**Environmental and Stormwater**

Water Quality, Stormwater Management and Erosion Control (14-526 (b) 3 a)

The proposed site has been designed in accordance to City and Chapter 500 requirements to minimize the amount of stormwater leaving the site. Please see the Stormwater Management report and plan included in this submittal.

ACF Environmental
2831 Cardwell Rd
Richmond, VA 23234

Dylan Stuart
Civil Engineer
Sebago Technics
75 John Roberts Rd., Suite 4A
South Portland, ME 04106

July 20, 2018

SUBJECT: Plan Review and Construction Oversight Commitment

Dear Dylan,

Thank you for forwarding the preliminary plans and drainage calculations for the proposed Self-Storage Building on Riverside Street in Portland, Maine to ACF environmental for review of the proposed FocalPoint biofiltration system.

Our team has reviewed the plans and calculations and take no exceptions to the location and application of the FocalPoint system for this project.

It appears that the system has been designed in accordance with the design criteria set forth by Maine DEP in the May 16, 2016 FocalPoint system approval letter and meets the system's specifications etc.

Upon completion of your detail sheets we would be happy to review the elevation data of each system.

With regard to the installation, ACF Environmental will host a preconstruction meeting with the site contractor and will be on-site during the entire installation to ensure that the installation is being conducted in accordance with our standard installation procedures.

ACF Environmental will also provide the first year's maintenance on the FocalPoint bed area.

Thank you for choosing to utilize the FocalPoint system and we look forward to a successful completion of your project.

Sincerely,

W. Scott Gorneau, P.E.
National Stormwater Manager
ACF Environmental

**Patagon Storage**
**150 Riverside Street**
**Portland, ME**

## Introduction

This Stormwater Management Plan has been prepared to address the potential impacts associated with this project due to the proposed modification in stormwater runoff characteristics. The stormwater management controls that are outlined in this plan have been incorporated to best suit the proposed development and to comply with applicable regulatory requirements.

The project consists of redevelopment of a 1.37 acre parcel at 142 Riverside Street and a 2.23 acre parcel at 150 Riverside Street. At 150 Riverside Street, the existing building currently used for Upscale Furniture will be removed to allow for the construction of a multi-story self-storage facility while the remaining parcel and the parcel at 142 Riverside Street will be used to provide parking and roadway areas to service the self-storage building.

Based upon the anticipated development, the project is subject to the Chapter 500 Basic, General, and Urban Impaired Stream standards. The proposed erosion controls, inspection and maintenance criteria, and the stormwater management systems have been designed to meet MDEP and City of Portland requirements.

## Existing Conditions

Both lots for the site are located in the City of Portland B4 Commercial Business District. The lot for 150 Riverside is developed with a building and parking area that currently services Upscale Furniture while the lot for 142 Riverside consists of a gravel parking area that was most recently used to store vehicles for a nearby car dealership. Stormwater is collected in a few on-site catch basins and an existing wet-pond. The existing wet pond is routed to the City's storm drainage infrastructure in Riverside Street through an existing 24" storm drain on the parcel that borders 150 Riverside Street to the north.

## Proposed Development

The developer proposes to construct a multi-story self-storage facility with a parking area that will service the facility along with additional parking along the westerly side of the lot that will be used for extra parking and storage. The site is accessed via two existing driveway from Riverside Street. The existing entrance on the south side of the parcel that services Upscale Furniture will be closed up following the demolition of the existing building, and the site will be accessed via the north entrance on Riverside Street.

The proposed development will result in the following:

Total disturbed/developed area = 2.83 acres
Total impervious area = 2.03 acres

**Regulatory Requirements**

Maine Department of Environmental Protection (MDEP)

MDEP Rule Chapters 500 and 502 describe stormwater management requirements for new development projects. These rules describe performance standards divided into five major categories: Basic Standard, General Standard, Phosphorous Standard, Urban Impaired Stream Standard, and Flooding Standard. The following sections describe how this project will address these stormwater management performance standards.

Basic Standard: A project must meet basic standards if it disturbs an area greater than one (1) acre. As this development will disturb approximately 2.83 acres, it must meet the basic standard. The standard includes various erosion and sedimentation controls, inspection and maintenance procedures, and general housekeeping requirements.

General Standard: A project is subject to the general standard if it results in the creation of one (1) or more acres of impervious area or developed areas greater than five (5) acres. As this project will include approximately 2.03 acres of impervious area, it must meet the general standard. The standard requires that a minimum of 95% of all impervious areas and at least 80% of all developed areas are designed to be tributary to stormwater BMPs. However, for redevelopment projects, the required treatment is scaled based on the pollutant discharge that, if the stormwater was untreated, would result from the redevelopment project. Standard BMPs have been defined by the MDEP and are described thoroughly in their publication Stormwater Management for Maine: Best Management Practices manual, as revised May 2016.

Phosphorous Standard: A project must meet the phosphorous standards if located within a lake watershed. As this project is not tributary to a lake watershed, it is not subject to the phosphorus standard.

Urban Impaired Stream Standard: A project must meet the urban impaired stream standards if located within an urban impaired stream watershed. As this project is tributary to Capisic Brook which is an Urban Impaired Stream as defined by MDEP Chapter 502, this project is subject to the urban impaired stream standard. The standard requires that the applicant must either pay a compensation fee or mitigate project impacts by reducing or eliminating an off-site pre-development impervious stormwater source as described in 06—096 CMR 501.

Flooding Standard: A project must meet to the flooding standards if it creates impervious areas greater than three (3) acres, or developed areas greater than twenty (20) acres. As this project includes approximately 2.03 acres of impervious area, it is not subject to the flooding standard.

**City of Portland:**

In accordance with Section 5.II.D of the City of Portland Technical manual, all projects not subject to requirements of an existing Site Law or Stormwater Management Law Permit that include redevelopment of non-roof impervious area greater than 5,000 square-feet and are subject to City of Portland review shall provide stormwater quality treatment in accordance with the General Standards for no less than 50% of the redeveloped impervious area. The runoff from any up-gradient area must be either directed away from the stormwater treatment measure or that measure must be sized to treat the runoff from the up-gradient area.

**Methodology**

In order to evaluate drainage characteristics as a result of the proposed development activities, a quantitative analysis was performed to determine peak runoff rates in the pre-development and post-development conditions. The evaluation was performed using the methodology outlined in the USDA Soil Conservation Service's "Urban Hydrology for Small Watersheds - Technical Release #55 (TR-55)". HydroCAD computer software was utilized to perform the calculations.

The peak runoff rates were calculated using a 24-hour duration storm event with a Type III rainfall distribution. The rainfall amounts for Cumberland County have recently been updated and the following 24-hour duration rainfall amounts were used for this report:

| Storm Frequency | 24-hr Duration Rainfall (in.) |
|---|---|
| 2-yr | 3.1 |
| 10-yr | 4.6 |
| 25-yr | 5.8 |

The model incorporates design assumptions including the following:

- The minimum time of concentration ($T_c$) is six minutes, based upon limitations of the TR-55 model.

**Quality Treatment**

Stormwater runoff from the building and parking area will be routed to three proposed focal point treatment units located in landscaped islands adjacent to parking areas onsite. The Water Quality Volume and any bypass flow will be routed to the City's infrastructure on Riverside Street.

The treatment volume of the focal point required is based upon water quality/channel protection volume which is equal to 1.0-inch times the subcatchment's impervious area and 0.4–inch times the subcatchment's tributary landscaped areas. The system is designed to drain completely within 24 to 72 hours after the storm.

Redevelopment standards apply because the proposed building will replace existing buildings and pavement areas. After completing the calculations outlined in §4.C(2)(d) of Chapter 500, the ranked impact change due to redevelopment is calculated to be -0.387, requiring that 0.0% of developed area be treated. However, the minimum level of treatment required by the City of Portland Technical manual is 50% for redevelopment projects.

The attached treatment table summarizes the total impervious and developed areas for the proposed development indicates the BMP measures proposed for treating the impervious areas. The conclusion is a tabulation of the effective treatment percentages for the proposed development. The results of this tabulation indicate the following:

- The post-development area requiring treatment includes approximately 2.03 acres of impervious area and a total of approximately 2.83 acres of developed area.

- The redevelopment standard requires treatment for 50% of the new impervious areas. As such, the site is required to provide treatment for a minimum of 1.01 acres. The total area receiving treatment is approximately 1.14 acres or 56.30%.

- The redevelopment standard requires treatment for 50% of the new developed areas. As such, the site is required to provide treatment for a minimum of 1.42 acres. The total area receiving treatment is approximately 1.42 acres or 50.20%.

**Peak Flow Analysis**

The subcatchment areas and times of concentration of the post-development conditions vary from the pre-development conditions based on the proposed site development and grading. The following table summarizes the results of the hydrologic analysis of the project during pre-development and post-development conditions.

**Stormwater Peak Discharge Summary Table**

| Study Point | 2-Year Storm | | | 10-Year Storm | | | 25-Year Storm | | |
|---|---|---|---|---|---|---|---|---|---|
| | Pre (cfs) | Post (cfs) | Diff. (cfs) | Pre (cfs) | Post (cfs) | Diff. (cfs) | Pre (cfs) | Post (cfs) | Diff. (cfs) |
| SP1 | 5.26 | 4.56 | -0.70 | 9.04 | 7.75 | -1.29 | 12.09 | 10.42 | -1.67 |

The results of the stormwater modeling at Study Point SP1 indicate that the peak rates of runoff in the post-developed condition will be less than the pre-developed condition for the 2-year, 10-year, and 25-year storm events.

**Conclusions**

Erosion and sedimentation controls, inspection and maintenance procedures and general housekeeping requirements have been outlined to prevent unreasonable impacts on the site and to the surrounding environment.

By utilizing Best Management practices, stormwater quality treatment has been provided for at least 50% of the total impervious area and at least 50% of the total developed area. Based on the modeling data, the post-development peak rates of runoff for the 2-year, 10-year, and 25-year storm events demonstrate decreases in the peak rates of runoff when compared to the pre-development peak rates of runoff.

With the incorporation of the above referenced erosion control, treatment and detention measures, the project has been designed in conformance with the Maine Department of Environmental Protection Chapter 500 Stormwater Law and City of Portland Stormwater Management Standards. Accordingly, it is anticipated that stormwater runoff from the proposed development will not cause a significant adverse effect to off-site receiving channels or downstream properties.

Prepared by,

SEBAGO TECHNICS, INC.

