill. Maintenance is performed by Hydro international Services. Disposal of accumulated sediment, trash, and hydrocarbons shall be in accordance with applicable local, state, and federal guidelines and regulations. Refer to attached manufacturers "inspection and maintenance guide" for more information.

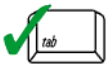
END

**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.

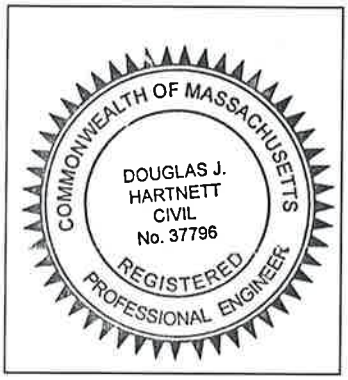
*Note:* Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that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




Signature and Date 02.09.2021

## Checklist

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

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

# Checklist for Stormwater Report

## Checklist (continued)

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

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

**Standard 1: No New Untreated Discharges**

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

# Checklist for Stormwater Report

## Checklist (continued)

**Standard 2: Peak Rate Attenuation**

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

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

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

**Standard 3: Recharge**

☐ Soil Analysis provided.

☐ Required Recharge Volume calculation provided.

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

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

☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

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

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

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

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

# Checklist for Stormwater Report

## Checklist (continued)

**Standard 3: Recharge** (continued)

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

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

**Standard 4: Water Quality**

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

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

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

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

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

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

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

# Checklist for Stormwater Report

## Checklist (continued)

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

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

**Standard 6: Critical Areas**

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

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

# Checklist for Stormwater Report

## Checklist (continued)

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

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

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

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

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

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

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

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

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

# Checklist for Stormwater Report

## Checklist (continued)

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

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

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

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

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

**Standard 9: Operation and Maintenance Plan**

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

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

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

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

**Standard 10: Prohibition of Illicit Discharges**

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

☒ An Illicit Discharge Compliance Statement is attached;

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

**Illicit Discharge Compliance Statement**

**Parking Lot Expansion**
**55 Wamsutta Street, New Bedford, MA 02740**
**Assessor's Map 78, Lot 125**

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Illicit discharges to the stormwater management system are discharges that are not entirely comprised of stormwater, discharges from fire-fighting activities, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditions condensation, footing drains, individual resident car washing, flows form riparian habitats and wetlands, dechlorinated water from swimming pools, water used from street washing and water used to clean residential buildings without detergents.

The Project was designed to eliminate potential illicit discharges to the stormwater management system in accordance with Standard 10 of the Massachusetts Stormwater Handbook. In accordance with Standard 10; to the best of my knowledge, information, and belief the stormwater management system as designed does not receive, nor contribute, any illicit discharges to regulated environmental resource areas or the municipal stormwater collection system.

The Long-Term Stormwater Operation & Maintenance Plan, dated February 10, 2021, outlines measures to prevent future illicit discharges.

Statement signed this 10th day of February, 2021.

Owner/Applicant:

Wamsutta II, LLC
c/o Acorn, Inc.
25 Braintree Hill Office Park, Suite 104
Braintree, MA 02184