Richard L. Meek
Sr. Project Engineer

July 20, 2018

**Attachment A**

# STORWATER QUALITY CALCULATIONS

**Table 1: MDEP GENERAL STANDARD CALCULATIONS**

**Job #17500**

| AREA ID | WATERSHED SIZE (S.F.) | EXISTING ONSITE IMPERVIOUS AREA (S.F.) | NEW ONSITE IMPERVIOUS AREA (S.F.) | EXISTING ONSITE LANDSCAPED AREA (S.F.) | NEW ONSITE LANDSCAPED AREA (S.F.) | NET NEW DEVELOPED AREA (S.F.) | NET EXISTING DEVELOPED AREAS (S.F.) | TREATMENT PROVIDED? | IMPERVIOUS AREA TREATED (S.F.) | LANDSCAPED AREA TREATED* (S.F.) | DEVELOPED AREA TREATED (S.F.) | TREATMENT BMP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 3,235 | 0 | 467 | 1,092 | 1,676 | 2,143 | 1,092 | NO | 0 | 0 | 0 | NONE |
| **2** | 17,839 | 0 | 16,389 | 0 | 1,450 | 17,839 | 0 | YES | 16,389 | 1,450 | 17,839 | FP-3 |
| **3** | 13,820 | 0 | 12,315 | 0 | 1,505 | 13,820 | 0 | YES | 12,315 | 1,505 | 13,820 | FP-2 |
| **4** | 28,093 | 0 | 19,240 | 0 | 8,853 | 28,093 | 0 | YES | 19,240 | 8,853 | 28,093 | WB-1 |
| **5** | 2,078 | 0 | 1,731 | 0 | 347 | 2,078 | 0 | YES | 1,731 | 347 | 2,078 | FP-1 |
| **6** | 58,372 | 0 | 38,089 | 0 | 9,828 | 47,917 | 0 | NO | 0 | 0 | 0 | NONE |
| **7** | 27,710 | 0 | 0 | 0 | 5,726 | 5,726 | 0 | NO | 0 | 0 | 0 | NONE |
| **8** | 5,560 | 0 | 0 | 0 | 5,560 | 5,560 | 0 | NO | 0 | 0 | 0 | NONE |
| | | | | | | | | | | | | |
| **TOTAL (S.F.)** | **156,707** | **0** | **88,231** | **1,092** | **34,945** | **123,176** | **1,092** | | **49,675** | **12,155** | **61,830** | |

| | | | |
|---|---|---|---|
| **TOTAL NEW IMPERVIOUS AREA (S.F.)** | **88,231** | **TOTAL DEVELOPED AREA (S.F.)** | **123,176** |
| **TOTAL IMPERVIOUS AREA RECEIVING TREATMENT (S.F.)** | **49,675** | **TOTAL DEV. AREA RECEIVING TREATMENT (S.F.)** | **61,830** |
| **% OF IMPERVIOUS AREA RECEIVING TREATMENT** | **56.30%** | **% OF DEV. AREA RECEIVING TREATMENT** | **50.20%** |

SEBAGO TECHNICS, INC.
75 John Roberts Road, Suite 4A
South Portland, ME 04106
**(207) 856-0277 FAX (207) 856-2206**

| | | | |
|---|---|---|---|
| JOB | 17500 | | |
| SHEET NO. | 1 | OF | 4 |
| CALCULATED BY | DJS | DATE | 7/11/2018 |
| CHECKED BY | JRS | | |
| FILE NAME | 17500_WQC 2018-3-16.xls› | PRINT DATE | 7/19/2018 |

Note: Buffers are sized in accordance with Chapter 5 of the Maine Department of Environmental Protection BMPs Technical Design Manual, latest revision.

| **Wooded Buffer 1 (WB-1)** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Type of Buffer : | | Buffer with Stone Bermed Level Spreader | | | | | | |
| Existing Cover : | | Gravel | | | | | | |
| Soils : | | Swanton | | | | | | |
| Buffer Slope : | | 1.6% | | | | | | |
| Buffer Length : | | 100 | feet | | | | | |
| | | | | | | | | |
| Tributary Area | | | | | | | | |
| Impervious : | | 19,240 | sf | | | | | |
| Landscaped : | | 371 | sf | | | | | |
| | | | | | | | | |
| Per Table 5-4 of Manual for Soil Group A Fine Sandy Loam: | | | | | | | | |
| Berm Length per acre of impervious : | | | | 200 | ft | | | |
| Berm Length per acre of landscaped : | | | | 60 | ft | | | |
| | | | | | | | | |
| Required Level Spreader Berm Length : | | | | 88.8 | ft | ($BMP_{ST}$) | | |
| Provided Level Spreader Berm Length : | | | | 82.0 | ft | ($BMP_{TF}$) | | |
| | | | | | | | | |
| Treatment Factor Calculation | | | | | | | | |
| TF=0.4 * ($BMP_{ST}$/$BMP_{TF}$)= | **0.43** | | | | | | | |

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South Portland, Maine 04106
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| | | | |
|---|---|---|---|
| JOB | 17500 | | |
| SHEET NO. | 2 | OF | 4 |
| CALCULATED BY | DJS | DATE | 7/11/2018 |
| FILE NAME | 17500_WQC 2018-3-16.xlsx | PRNT DATE | 7/19/2018 |

**FOCALPOINT, ACF ENVIRONMENTAL**

Task: Size Focal Point treatment system pursuant to the General Standards, Section 4.C of Chapter 500.

References 1. Letter from Maine Department of Environmental Protection, Director-Bureau of Land Resources to Stormwater Systems ACF-Convergent Water Technologies Alliance, Dated May 16, 2016 indicating FocalPoint biofiltration meets requirements of the General Standards for Treatment.

Per Reference 1 above, the system must be sized to meet:

a. "entire volume of a 0.96 inch Type III 24-hour storm is treated prior to activation of the bypass/overflow"

b. "surface area….must be a minimum of 174 s.f. per 1 acres of impervious area treated (26s.f. per 0.15 acres)"

c. "treatment flow rate for the Stormtech Isolator Row is the projected one year peak flow rate for the drainage area feeding the Isolator Row"

Flow rates:

| | | |
|---|---|---|
| Stormtech SC-310 | 0.10 | cfs/chamber |
| Stormtech SC-740 | 0.20 | cfs/chamber |
| Stormtech DC-780 | 0.20 | cfs/chamber |
| Stormtech MC-3500 | 0.30 | cfs/chamber |
| Cultech 150XLHD | 0.185 | cfs/chamber |
| Cultech 330XLHD | 0.227 | cfs/chamber |

Tributary to FocalPoint System: FP-1

| | | |
|---|---|---|
| Landscaped Area | 347.00 | SF |
| Impervious Area | 1,731.00 | SF |

Minimum Surface Area of FocalPoint:

Required: 26 s.f. per 0.15 acres of impervious area

| | | | | |
|---|---|---|---|---|
| Total Impervious Area | 1,731.00 | SF | 0.04 | AC |
| | | X | 174.00 | SF/ACRE |
| Required Minimum Surface Area | | | 6.9 | SF |
| Provided Surface Area | | | 20.0 | SF |

Treatment Volume

Required: (0.4" X Landscaped + 1.0" X Impervious)

| | | | | | |
|---|---|---|---|---|---|
| Landscaped Area | 347.00 | SF | Volume | 11.6 | |
| Impervious Area | 1,731.00 | SF | Volume | 144.3 | |
| Treatment Volume Required | | | | 155.8 | CF |
| | | | | must discharge in 24-48 hours | |

| | | | |
|---|---|---|---|
| 0.004 | AF | | |

Sediment Pre-Treatment

Per Reference "C" above

| | | |
|---|---|---|
| One year flow rate out put from Hydrocad: | 0.10 | cfs |
| Treatment Row sizing for: | **Cultech 150XLHD** | **0.185** cfs |
| Total number of Isolator Row Chambers required: | 1 | |

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JOB
SHEET NO. 3 OF 4
CALCULATED BY DJS DATE 7/11/2018
FILE NAME 17500_WQC 2018-3-16.xlsx PRNT DATE 7/19/2018

**FOCALPOINT, ACF ENVIRONMENTAL**

Task: Size Focal Point treatment system pursuant to the General Standards, Section 4.C of Chapter 500.

References 1. Letter from Maine Department of Environmental Protection, Director-Bureau of Land Resources to Stormwater Systems ACF-Convergent Water Technologies Alliance, Dated May 16, 2016 indicating FocalPoint biofiltration meets requirements of the General Standards for Treatment.

Per Reference 1 above, the system must be sized to meet:

a. "entire volume of a 0.96 inch Type III 24-hour storm is treated prior to activation of the bypass/overflow"

b. "surface area….must be a minimum of 174 s.f. per 1 acres of impervious area treated (26s.f. per 0.15 acres)"

c. "treatment flow rate for the Stormtech Isolator Row is the projected one year peak flow rate for the drainage area feeding the Isolator Row"

Flow rates:

| | | |
|---|---|---|
| Stormtech SC-310 | 0.10 | cfs/chamber |
| Stormtech SC-740 | 0.20 | cfs/chamber |
| Stormtech DC-780 | 0.20 | cfs/chamber |
| Stormtech MC-3500 | 0.30 | cfs/chamber |
| Cultech 150XLHD | 0.185 | cfs/chamber |
| Cultech 330XLHD | 0.227 | cfs/chamber |

Tributary to FocalPoint System: FP-2

| | | |
|---|---|---|
| Landscaped Area | 1,505.00 | SF |
| Impervious Area | 12,315.00 | SF |

Minimum Surface Area of FocalPoint:

Required: 26 s.f. per 0.15 acres of impervious area

| | | | | |
|---|---|---|---|---|
| Total Impervious Area | 12,315.00 | SF | 0.28 | AC |
| | | X | 174.00 | SF/ACRE |
| Required Minimum Surface Area | | | 49.2 | SF |
| Provided Surface Area | | | 50.0 | SF |

Treatment Volume

Required: (0.4" X Landscaped + 1.0" X Impervious)

| | | | | | |
|---|---|---|---|---|---|
| Landscaped Area | 1,505.00 | SF | Volume | 50.2 | |
| Impervious Area | 12,315.00 | SF | Volume | 1,026.3 | |
| Treatment Volume Required | | | | 1,076.4 | CF |
| | | | | must discharge in 24-48 hours | |

Sediment Pre-Treatment

Per Reference "C" above

| | | | |
|---|---|---|---|
| One year flow rate out put from Hydrocad: | | 0.67 | cfs |
| Treatment Row sizing for: | **Cultech 150XLHD** | **0.185** | cfs |
| Total number of Isolator Row Chambers required: | | 4 | |

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| | | | |
|---|---|---|---|
| JOB | 17500 | | |
| SHEET NO. | 4 | OF | 4 |
| CALCULATED BY | DJS | DATE | 7/11/2018 |
| FILE NAME | 17500_WQC 2018-3-16.xlsx | PRNT DATE | 7/19/2018 |

**FOCALPOINT, ACF ENVIRONMENTAL**

Task: Size Focal Point treatment system pursuant to the General Standards, Section 4.C of Chapter 500.

References 1. Letter from Maine Department of Environmental Protection, Director-Bureau of Land Resources to Stormwater Systems ACF-Convergent Water Technologies Alliance, Dated May 16, 2016 indicating FocalPoint biofiltration meets requirements of the General Standards for Treatment.

Per Reference 1 above, the system must be sized to meet:

a. "entire volume of a 0.96 inch Type III 24-hour storm is treated prior to activation of the bypass/overflow"

b. "surface area….must be a minimum of 174 s.f. per 1 acres of impervious area treated (26s.f. per 0.15 acres)"

c. "treatment flow rate for the Stormtech Isolator Row is the projected one year peak flow rate for the drainage area feeding the Isolator Row"

Flow rates:

| | | |
|---|---|---|
| Stormtech SC-310 | 0.10 | cfs/chamber |
| Stormtech SC-740 | 0.20 | cfs/chamber |
| Stormtech DC-780 | 0.20 | cfs/chamber |
| Stormtech MC-3500 | 0.30 | cfs/chamber |
| Cultech 150XLHD | 0.185 | cfs/chamber |
| Cultech 330XLHD | 0.227 | cfs/chamber |

Tributary to FocalPoint System: FP-3

| | | | |
|---|---|---|---|
| Landscaped Area | 1,450.00 | SF | |
| Impervious Area | 16,389.00 | SF | |

Minimum Surface Area of FocalPoint:

Required: 26 s.f. per 0.15 acres of impervious area

| | | | | | |
|---|---|---|---|---|---|
| Total Impervious Area | 16,389.00 | SF | | 0.38 | AC |
| | | | X | 174.00 | SF/ACRE |
| Required Minimum Surface Area | | | | 65.5 | SF |
| Provided Surface Area | | | | 70.0 | SF |

Treatment Volume

Required: (0.4" X Landscaped + 1.0" X Impervious)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Landscaped Area | 1,450.00 | SF | Volume | 48.3 | | | | |
| Impervious Area | 16,389.00 | SF | Volume | 1,365.8 | | | | |
| Treatment Volume Required | | | | 1,414.1 | CF | 0.032 | AF | |
| | | | | must discharge in 24-48 hours | | | | |

Sediment Pre-Treatment

Per Reference "C" above

| | | | |
|---|---|---|---|
| One year flow rate out put from Hydrocad: | | 0.86 | cfs |
| Treatment Row sizing for: | **Cultech 150XLHD** | **0.185** | cfs |
| Total number of Isolator Row Chambers required: | | 5 | |

**Table 2: MDEP REDEVELOPMENT STANDARD CALCULATIONS: Patagon Self Storage, LLC., Portland, Maine**

| Existing Areas by Pollutant Ranking (S.F.) | | | | | | | Proposed Areas by Pollutant Ranking (S.F.) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | SUM | 0 | 1 | 2 | 3 | 4 | 5 | SUM |
| 19,861 | 7,091 | 16,320 | 18,726 | 94,709 | 0 | 156,707 | 16,051 | 7,091 | 46,837 | 33,611 | 53,117 | 0 | 156,707 |

| Existing Areas by Pollutant Ranking (acres) | | | | | | | Proposed Areas by Pollutant Ranking (acres) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | SUM | 0 | 1 | 2 | 3 | 4 | 5 | SUM |
| 0.456 | 0.163 | 0.375 | 0.430 | 2.174 | 0.000 | 3.597 | 0.368 | 0.163 | 1.075 | 0.772 | 1.219 | 0.000 | 3.597 |

| Existing Weighted Average (Item A) | Proposed Weighted Average (Item B) |
|---|---|
| **10.899** | **9.506** |

| Total Development Acres (Item C) | Total Redevelopment Acres (Item D) |
|---|---|
| **3.030** | **2.642** |

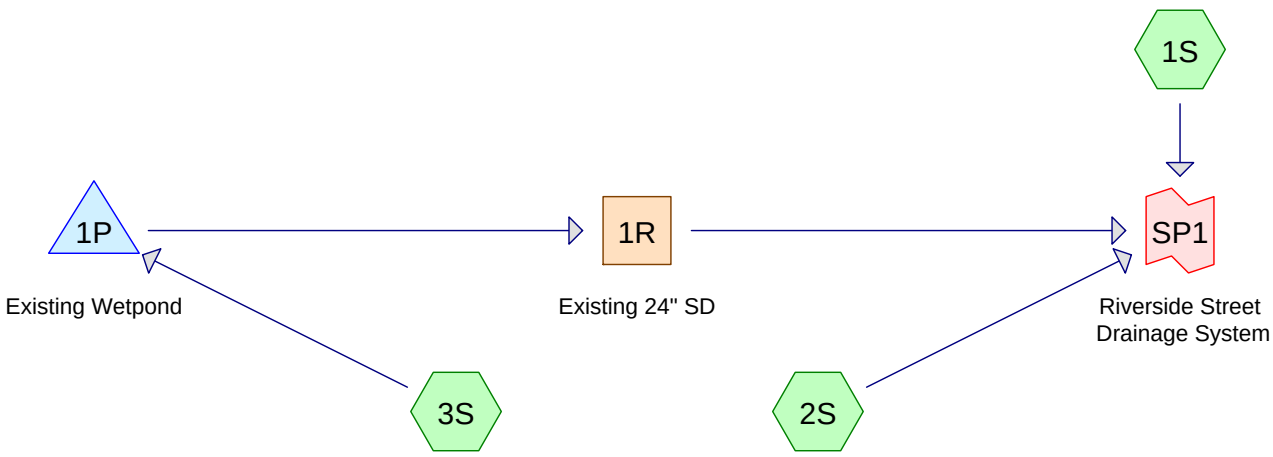
| Ranked Impact Change Due to Redevelopment (Item E) |
|---|
| **-0.387** |

**Treatment Levels for Redevelopment Projects**

| Ranked Impact Change Due to Redevelopment (Item E) | Percentage of Developed Area that Must be Treated |
|---|---|
| **0.0 or less** | **0% (Stormwater projects)**<br>**50% (Site projects)** |
| **≤ 0.0 to ≥ 1.0** | **60%** |
| **> 1.0 to ≥ 2.0** | **70%** |
| **> 2.0 to ≥ 3.0** | **80%** |
| **> 3.0** | **Same treatment level as for new development** |

**Attachment B**

# HYDROCAD OUTPUT




Subcat Reach Pond Link

**Routing Diagram for 17500_Predevelopment 2018-3-16**
Prepared by Sebago Technics, Inc., Printed 7/19/2018

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.427 | 39 | >75% Grass cover, Good, HSG A (1S, 2S) |
| 0.258 | 74 | >75% Grass cover, Good, HSG C (2S, 3S) |
| 2.176 | 98 | Parking (1S, 2S, 3S) |
| 0.430 | 98 | Roofs (1S, 2S) |
| 0.307 | 70 | Woods, Good, HSG C (2S, 3S) |
| **3.597** | **87** | **TOTAL AREA** |

## Summary for Subcatchment 1S:

Runoff = 0.67 cfs @ 12.09 hrs, Volume= 0.049 af, Depth= 2.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 1,947 | 98 | Parking |
| * | 3,125 | 98 | Roofs |
| | 3,886 | 39 | >75% Grass cover, Good, HSG A |
| | 8,958 | 72 | Weighted Average |
| | 3,886 | | 43.38% Pervious Area |
| | 5,072 | | 56.62% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.4 | 32 | 0.0266 | 1.19 | | **Sheet Flow, A to B** Smooth surfaces n= 0.011 P2= 3.00" |
| 0.1 | 20 | 0.1250 | 2.47 | | **Shallow Concentrated Flow, B to C** Short Grass Pasture Kv= 7.0 fps |
| 0.6 | 38 | 0.0221 | 1.04 | | **Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps |
| 4.9 | | | | | **Direct Entry, Direct Entry** |
| 6.0 | 90 | Total | | | |

## Summary for Subcatchment 2S:

Runoff = 11.42 cfs @ 12.09 hrs, Volume= 0.858 af, Depth= 4.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 15,601 | 98 | Roofs |
| * | 63,120 | 98 | Parking |
| | 14,709 | 39 | >75% Grass cover, Good, HSG A |
| | 6,850 | 74 | >75% Grass cover, Good, HSG C |
| | 879 | 70 | Woods, Good, HSG C |
| | 101,159 | 88 | Weighted Average |
| | 22,438 | | 22.18% Pervious Area |
| | 78,721 | | 77.82% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.6 | 150 | 0.0070 | 0.95 | | **Sheet Flow, A to B** Smooth surfaces n= 0.011 P2= 3.00" |
| 1.2 | 143 | 0.0102 | 2.05 | | **Shallow Concentrated Flow, B to C** Paved Kv= 20.3 fps |
| 1.0 | 171 | 0.0050 | 2.84 | 1.55 | **Pipe Channel, C to D** 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.013 |
| 1.0 | 195 | 0.0050 | 3.21 | 2.52 | **Pipe Channel, D to E** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 |
| 0.2 | | | | | **Direct Entry, Direct Entry** |
| 6.0 | 659 | Total | | | |

## Summary for Subcatchment 3S:

Runoff = 2.93 cfs @ 12.44 hrs, Volume= 0.395 af, Depth= 4.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 29,730 | 98 | Parking |
| | 4,381 | 74 | >75% Grass cover, Good, HSG C |
| | 12,479 | 70 | Woods, Good, HSG C |
| | 46,590 | 88 | Weighted Average |
| | 16,860 | | 36.19% Pervious Area |
| | 29,730 | | 63.81% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 31.2 | 150 | 0.0069 | 0.08 | | **Sheet Flow, A to B** Grass: Dense n= 0.240 P2= 3.00" |
| 1.8 | 120 | 0.0050 | 1.14 | | **Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps |
| 33.0 | 270 | Total | | | |

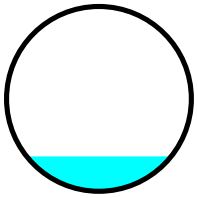
## Summary for Reach 1R: Existing 24" SD

Inflow Area = 1.070 ac, 63.81% Impervious, Inflow Depth > 3.62" for 25-YEAR event
Inflow = 0.65 cfs @ 13.27 hrs, Volume= 0.323 af
Outflow = 0.64 cfs @ 13.38 hrs, Volume= 0.322 af, Atten= 0%, Lag= 6.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.57 fps, Min. Travel Time= 7.7 min
Avg. Velocity = 0.74 fps, Avg. Travel Time= 16.4 min

Peak Storage= 299 cf @ 13.38 hrs
Average Depth at Peak Storage= 0.38'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 8.33 cfs

24.0" Round Pipe
n= 0.013
Length= 730.0' Slope= 0.0014 '/'
Inlet Invert= 68.26', Outlet Invert= 67.27'



## Summary for Pond 1P: Existing Wetpond

Inflow Area = 1.070 ac, 63.81% Impervious, Inflow Depth = 4.43" for 25-YEAR event
Inflow = 2.93 cfs @ 12.44 hrs, Volume= 0.395 af
Outflow = 0.65 cfs @ 13.27 hrs, Volume= 0.323 af, Atten= 78%, Lag= 49.4 min
Primary = 0.65 cfs @ 13.27 hrs, Volume= 0.323 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 68.97' @ 13.31 hrs Surf.Area= 19,315 sf Storage= 9,622 cf

Plug-Flow detention time= 343.8 min calculated for 0.322 af (82% of inflow)
Center-of-Mass det. time= 273.6 min ( 1,091.3 - 817.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 68.00' | 32,251 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Voids (%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|---|
| 68.00 | 511 | 0.0 | 0 | 0 |
| 69.00 | 19,883 | 100.0 | 10,197 | 10,197 |
| 70.00 | 24,224 | 100.0 | 22,054 | 32,251 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 68.50' | **24.0" Round Culvert**<br>L= 150.0' CMP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 68.50' / 68.26' S= 0.0016 '/' Cc= 0.900<br>n= 0.013, Flow Area= 3.14 sf |

**Primary OutFlow** Max=0.65 cfs @ 13.27 hrs HW=68.97' TW=68.64' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.65 cfs @ 1.73 fps)

## Summary for Link SP1: Riverside Street Drainage System

Inflow Area = 3.597 ac, 72.44% Impervious, Inflow Depth > 4.10" for 25-YEAR event
Inflow = 12.09 cfs @ 12.09 hrs, Volume= 1.229 af
Primary = 12.09 cfs @ 12.09 hrs, Volume= 1.229 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment 1S:** Runoff Area=8,958 sf 56.62% Impervious Runoff Depth=0.87"
Flow Length=90' Tc=6.0 min CN=72 Runoff=0.19 cfs 0.015 af

**Subcatchment 2S:** Runoff Area=101,159 sf 77.82% Impervious Runoff Depth=1.91"
Flow Length=659' Tc=6.0 min CN=88 Runoff=5.07 cfs 0.369 af

**Subcatchment 3S:** Runoff Area=46,590 sf 63.81% Impervious Runoff Depth=1.91"
Flow Length=270' Tc=33.0 min CN=88 Runoff=1.29 cfs 0.170 af

**Reach 1R: Existing 24" SD** Avg. Flow Depth=0.16' Max Vel=0.91 fps Inflow=0.10 cfs 0.098 af
24.0" Round Pipe n=0.013 L=730.0' S=0.0014 '/' Capacity=8.33 cfs Outflow=0.10 cfs 0.098 af

**Pond 1P: Existing Wetpond** Peak Elev=68.70' Storage=5,055 cf Inflow=1.29 cfs 0.170 af
24.0" Round Culvert n=0.013 L=150.0' S=0.0016 '/' Outflow=0.10 cfs 0.098 af

**Link SP1: Riverside Street Drainage System** Inflow=5.26 cfs 0.482 af
Primary=5.26 cfs 0.482 af

**Total Runoff Area = 3.597 ac Runoff Volume = 0.554 af Average Runoff Depth = 1.85"**
**27.56% Pervious = 0.991 ac 72.44% Impervious = 2.606 ac**

## Summary for Subcatchment 1S:

Runoff = 0.19 cfs @ 12.10 hrs, Volume= 0.015 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 1,947 | 98 | Parking |
| * | 3,125 | 98 | Roofs |
| | 3,886 | 39 | >75% Grass cover, Good, HSG A |
| | 8,958 | 72 | Weighted Average |
| | 3,886 | | 43.38% Pervious Area |
| | 5,072 | | 56.62% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.4 | 32 | 0.0266 | 1.19 | | **Sheet Flow, A to B** Smooth surfaces n= 0.011 P2= 3.00" |
| 0.1 | 20 | 0.1250 | 2.47 | | **Shallow Concentrated Flow, B to C** Short Grass Pasture Kv= 7.0 fps |
| 0.6 | 38 | 0.0221 | 1.04 | | **Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps |
| 4.9 | | | | | **Direct Entry, Direct Entry** |
| 6.0 | 90 | Total | | | |

## Summary for Subcatchment 2S:

Runoff = 5.07 cfs @ 12.09 hrs, Volume= 0.369 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 15,601 | 98 | Roofs |
| * | 63,120 | 98 | Parking |
| | 14,709 | 39 | >75% Grass cover, Good, HSG A |
| | 6,850 | 74 | >75% Grass cover, Good, HSG C |
| | 879 | 70 | Woods, Good, HSG C |
| | 101,159 | 88 | Weighted Average |
| | 22,438 | | 22.18% Pervious Area |
| | 78,721 | | 77.82% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.6 | 150 | 0.0070 | 0.95 | | **Sheet Flow, A to B** Smooth surfaces n= 0.011 P2= 3.00" |
| 1.2 | 143 | 0.0102 | 2.05 | | **Shallow Concentrated Flow, B to C** Paved Kv= 20.3 fps |
| 1.0 | 171 | 0.0050 | 2.84 | 1.55 | **Pipe Channel, C to D** 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.013 |
| 1.0 | 195 | 0.0050 | 3.21 | 2.52 | **Pipe Channel, D to E** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 |
| 0.2 | | | | | **Direct Entry, Direct Entry** |
| 6.0 | 659 | Total | | | |

## Summary for Subcatchment 3S:

Runoff = 1.29 cfs @ 12.46 hrs, Volume= 0.170 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 29,730 | 98 | Parking |
| | 4,381 | 74 | >75% Grass cover, Good, HSG C |
| | 12,479 | 70 | Woods, Good, HSG C |
| | 46,590 | 88 | Weighted Average |
| | 16,860 | | 36.19% Pervious Area |
| | 29,730 | | 63.81% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 31.2 | 150 | 0.0069 | 0.08 | | **Sheet Flow, A to B** Grass: Dense n= 0.240 P2= 3.00" |
| 1.8 | 120 | 0.0050 | 1.14 | | **Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps |
| 33.0 | 270 | Total | | | |

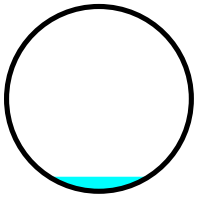
## Summary for Reach 1R: Existing 24" SD

Inflow Area = 1.070 ac, 63.81% Impervious, Inflow Depth > 1.10" for 2-YEAR event
Inflow = 0.10 cfs @ 15.67 hrs, Volume= 0.098 af
Outflow = 0.10 cfs @ 15.83 hrs, Volume= 0.098 af, Atten= 0%, Lag= 9.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.91 fps, Min. Travel Time= 13.4 min
Avg. Velocity = 0.58 fps, Avg. Travel Time= 20.9 min

Peak Storage= 83 cf @ 15.83 hrs
Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 8.33 cfs

24.0" Round Pipe
n= 0.013
Length= 730.0' Slope= 0.0014 '/'
Inlet Invert= 68.26', Outlet Invert= 67.27'



## Summary for Pond 1P: Existing Wetpond

Inflow Area = 1.070 ac, 63.81% Impervious, Inflow Depth = 1.91" for 2-YEAR event
Inflow = 1.29 cfs @ 12.46 hrs, Volume= 0.170 af
Outflow = 0.10 cfs @ 15.67 hrs, Volume= 0.098 af, Atten= 92%, Lag= 192.6 min
Primary = 0.10 cfs @ 15.67 hrs, Volume= 0.098 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 68.70' @ 15.69 hrs Surf.Area= 14,004 sf Storage= 5,055 cf

Plug-Flow detention time= 562.3 min calculated for 0.098 af (58% of inflow)
Center-of-Mass det. time= 453.7 min ( 1,295.1 - 841.4 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 68.00' | 32,251 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Voids (%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|---|
| 68.00 | 511 | 0.0 | 0 | 0 |
| 69.00 | 19,883 | 100.0 | 10,197 | 10,197 |
| 70.00 | 24,224 | 100.0 | 22,054 | 32,251 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 68.50' | **24.0" Round Culvert**<br>L= 150.0' CMP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 68.50' / 68.26' S= 0.0016 '/' Cc= 0.900<br>n= 0.013, Flow Area= 3.14 sf |

**Primary OutFlow** Max=0.10 cfs @ 15.67 hrs HW=68.70' TW=68.42' (Dynamic Tailwater)
**1=Culvert** (Outlet Controls 0.10 cfs @ 0.99 fps)

## Summary for Link SP1: Riverside Street Drainage System

Inflow Area = 3.597 ac, 72.44% Impervious, Inflow Depth > 1.61" for 2-YEAR event
Inflow = 5.26 cfs @ 12.09 hrs, Volume= 0.482 af
Primary = 5.26 cfs @ 12.09 hrs, Volume= 0.482 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment 1S:** Runoff Area=8,958 sf 56.62% Impervious Runoff Depth=1.89"
Flow Length=90' Tc=6.0 min CN=72 Runoff=0.44 cfs 0.032 af

**Subcatchment 2S:** Runoff Area=101,159 sf 77.82% Impervious Runoff Depth=3.29"
Flow Length=659' Tc=6.0 min CN=88 Runoff=8.60 cfs 0.637 af

**Subcatchment 3S:** Runoff Area=46,590 sf 63.81% Impervious Runoff Depth=3.29"
Flow Length=270' Tc=33.0 min CN=88 Runoff=2.20 cfs 0.293 af

**Reach 1R: Existing 24" SD** Avg. Flow Depth=0.28' Max Vel=1.32 fps Inflow=0.36 cfs 0.221 af
24.0" Round Pipe n=0.013 L=730.0' S=0.0014 '/' Capacity=8.33 cfs Outflow=0.36 cfs 0.221 af

**Pond 1P: Existing Wetpond** Peak Elev=68.85' Storage=7,516 cf Inflow=2.20 cfs 0.293 af
24.0" Round Culvert n=0.013 L=150.0' S=0.0016 '/' Outflow=0.36 cfs 0.221 af

**Link SP1: Riverside Street Drainage System** Inflow=9.04 cfs 0.890 af
Primary=9.04 cfs 0.890 af

**Total Runoff Area = 3.597 ac Runoff Volume = 0.963 af Average Runoff Depth = 3.21"**
**27.56% Pervious = 0.991 ac 72.44% Impervious = 2.606 ac**

## Summary for Subcatchment 1S:

Runoff = 0.44 cfs @ 12.10 hrs, Volume= 0.032 af, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR Rainfall=4.60"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 1,947 | 98 | Parking |
| * | 3,125 | 98 | Roofs |
| | 3,886 | 39 | >75% Grass cover, Good, HSG A |
| | 8,958 | 72 | Weighted Average |
| | 3,886 | | 43.38% Pervious Area |
| | 5,072 | | 56.62% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.4 | 32 | 0.0266 | 1.19 | | **Sheet Flow, A to B** Smooth surfaces n= 0.011 P2= 3.00" |
| 0.1 | 20 | 0.1250 | 2.47 | | **Shallow Concentrated Flow, B to C** Short Grass Pasture Kv= 7.0 fps |
| 0.6 | 38 | 0.0221 | 1.04 | | **Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps |
| 4.9 | | | | | **Direct Entry, Direct Entry** |
| 6.0 | 90 | Total | | | |

## Summary for Subcatchment 2S:

Runoff = 8.60 cfs @ 12.09 hrs, Volume= 0.637 af, Depth= 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR Rainfall=4.60"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 15,601 | 98 | Roofs |
| * | 63,120 | 98 | Parking |
| | 14,709 | 39 | >75% Grass cover, Good, HSG A |
| | 6,850 | 74 | >75% Grass cover, Good, HSG C |
| | 879 | 70 | Woods, Good, HSG C |
| | 101,159 | 88 | Weighted Average |
| | 22,438 | | 22.18% Pervious Area |
| | 78,721 | | 77.82% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.6 | 150 | 0.0070 | 0.95 | | **Sheet Flow, A to B** Smooth surfaces n= 0.011 P2= 3.00" |
| 1.2 | 143 | 0.0102 | 2.05 | | **Shallow Concentrated Flow, B to C** Paved Kv= 20.3 fps |
| 1.0 | 171 | 0.0050 | 2.84 | 1.55 | **Pipe Channel, C to D** 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.013 |
| 1.0 | 195 | 0.0050 | 3.21 | 2.52 | **Pipe Channel, D to E** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 |
| 0.2 | | | | | **Direct Entry, Direct Entry** |
| 6.0 | 659 | Total | | | |

## Summary for Subcatchment 3S:

Runoff = 2.20 cfs @ 12.45 hrs, Volume= 0.293 af, Depth= 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR Rainfall=4.60"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 29,730 | 98 | Parking |
| | 4,381 | 74 | >75% Grass cover, Good, HSG C |
| | 12,479 | 70 | Woods, Good, HSG C |
| | 46,590 | 88 | Weighted Average |
| | 16,860 | | 36.19% Pervious Area |
| | 29,730 | | 63.81% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 31.2 | 150 | 0.0069 | 0.08 | | **Sheet Flow, A to B** Grass: Dense n= 0.240 P2= 3.00" |
| 1.8 | 120 | 0.0050 | 1.14 | | **Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps |
| 33.0 | 270 | Total | | | |

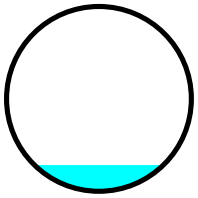
## Summary for Reach 1R: Existing 24" SD

Inflow Area = 1.070 ac, 63.81% Impervious, Inflow Depth > 2.48" for 10-YEAR event
Inflow = 0.36 cfs @ 13.56 hrs, Volume= 0.221 af
Outflow = 0.36 cfs @ 13.69 hrs, Volume= 0.221 af, Atten= 0%, Lag= 7.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.32 fps, Min. Travel Time= 9.2 min
Avg. Velocity = 0.69 fps, Avg. Travel Time= 17.7 min

Peak Storage= 198 cf @ 13.69 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 8.33 cfs

24.0" Round Pipe
n= 0.013
Length= 730.0' Slope= 0.0014 '/'
Inlet Invert= 68.26', Outlet Invert= 67.27'



## Summary for Pond 1P: Existing Wetpond

Inflow Area = 1.070 ac, 63.81% Impervious, Inflow Depth = 3.29" for 10-YEAR event
Inflow = 2.20 cfs @ 12.45 hrs, Volume= 0.293 af
Outflow = 0.36 cfs @ 13.56 hrs, Volume= 0.221 af, Atten= 84%, Lag= 66.9 min
Primary = 0.36 cfs @ 13.56 hrs, Volume= 0.221 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 68.85' @ 13.60 hrs Surf.Area= 17,073 sf Storage= 7,516 cf

Plug-Flow detention time= 402.0 min calculated for 0.221 af (75% of inflow)
Center-of-Mass det. time= 318.9 min ( 1,144.9 - 826.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 68.00' | 32,251 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Voids (%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|---|
| 68.00 | 511 | 0.0 | 0 | 0 |
| 69.00 | 19,883 | 100.0 | 10,197 | 10,197 |
| 70.00 | 24,224 | 100.0 | 22,054 | 32,251 |

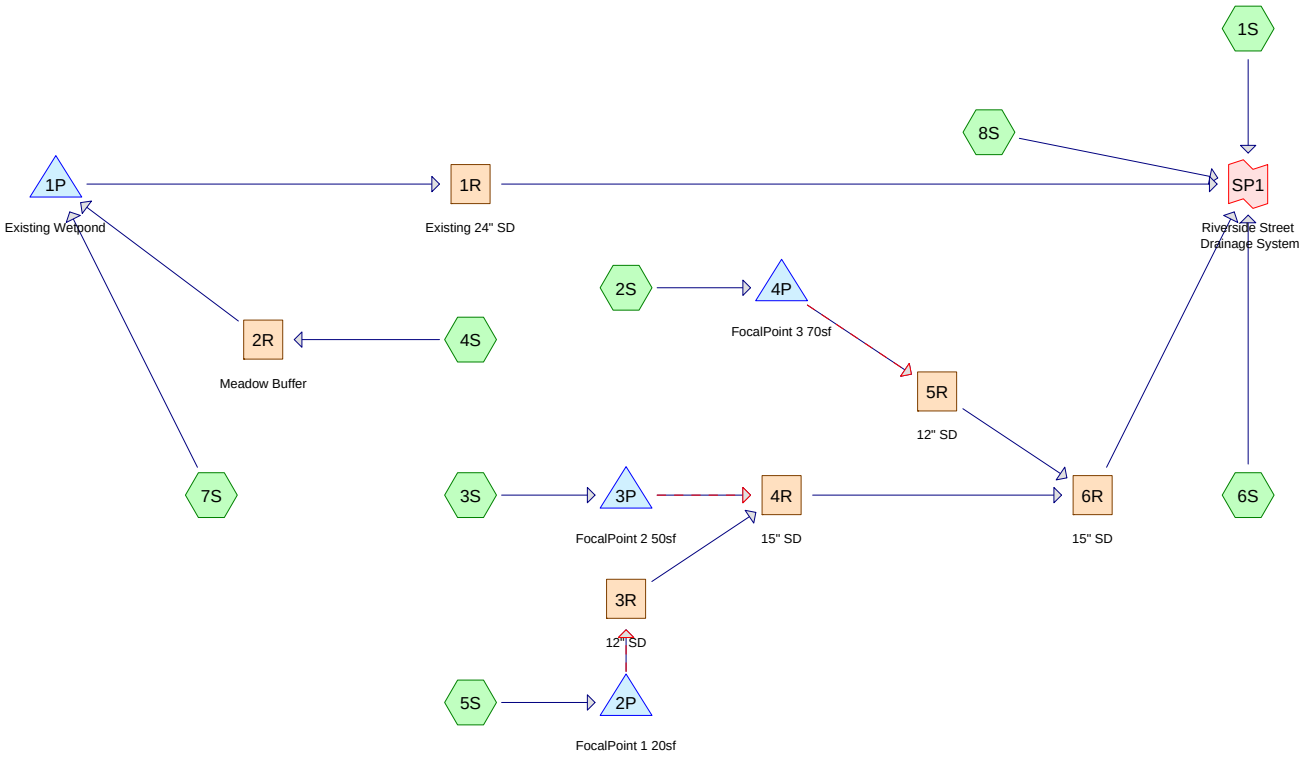
| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 68.50' | **24.0" Round Culvert**<br>L= 150.0' CMP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 68.50' / 68.26' S= 0.0016 '/' Cc= 0.900<br>n= 0.013, Flow Area= 3.14 sf |

**Primary OutFlow** Max=0.36 cfs @ 13.56 hrs HW=68.85' TW=68.54' (Dynamic Tailwater)
**1=Culvert** (Outlet Controls 0.36 cfs @ 1.45 fps)

## Summary for Link SP1: Riverside Street Drainage System

Inflow Area = 3.597 ac, 72.44% Impervious, Inflow Depth > 2.97" for 10-YEAR event
Inflow = 9.04 cfs @ 12.09 hrs, Volume= 0.890 af
Primary = 9.04 cfs @ 12.09 hrs, Volume= 0.890 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs




Subcat Reach Pond Link

**Routing Diagram for 17500_Postdevelopment 2018-3-26**
Prepared by Sebago Technics, Inc., Printed 7/19/2018

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.356 | 39 | >75% Grass cover, Good, HSG A (1S, 2S, 3S, 6S, 8S) |
| 0.471 | 74 | >75% Grass cover, Good, HSG C (3S, 4S, 5S, 6S, 7S, 8S) |
| 0.440 | 71 | Meadow, non-grazed, HSG C (6S, 7S) |
| 1.254 | 98 | Parking (1S, 2S, 3S, 4S, 5S, 6S) |
| 0.772 | 98 | Roofs (6S) |
| 0.305 | 70 | Woods, Good, HSG C (6S, 7S) |
| **3.597** | **83** | **TOTAL AREA** |

## Summary for Subcatchment 1S:

Runoff = 0.06 cfs @ 12.12 hrs, Volume= 0.006 af, Depth= 0.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 467 | 98 | Parking |
| | 2,768 | 39 | >75% Grass cover, Good, HSG A |
| | 3,235 | 48 | Weighted Average |
| | 2,768 | | 85.56% Pervious Area |
| | 467 | | 14.44% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.1 | 17 | 0.0294 | 0.13 | | **Sheet Flow, A to B** Grass: Short n= 0.150 P2= 3.00" |
| 0.1 | 20 | 0.1250 | 2.47 | | **Shallow Concentrated Flow, B to C** Short Grass Pasture Kv= 7.0 fps |
| 0.6 | 38 | 0.0221 | 1.04 | | **Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps |
| 3.2 | | | | | **Direct Entry, Direct Entry** |
| 6.0 | 75 | Total | | | |

## Summary for Subcatchment 2S:

Runoff = 2.22 cfs @ 12.08 hrs, Volume= 0.170 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 16,389 | 98 | Parking |
| | 1,450 | 39 | >75% Grass cover, Good, HSG A |
| | 17,839 | 93 | Weighted Average |
| | 1,450 | | 8.13% Pervious Area |
| | 16,389 | | 91.87% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 1.0 | 78 | 0.0240 | 1.36 | | **Sheet Flow, A to B** Smooth surfaces n= 0.011 P2= 3.00" |
| 1.0 | 86 | 0.0050 | 1.44 | | **Shallow Concentrated Flow, B to C** Paved Kv= 20.3 fps |
| 0.4 | 58 | 0.0133 | 2.34 | | **Shallow Concentrated Flow, C to D** Paved Kv= 20.3 fps |
| 3.6 | | | | | **Direct Entry, Direct Entry** |
| 6.0 | 222 | Total | | | |

## Summary for Subcatchment 3S:

Runoff = 1.72 cfs @ 12.08 hrs, Volume= 0.132 af, Depth= 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 12,315 | 98 | Parking |
| | 840 | 39 | >75% Grass cover, Good, HSG A |
| | 665 | 74 | >75% Grass cover, Good, HSG C |
| | 13,820 | 93 | Weighted Average |
| | 1,505 | | 10.89% Pervious Area |
| | 12,315 | | 89.11% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.6 | 58 | 0.0350 | 1.49 | | **Sheet Flow, A to B** Smooth surfaces n= 0.011 P2= 3.00" |
| 0.3 | 49 | 0.0204 | 2.90 | | **Shallow Concentrated Flow, B to C** Paved Kv= 20.3 fps |
| 0.2 | 21 | 0.0119 | 2.21 | | **Shallow Concentrated Flow, C to D** Paved Kv= 20.3 fps |
| 4.9 | | | | | **Direct Entry, Direct Entry** |
| 6.0 | 128 | Total | | | |

## Summary for Subcatchment 4S:

Runoff = 3.35 cfs @ 12.08 hrs, Volume= 0.250 af, Depth= 4.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 19,240 | 98 | Parking |
| | 8,853 | 74 | >75% Grass cover, Good, HSG C |
| | 28,093 | 90 | Weighted Average |
| | 8,853 | | 31.51% Pervious Area |
| | 19,240 | | 68.49% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 1.9 | 150 | 0.0150 | 1.29 | | **Sheet Flow, A to B** Smooth surfaces n= 0.011 P2= 3.00" |
| 0.5 | 19 | 0.0100 | 0.70 | | **Shallow Concentrated Flow, B to C** Short Grass Pasture Kv= 7.0 fps |
| 3.6 | | | | | **Direct Entry, Direct Entry** |
| 6.0 | 169 | Total | | | |

## Summary for Subcatchment 5S:

Runoff = 0.26 cfs @ 12.08 hrs, Volume= 0.020 af, Depth= 5.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 1,731 | 98 | Parking |
| | 347 | 74 | >75% Grass cover, Good, HSG C |
| | 2,078 | 94 | Weighted Average |
| | 347 | | 16.70% Pervious Area |
| | 1,731 | | 83.30% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.5 | 36 | 0.0280 | 1.24 | | **Sheet Flow, A to B** Smooth surfaces n= 0.011 P2= 3.00" |
| 0.1 | 13 | 0.0070 | 1.70 | | **Shallow Concentrated Flow, B to C** Paved Kv= 20.3 fps |
| 5.4 | | | | | **Direct Entry, Direct Entry** |
| 6.0 | 49 | Total | | | |

## Summary for Subcatchment 6S:

Runoff = 6.34 cfs @ 12.09 hrs, Volume= 0.459 af, Depth= 4.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 33,611 | 98 | Roofs |
| * | 4,478 | 98 | Parking |
| | 6,650 | 39 | >75% Grass cover, Good, HSG A |
| | 3,178 | 74 | >75% Grass cover, Good, HSG C |
| | 879 | 70 | Woods, Good, HSG C |
| | 9,576 | 71 | Meadow, non-grazed, HSG C |
| | 58,372 | 85 | Weighted Average |
| | 20,283 | | 34.75% Pervious Area |
| | 38,089 | | 65.25% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.6 | 12 | 0.3333 | 0.33 | | **Sheet Flow, A to B** Grass: Short n= 0.150 P2= 3.00" |
| 2.2 | 177 | 0.0070 | 1.35 | | **Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps |
| 0.3 | 95 | 0.0178 | 6.05 | 4.75 | **Pipe Channel, CMP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 |
| 1.0 | 196 | 0.0050 | 3.21 | 2.52 | **Pipe Channel, RCP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 |
| 1.9 | | | | | **Direct Entry, Direct Entry** |
| 6.0 | 480 | Total | | | |

## Summary for Subcatchment 7S:

Runoff = 1.10 cfs @ 12.47 hrs, Volume= 0.145 af, Depth= 2.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

| Area (sf) | CN | Description |
|---|---|---|
| 5,726 | 74 | >75% Grass cover, Good, HSG C |
| 12,408 | 70 | Woods, Good, HSG C |
| 9,576 | 71 | Meadow, non-grazed, HSG C |
| 27,710 | 71 | Weighted Average |
| 27,710 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 31.2 | 150 | 0.0069 | 0.08 | | **Sheet Flow, A to B** Grass: Dense n= 0.240 P2= 3.00" |
| 1.8 | 120 | 0.0050 | 1.14 | | **Shallow Concentrated Flow, B to C** Unpaved Kv= 16.1 fps |
| 33.0 | 270 | Total | | | |

## Summary for Subcatchment 8S:

Runoff = 0.12 cfs @ 12.11 hrs, Volume= 0.011 af, Depth= 1.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-YEAR Rainfall=5.80"

| Area (sf) | CN | Description |
|---|---|---|
| 3,791 | 39 | >75% Grass cover, Good, HSG A |
| 1,769 | 74 | >75% Grass cover, Good, HSG C |
| 5,560 | 50 | Weighted Average |
| 5,560 | | 100.00% Pervious Area |

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

## Summary for Reach 1R: Meadow Buffer

Inflow Area = 0.645 ac, 68.49% Impervious, Inflow Depth = 4.65" for 25-YEAR event
Inflow = 3.35 cfs @ 12.08 hrs, Volume= 0.250 af
Outflow = 2.70 cfs @ 12.14 hrs, Volume= 0.250 af, Atten= 20%, Lag= 3.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 2
Max. Velocity= 0.23 fps, Min. Travel Time= 7.4 min
Avg. Velocity = 0.06 fps, Avg. Travel Time= 29.4 min

Peak Storage= 1,194 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 1.00' Flow Area= 105.0 sf, Capacity= 61.41 cfs

55.00' x 1.00' deep channel, n= 0.240 Sheet flow over Dense Grass
Side Slope Z-value= 50.0 '/' Top Width= 155.00'
Length= 100.0' Slope= 0.0150 '/'
Inlet Invert= 71.50', Outlet Invert= 70.00'

‡

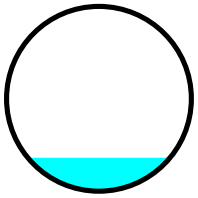
## Summary for Reach 2R: Existing 24" SD

Inflow Area = 1.281 ac, 34.48% Impervious, Inflow Depth > 3.02" for 25-YEAR event
Inflow = 0.59 cfs @ 13.22 hrs, Volume= 0.322 af
Outflow = 0.59 cfs @ 13.33 hrs, Volume= 0.322 af, Atten= 0%, Lag= 7.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 2
Max. Velocity= 1.53 fps, Min. Travel Time= 7.9 min
Avg. Velocity = 0.75 fps, Avg. Travel Time= 16.3 min

Peak Storage= 281 cf @ 13.33 hrs
Average Depth at Peak Storage= 0.36'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 8.33 cfs

24.0" Round Pipe
n= 0.013
Length= 730.0' Slope= 0.0014 '/'
Inlet Invert= 68.26', Outlet Invert= 67.27'



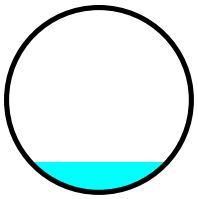
## Summary for Reach 3R: 12" SD

Inflow Area = 0.048 ac, 83.30% Impervious, Inflow Depth = 5.10" for 25-YEAR event
Inflow = 0.15 cfs @ 12.21 hrs, Volume= 0.020 af
Outflow = 0.14 cfs @ 12.22 hrs, Volume= 0.020 af, Atten= 3%, Lag= 1.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 2
Max. Velocity= 1.73 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 2.0 min

Peak Storage= 7 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 2.50 cfs

12.0" Round Pipe
n= 0.013
Length= 81.0' Slope= 0.0049 '/'
Inlet Invert= 68.25', Outlet Invert= 67.85'



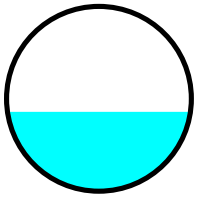
## Summary for Reach 4R: 15" SD

Inflow Area = 0.365 ac, 88.35% Impervious, Inflow Depth = 5.00" for 25-YEAR event
Inflow = 1.77 cfs @ 12.09 hrs, Volume= 0.152 af
Outflow = 1.74 cfs @ 12.10 hrs, Volume= 0.152 af, Atten= 1%, Lag= 0.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 2
Max. Velocity= 3.47 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.17 fps, Avg. Travel Time= 3.3 min

Peak Storage= 117 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.54'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 4.57 cfs

15.0" Round Pipe
n= 0.013
Length= 234.0' Slope= 0.0050 '/'
Inlet Invert= 67.75', Outlet Invert= 66.58'



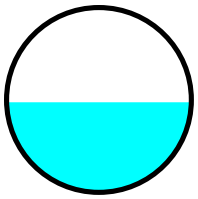
## Summary for Reach 5R: 12" SD

Inflow Area = 0.410 ac, 91.87% Impervious, Inflow Depth = 4.99" for 25-YEAR event
Inflow = 2.22 cfs @ 12.09 hrs, Volume= 0.170 af
Outflow = 2.22 cfs @ 12.09 hrs, Volume= 0.170 af, Atten= 0%, Lag= 0.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 2
Max. Velocity= 5.85 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.95 fps, Avg. Travel Time= 0.4 min

Peak Storage= 19 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.49'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.65 cfs

12.0" Round Pipe
n= 0.013
Length= 51.0' Slope= 0.0171 '/'
Inlet Invert= 66.95', Outlet Invert= 66.08'



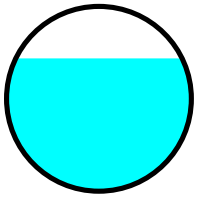
## Summary for Reach 6R: 15" SD

Inflow Area = 0.774 ac, 90.21% Impervious, Inflow Depth = 4.99" for 25-YEAR event
Inflow = 3.95 cfs @ 12.10 hrs, Volume= 0.322 af
Outflow = 3.95 cfs @ 12.10 hrs, Volume= 0.322 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 2
Max. Velocity= 4.19 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.46 fps, Avg. Travel Time= 0.7 min

Peak Storage= 58 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.90'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 4.57 cfs

15.0" Round Pipe
n= 0.013
Length= 62.0' Slope= 0.0050 '/'
Inlet Invert= 65.98', Outlet Invert= 65.67'



## Summary for Pond 1P: Existing Wetpond

Inflow Area = 1.281 ac, 34.48% Impervious, Inflow Depth = 3.70" for 25-YEAR event
Inflow = 3.20 cfs @ 12.16 hrs, Volume= 0.395 af
Outflow = 0.59 cfs @ 13.22 hrs, Volume= 0.322 af, Atten= 82%, Lag= 63.6 min
Primary = 0.59 cfs @ 13.22 hrs, Volume= 0.322 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 68.95' @ 13.25 hrs Surf.Area= 18,929 sf Storage= 9,242 cf

Plug-Flow detention time= 349.7 min calculated for 0.322 af (82% of inflow)
Center-of-Mass det. time= 274.0 min ( 1,098.9 - 824.9 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 68.00' | 33,213 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Voids (%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|---|
| 68.00 | 511 | 0.0 | 0 | 0 |
| 69.00 | 19,883 | 100.0 | 10,197 | 10,197 |
| 70.00 | 26,149 | 100.0 | 23,016 | 33,213 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 68.50' | **24.0" Round Culvert**<br>L= 150.0' CMP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 68.50' / 68.26' S= 0.0016 '/' Cc= 0.900<br>n= 0.013, Flow Area= 3.14 sf |

**Primary OutFlow** Max=0.59 cfs @ 13.22 hrs HW=68.95' TW=68.62' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.59 cfs @ 1.68 fps)

## Summary for Pond 2P: FocalPoint 1 20sf

Inflow Area = 0.048 ac, 83.30% Impervious, Inflow Depth = 5.10" for 25-YEAR event
Inflow = 0.26 cfs @ 12.08 hrs, Volume= 0.020 af
Outflow = 0.15 cfs @ 12.21 hrs, Volume= 0.020 af, Atten= 43%, Lag= 7.5 min
Primary = 0.05 cfs @ 11.68 hrs, Volume= 0.019 af
Secondary = 0.10 cfs @ 12.21 hrs, Volume= 0.002 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 70.54' @ 12.21 hrs Surf.Area= 20 sf Storage= 166 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 16.2 min ( 785.6 - 769.4 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 68.25' | 10 cf | **4.00'W x 5.00'L x 2.50'H FocalPoint**<br>50 cf Overall x 20.0% Voids |
| #2 | 69.75' | 200 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) -Impervious |
| | | 210 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 69.75 | 200 | 0 | 0 |
| 70.25 | 200 | 100 | 100 |
| 70.75 | 200 | 100 | 200 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 68.25' | **100.000 in/hr Exfiltration over Surface area** Phase-In= 0.10' |
| #2 | Secondary | 70.50' | **18.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |

**Primary OutFlow** Max=0.05 cfs @ 11.68 hrs HW=68.40' TW=68.34' (Dynamic Tailwater)
↑**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

**Secondary OutFlow** Max=0.10 cfs @ 12.21 hrs HW=70.53' TW=68.41' (Dynamic Tailwater)
↑**2=Orifice/Grate** (Weir Controls 0.10 cfs @ 0.61 fps)

## Summary for Pond 3P: FocalPoint 2 50sf

Inflow Area = 0.317 ac, 89.11% Impervious, Inflow Depth = 4.99" for 25-YEAR event
Inflow = 1.72 cfs @ 12.08 hrs, Volume= 0.132 af
Outflow = 1.72 cfs @ 12.09 hrs, Volume= 0.132 af, Atten= 0%, Lag= 0.3 min
Primary = 0.12 cfs @ 11.10 hrs, Volume= 0.083 af
Secondary = 1.60 cfs @ 12.09 hrs, Volume= 0.049 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 70.68' @ 12.09 hrs Surf.Area= 50 sf Storage= 236 cf

Plug-Flow detention time= 6.6 min calculated for 0.132 af (100% of inflow)
Center-of-Mass det. time= 6.5 min ( 780.5 - 774.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 67.72' | 29 cf | **5.00'W x 10.00'L x 2.93'H FocalPoint**<br>147 cf Overall x 20.0% Voids |
| #2 | 69.65' | 222 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) -Impervious |
| | | 252 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 69.65 | 200 | 0 | 0 |
| 70.15 | 200 | 100 | 100 |
| 70.65 | 200 | 100 | 200 |
| 70.75 | 250 | 22 | 222 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 67.72' | **100.000 in/hr Exfiltration over Surface area** Phase-In= 0.10' |
| #2 | Secondary | 70.50' | **24.0" Horiz. Orifice/Grate** C= 0.600 |
| | | | Limited to weir flow at low heads |

**Primary OutFlow** Max=0.12 cfs @ 11.10 hrs HW=67.85' TW=67.90' (Dynamic Tailwater)
↑—**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

**Secondary OutFlow** Max=1.59 cfs @ 12.09 hrs HW=70.68' TW=68.28' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 1.59 cfs @ 1.39 fps)

## Summary for Pond 4P: FocalPoint 3 70sf

Inflow Area = 0.410 ac, 91.87% Impervious, Inflow Depth = 4.99" for 25-YEAR event
Inflow = 2.22 cfs @ 12.08 hrs, Volume= 0.170 af
Outflow = 2.22 cfs @ 12.09 hrs, Volume= 0.170 af, Atten= 0%, Lag= 0.3 min
Primary = 0.16 cfs @ 11.18 hrs, Volume= 0.106 af
Secondary = 2.06 cfs @ 12.09 hrs, Volume= 0.064 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 2
Peak Elev= 69.28' @ 12.09 hrs Surf.Area= 70 sf Storage= 184 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 2.9 min ( 776.8 - 774.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 67.02' | 35 cf | **7.00'W x 10.00'L x 2.50'H FocalPoint** |
| | | | 175 cf Overall x 20.0% Voids |
| #2 | 68.52' | 561 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) -Impervious |
| | | 596 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 68.52 | 200 | 0 | 0 |
| 69.02 | 200 | 100 | 100 |
| 69.52 | 200 | 100 | 200 |
| 69.90 | 1,700 | 361 | 561 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 67.02' | **100.000 in/hr Exfiltration over Surface area** Phase-In= 0.10' |
| #2 | Secondary | 69.02' | **18.0" Horiz. Orifice/Grate** C= 0.600 |
| | | | Limited to weir flow at low heads |

**Primary OutFlow** Max=0.16 cfs @ 11.18 hrs HW=67.16' TW=67.08' (Dynamic Tailwater)
↑—**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

**Secondary OutFlow** Max=2.04 cfs @ 12.09 hrs HW=69.28' TW=67.43' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Weir Controls 2.04 cfs @ 1.67 fps)

## Summary for Link SP1: Riverside Street Drainage System

Inflow Area = 3.597 ac, 56.30% Impervious, Inflow Depth > 3.74" for 25-YEAR event
Inflow = 10.42 cfs @ 12.09 hrs, Volume= 1.121 af
Primary = 10.42 cfs @ 12.09 hrs, Volume= 1.121 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment 1S:** Runoff Area=3,235 sf 14.44% Impervious Runoff Depth=0.07"
Flow Length=75' Tc=6.0 min CN=48 Runoff=0.00 cfs 0.000 af

**Subcatchment 2S:** Runoff Area=17,839 sf 91.87% Impervious Runoff Depth=2.35"
Flow Length=222' Tc=6.0 min CN=93 Runoff=1.09 cfs 0.080 af

**Subcatchment 3S:** Runoff Area=13,820 sf 89.11% Impervious Runoff Depth=2.35"
Flow Length=128' Tc=6.0 min CN=93 Runoff=0.85 cfs 0.062 af

**Subcatchment 4S:** Runoff Area=28,093 sf 68.49% Impervious Runoff Depth=2.08"
Flow Length=169' Tc=6.0 min CN=90 Runoff=1.55 cfs 0.112 af

**Subcatchment 5S:** Runoff Area=2,078 sf 83.30% Impervious Runoff Depth=2.45"
Flow Length=49' Tc=6.0 min CN=94 Runoff=0.13 cfs 0.010 af

**Subcatchment 6S:** Runoff Area=58,372 sf 65.25% Impervious Runoff Depth=1.67"
Flow Length=480' Tc=6.0 min CN=85 Runoff=2.62 cfs 0.187 af

**Subcatchment 7S:** Runoff Area=27,710 sf 0.00% Impervious Runoff Depth=0.82"
Flow Length=270' Tc=33.0 min CN=71 Runoff=0.30 cfs 0.043 af

**Subcatchment 8S:** Runoff Area=5,560 sf 0.00% Impervious Runoff Depth=0.11"
Tc=6.0 min CN=50 Runoff=0.00 cfs 0.001 af

**Reach 1R: Meadow Buffer** Avg. Flow Depth=0.11' Max Vel=0.17 fps Inflow=1.55 cfs 0.112 af
n=0.240 L=100.0' S=0.0150 '/' Capacity=61.41 cfs Outflow=1.14 cfs 0.112 af

**Reach 2R: Existing 24" SD** Avg. Flow Depth=0.14' Max Vel=0.83 fps Inflow=0.08 cfs 0.083 af
24.0" Round Pipe n=0.013 L=730.0' S=0.0014 '/' Capacity=8.33 cfs Outflow=0.08 cfs 0.083 af

**Reach 3R: 12" SD** Avg. Flow Depth=0.09' Max Vel=1.23 fps Inflow=0.05 cfs 0.010 af
12.0" Round Pipe n=0.013 L=81.0' S=0.0049 '/' Capacity=2.50 cfs Outflow=0.05 cfs 0.010 af

**Reach 4R: 15" SD** Avg. Flow Depth=0.37' Max Vel=2.86 fps Inflow=0.89 cfs 0.072 af
15.0" Round Pipe n=0.013 L=234.0' S=0.0050 '/' Capacity=4.57 cfs Outflow=0.87 cfs 0.072 af

**Reach 5R: 12" SD** Avg. Flow Depth=0.33' Max Vel=4.83 fps Inflow=1.09 cfs 0.080 af
12.0" Round Pipe n=0.013 L=51.0' S=0.0171 '/' Capacity=4.65 cfs Outflow=1.09 cfs 0.080 af

**Reach 6R: 15" SD** Avg. Flow Depth=0.57' Max Vel=3.58 fps Inflow=1.95 cfs 0.152 af
15.0" Round Pipe n=0.013 L=62.0' S=0.0050 '/' Capacity=4.57 cfs Outflow=1.95 cfs 0.152 af

**Pond 1P: Existing Wetpond** Peak Elev=68.67' Storage=4,725 cf Inflow=1.25 cfs 0.155 af
24.0" Round Culvert n=0.013 L=150.0' S=0.0016 '/' Outflow=0.08 cfs 0.083 af

**Pond 2P: FocalPoint 1 20sf** Peak Elev=70.00' Storage=56 cf Inflow=0.13 cfs 0.010 af
Primary=0.05 cfs 0.010 af Secondary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.010 af

**Pond 3P: FocalPoint 2 50sf** Peak Elev=70.61' Storage=220 cf Inflow=0.85 cfs 0.062 af
Primary=0.12 cfs 0.048 af Secondary=0.73 cfs 0.015 af Outflow=0.84 cfs 0.062 af

**Pond 4P: FocalPoint 3 70sf** Peak Elev=69.17' Storage=161 cf Inflow=1.09 cfs 0.080 af
Primary=0.16 cfs 0.060 af Secondary=0.93 cfs 0.021 af Outflow=1.09 cfs 0.080 af

**Link SP1: Riverside Street Drainage System** Inflow=4.56 cfs 0.424 af
Primary=4.56 cfs 0.424 af

**Total Runoff Area = 3.597 ac Runoff Volume = 0.495 af Average Runoff Depth = 1.65"**
**43.70% Pervious = 1.572 ac 56.30% Impervious = 2.026 ac**

Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment 1S:** Runoff Area=3,235 sf 14.44% Impervious Runoff Depth=0.45"
Flow Length=75' Tc=6.0 min CN=48 Runoff=0.02 cfs 0.003 af

**Subcatchment 2S:** Runoff Area=17,839 sf 91.87% Impervious Runoff Depth=3.81"
Flow Length=222' Tc=6.0 min CN=93 Runoff=1.72 cfs 0.130 af

**Subcatchment 3S:** Runoff Area=13,820 sf 89.11% Impervious Runoff Depth=3.81"
Flow Length=128' Tc=6.0 min CN=93 Runoff=1.34 cfs 0.101 af

**Subcatchment 4S:** Runoff Area=28,093 sf 68.49% Impervious Runoff Depth=3.49"
Flow Length=169' Tc=6.0 min CN=90 Runoff=2.56 cfs 0.188 af

**Subcatchment 5S:** Runoff Area=2,078 sf 83.30% Impervious Runoff Depth=3.91"
Flow Length=49' Tc=6.0 min CN=94 Runoff=0.20 cfs 0.016 af

**Subcatchment 6S:** Runoff Area=58,372 sf 65.25% Impervious Runoff Depth=3.00"
Flow Length=480' Tc=6.0 min CN=85 Runoff=4.68 cfs 0.335 af

**Subcatchment 7S:** Runoff Area=27,710 sf 0.00% Impervious Runoff Depth=1.82"
Flow Length=270' Tc=33.0 min CN=71 Runoff=0.72 cfs 0.096 af

**Subcatchment 8S:** Runoff Area=5,560 sf 0.00% Impervious Runoff Depth=0.54"
Tc=6.0 min CN=50 Runoff=0.04 cfs 0.006 af

**Reach 1R: Meadow Buffer** Avg. Flow Depth=0.16' Max Vel=0.20 fps Inflow=2.56 cfs 0.188 af
n=0.240 L=100.0' S=0.0150 '/' Capacity=61.41 cfs Outflow=2.00 cfs 0.188 af

**Reach 2R: Existing 24" SD** Avg. Flow Depth=0.26' Max Vel=1.26 fps Inflow=0.31 cfs 0.212 af
24.0" Round Pipe n=0.013 L=730.0' S=0.0014 '/' Capacity=8.33 cfs Outflow=0.30 cfs 0.211 af

**Reach 3R: 12" SD** Avg. Flow Depth=0.09' Max Vel=1.23 fps Inflow=0.05 cfs 0.016 af
12.0" Round Pipe n=0.013 L=81.0' S=0.0049 '/' Capacity=2.50 cfs Outflow=0.05 cfs 0.016 af

**Reach 4R: 15" SD** Avg. Flow Depth=0.47' Max Vel=3.24 fps Inflow=1.38 cfs 0.116 af
15.0" Round Pipe n=0.013 L=234.0' S=0.0050 '/' Capacity=4.57 cfs Outflow=1.36 cfs 0.116 af

**Reach 5R: 12" SD** Avg. Flow Depth=0.42' Max Vel=5.47 fps Inflow=1.72 cfs 0.130 af
12.0" Round Pipe n=0.013 L=51.0' S=0.0171 '/' Capacity=4.65 cfs Outflow=1.72 cfs 0.130 af

**Reach 6R: 15" SD** Avg. Flow Depth=0.75' Max Vel=3.99 fps Inflow=3.07 cfs 0.246 af
15.0" Round Pipe n=0.013 L=62.0' S=0.0050 '/' Capacity=4.57 cfs Outflow=3.07 cfs 0.246 af

**Pond 1P: Existing Wetpond** Peak Elev=68.83' Storage=7,068 cf Inflow=2.31 cfs 0.284 af
24.0" Round Culvert n=0.013 L=150.0' S=0.0016 '/' Outflow=0.31 cfs 0.212 af

**Pond 2P: FocalPoint 1 20sf** Peak Elev=70.43' Storage=145 cf Inflow=0.20 cfs 0.016 af
Primary=0.05 cfs 0.016 af Secondary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.016 af

**Pond 3P: FocalPoint 2 50sf** Peak Elev=70.65' Storage=230 cf Inflow=1.34 cfs 0.101 af
Primary=0.12 cfs 0.068 af Secondary=1.22 cfs 0.033 af Outflow=1.33 cfs 0.101 af

**Pond 4P: FocalPoint 3 70sf** Peak Elev=69.24' Storage=174 cf Inflow=1.72 cfs 0.130 af
Primary=0.16 cfs 0.087 af Secondary=1.56 cfs 0.043 af Outflow=1.72 cfs 0.130 af

**Link SP1: Riverside Street Drainage System** Inflow=7.75 cfs 0.801 af
Primary=7.75 cfs 0.801 af

**Total Runoff Area = 3.597 ac Runoff Volume = 0.874 af Average Runoff Depth = 2.91"**
**43.70% Pervious = 1.572 ac 56.30% Impervious = 2.026 ac**

**Attachment C**

# INSPECTION, MAINTENANCE, AND HOUSEKEEPING

# INSPECTION, MAINTENANCE, AND HOUSEKEEPING PLAN

## Patagon Storage
## Portland, Maine

**Introduction**

The developer responsible for the proposed project is Patagon Storage, LLC. The developer's address is 1700 Main Street, Suite 70 Washaugal, Washington. After construction, the driveway area will be maintained by the developer. The owner of the proposed project will be responsible for the maintenance of all stormwater management structures, and the keeping of records and maintenance logbook. Records of all inspections and maintenance work accomplished must be kept on file and retained for a minimum 5-year time span. The maintenance logbook will be made available to the Maine Department of Environmental Protection (MDEP) upon request. At a minimum, the appropriate and relevant activities for each of the stormwater management systems will be performed on the prescribed schedule.

The following plan outlines the anticipated inspection, maintenance, and housekeeping procedures for the erosion and sedimentation controls as well as stormwater management devices for the project site. Also, this plan outlines several housekeeping requirements that shall be followed during and after construction. These procedures should be followed in order to ensure the intended function of the designed measures and to prevent unreasonable adverse impacts to the surrounding environment.

The procedures outlined in this Inspection, Maintenance, and Housekeeping Plan are provided as an overview of the anticipated practices to be used on this site. In some instances, additional measures may be required due to unexpected conditions. For additional details on any of the erosion and sedimentation control measures or stormwater management devices to be utilized on this project, refer to the most recently revised edition of the "Maine Erosion and Sedimentation Control BMP" manual and/or the "Stormwater Management for Maine: Best Management Practices" manual as published by the MDEP.

**During Construction**

1. **Inspection:** During the construction process, it is the Contractor's responsibility to comply with the inspection and maintenance procedures outlined in this section. These responsibilities include inspecting disturbed and impervious areas, erosion control measures, materials storage areas that are exposed to precipitation, and locations where vehicles enter or exit the site. These areas shall be inspected at least once a week as well as before and after a storm event, and prior to completing permanent stabilization measures. A person with knowledge of erosion and stormwater control, including the standards and conditions in any applicable permits, shall conduct the inspections.

2. **Maintenance:** All measures shall be maintained in an effective operating condition until areas are permanently stabilized. If Best Management Practices (BMPs) need to be maintained or modified, additional BMPs are necessary, or other corrective action is needed, implementation must be completed within seven (7) calendar days and prior to any storm event (rainfall).

3. **Documentation:** A log summarizing the inspections and any corrective action taken must be maintained on-site. The log must include the name(s) and qualifications of the person making the inspections, the date(s) of the inspections, and major observations about the operation and maintenance of erosion and sedimentation controls, material storage areas, and vehicle access points to the site. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to the appropriate regulatory agency upon request. The permittee shall retain a copy of the log for a period of at least three (3) years from the completion of permanent stabilization.

4. **Specific Inspection and Maintenance Tasks:** The following is a list of erosion control and stormwater management measures and the specific inspection and maintenance tasks to be performed during construction.

   A. <u>Sediment Barriers:</u>

   - Hay bale barriers, silt fences, and filter berms shall be inspected immediately after each rainfall and at least daily during prolonged rainfall.
   - If the fabric on the silt fence or filter barrier should decompose or become ineffective prior to the end of the expected usable life and the barrier is still necessary, it shall be replaced.
   - Sediment deposits should be removed after each storm event. They must be removed before deposits reach approximately one-half the height of the barrier.
   - Filter berms shall be reshaped as needed.
   - Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required should be dressed to conform to the existing grade, prepared, and seeded.

   B. <u>Riprap Materials:</u>

   - Once a riprap installation has been completed, it should require very little maintenance. It shall, however, be inspected periodically to determine if high flows have caused scour beneath the riprap or dislodged any of the stone.

C. Stabilized Construction Entrances/Exits:

- The exit shall be maintained in a condition that will prevent tracking of sediment onto public rights-of-way.
- When the control pad becomes ineffective, the stone shall be removed along with the collected soil material. The entrance should then be reconstructed.
- Areas that have received mud-tracking or sediment deposits shall be swept or washed. Washing shall be done on an area stabilized with aggregate, which drains into an approved sediment-trapping device (not into storm drains, ditches, or waterways).

D. Temporary Seed and Mulch:

- Mulched areas should be inspected after rain events to check for rill erosion.
- If less than 90% of the soil surface is covered by mulch, additional mulch shall be applied in bare areas.
- In applications where seeding and mulch have been applied in conjunction with erosion control blankets, the blankets must be inspected after rain events for dislocation or undercutting.
- Mulch shall continue to be reapplied until 95% of the soil surface has established temporary vegetative cover.

E. Level Lip Spreaders and Ditch Turnouts:

- The level spreader pool should be inspected after rainfall events for sediment accumulation and debris that may reduce its capacity. Sediment and debris buildup should be removed once the volume of the pool has been reduced by 25%.
- The level lip must be constructed so that runoff flows slowly over the lip to a sheet flow through the receiving buffer. Repair or reconstruction of the level lip is required when flow from the spreader becomes channelized.
- Do not store snow removed from the street and/or parking lot within the area of a level spreader.

F. Stabilized Temporary Drainage Swales:

- Sediment accumulation in the swale shall be removed once the cross section of the swale is reduced by 25%.

- The swales shall be inspected after rainfall events. Any evidence of sloughing of the side slopes or channel erosion shall be repaired and corrective action should be taken to prevent reoccurrence of the problem.

- In addition to the stabilized lining of the channel (i.e. erosion control blankets), stone check dams may be needed to further reduce channel velocity.

5. **Housekeeping:** The following general performance standards apply to the proposed project.

   A. Spill Prevention: Controls must be used to prevent pollutants from being discharged from materials on-site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.

   B. Groundwater Protection: During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors, accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.

   C. Fugitive Sediment and Dust: Actions must be taken to insure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control.

   D. Debris and Other Materials: Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.

   E. Trench Dewatering: Trench dewatering is the removal of water from trenches, foundations, cofferdams, ponds, and other areas within the construction area that retain water after excavation. In most cases, the collected water is heavily silted and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved.

**After Construction**

1. **Inspection:** After construction, it is the responsibility of the owner or assigned heirs to comply with the inspection, maintenance, and housekeeping procedures outlined in this section. All measures must be maintained in effective operating condition. A person with knowledge of erosion and stormwater control, including the standards and conditions in all applicable permits, shall conduct the inspections.

2. **Specific Inspection, Maintenance, and Housekeeping Tasks:** The following is a list of permanent erosion control and stormwater management measures and the inspection, maintenance, and housekeeping tasks to be performed after construction.

   A. Vegetated Areas:

   - Inspect vegetated areas, particularly slopes and embankments, early in the growing season or after heavy rains to identify active or potential erosion problems.

   - Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

   B. Ditches, Swales, and Other Open Channels:

   - Inspect ditches, swales and other open stormwater channels in the spring, in the late fall, and after heavy rains to remove any obstructions to flow. Remove accumulated sediments and debris, remove woody vegetative growth that could obstruct flow, and repair any erosion of the ditch lining.

   - Vegetated ditches must be mowed at least annually or otherwise maintained to control the growth of woody vegetation and maintain flow capacity.

   - Any woody vegetation growing through riprap linings must also be removed. Repair any slumping side slopes as soon as practicable.

   - If the ditch has a riprap lining, replace riprap in areas where any underlying filter fabric or underdrain gravel is showing through the stone or where stones have dislodged.

   C. Culverts:

   - Inspect culverts in the spring, in the late fall, and after heavy rains to remove any obstructions to flow.

   - Remove accumulated sediments and debris at the inlet, at the outlet, and

within the conduit.

- Inspect and repair any erosion damage at the culvert's inlet and outlet.

D. Catch Basins/Outlet Control Structures:

- Inspect and, if required, clean-out basins at least once a year, preferably in early spring.

- Clean out must include the removal and legal disposal of accumulated sediments and debris at the bottom of the basin, at any inlet grates, at any inflow channels to the basin, and at any pipes between basins.

E. Level Lip Spreaders, Rip-Rap Outfalls and Ditch Turnouts:

- The level spreader pool should be inspected after significant rainfall events for sediment accumulation and debris that may reduce its capacity. Sediment and debris buildup should be removed once the volume of the pool has been reduced by 25%.

- The level lip must be constructed so that runoff flows slowly over the lip to a sheet flow through the receiving buffer. Repair or reconstruction of the level lip is required when flow from the spreader becomes channelized.

- Do not store snow removed from the street and/or parking lot within the area of a level spreader.

F. Winter Sanding

- Clear accumulation of winter sand along roadways at least once a year, preferably in the spring.

- Accumulations on pavement may be removed by pavement sweeping.

- Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader or other acceptable method.

G. Focal Point Treatment Systems

- The focal point should be inspected after every major storm in the first few months to ensure proper function. Thereafter, the filter should be inspected at least once every six months to ensure that it is draining in no less than 24 hours and no more than 48 hours.

- The top several inches of the filter shall be replaced with fresh material when water ponds on the surface of the bed for more than 72 hours.

- The filter bed vegetations shall be mowed once or twice per year to a grass height no less than six (6) inches.

- Fertilization of the focal point filter area should be avoided unless absolutely necessary to establish vegetation.

- Harvesting and pruning of excessive growth will need to be done occasionally. Weeding to control unwanted or invasive plants may also be necessary.

- Inspect embankment for erosion, settling, and structural failure.

3. **Documentation:** A log summarizing the inspections and any corrective action taken must be maintained. The log must include the name(s) and qualifications of the person making the inspections, the date(s) of the inspections, and major observations about the operation and maintenance of controls. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to the appropriate regulatory agency upon request. A sample "Stormwater Inspection and Maintenance Form" has been included as Attachment 1 of this Inspection, Maintenance, and Housekeeping Plan.

4. **Recertification:** A certification of the following shall be submitted to the Maine Department of Environmental Protection (MDEP) within three months of the expiration of each five year interval from the date of issuance of MDEP permits.

   A. Identification and repair of erosion problems. All areas of the project site have been inspected for areas of erosion, and appropriate steps have been taken to permanently stabilize these areas.

   B. Inspection and repair of stormwater control system. All aspects of the stormwater control system have been inspected for damage, wear, and malfunction, and appropriate steps have been taken to repair or replace the system, or portions of the system.

C. The Inspection, Maintenance, and Housekeeping Plan for the site is being implemented as written, or modifications to the plan have been submitted to and approved by the MDEP, and the maintenance log is being maintained.

5. **Duration of Maintenance:** Perform maintenance as described and required for any associated permits unless and until the system is formally accepted by a municipality or quasi-municipal district, or is placed under the jurisdiction of a legally created association that will be responsible for the maintenance of the system. If a municipality or quasi-municipal district chooses to accept a stormwater management system, or a component of a stormwater system, it must provide a letter to the MDEP stating that it assumes responsibility for the system. The letter must specify the components of the system for which the municipality or district will assume responsibility, and that the municipality or district agrees to maintain those components of the system in compliance with MDEP standards. Upon such assumption of responsibility, and approval by the MDEP, the municipality, quasi-municipal district, or association becomes a co-permittee for this purpose only and must comply with all terms and conditions of the permit.

**Attachments**

Attachment 1 – Sample Stormwater Inspection and Maintenance Form

17500

## MAINTENANCE LOG

## Patagon Storage
## Portland, Maine
## Attachment 1

This log is intended to accompany the stormwater Inspection, Maintenance and Housekeeping Plan for Patagon Storage. The following items shall be checked, cleaned and maintained on a regular basis as specified in the Maintenance Plan and as described in the table below. This log shall be kept on file for a minimum of five (5) years and shall be available for review by the MDEP. Qualified personnel familiar with drainage systems and soils shall perform all inspections. Attached is a copy of the construction and post-construction maintenance logs.

| Item | Maintenance Required & Frequency | Date Completed | Maintenance Personnel | Comments |
|---|---|---|---|---|
| Vegetated Areas | Inspect Slopes | | | |
| | Replant Bare Areas | | | |
| | Check after Major Storms | | | |
| Ditches and Swales | Inspect after major rainfall event producing greater than 3" of rain in 2 hours. | | | |
| | Repair erosion or damage immediately. | | | |
| Culverts | Inspect culverts monthly or after rainfall of >1" | | | |
| | Clean culverts when sediment occupies more than 20% of pipe diameter | | | |
| | Repair any erosion at inlet and outlet pipes | | | |
| | Replace displaced riprap at least once a year | | | |
| | Remove vegetation growing through riprap at least once a year | | | |
| Catch Basins/ Outlet Control Structures | Inspect and cleanout basins at least annually, (Spring) | | | |
| Level Spreader, Rip-Rap Outfalls and Ditch Turnouts | Inspect after significant rainfall events for sediment accumulation | | | |
| | If volume of pool is reduced by 25%, must remove sediment and debris | | | |
| Level Spreader and Ditch Turnouts | Repair or reconstruct the riprap if flow from the spreader becomes channelized | | | |

| Item | Maintenance Required & Frequency | Date Completed | Maintenance Personnel | Comments |
|---|---|---|---|---|
| | No snow storage is allowed in the level lip spreader | | | |
| Winter Sanding | Clean annually (Spring) | | | |
| | Remove sand and sediment from roadway shoulders | | | |
| Focal Point Treatment Systems | Inspect filter every 6 months to ensure drain times between 24-48 hours. | | | |
| | Replace top several inches of the filter if drain time is more than 72 hours. | | | |
| | Inspect inlet and outlet control structure for blockage. | | | |
| | Mow filter bed vegetation no more than twice a year to a height no less than 6 inches. | | | |
| | Remove or prune unwanted vegetation as necessary. | | | |
| | Inspect embankment for erosion settling and structural failure | | | |