# STORMWATER MANAGEMENT REPORT

for

# 480-482 RANTOUL STREET BEVERLY, MASSACHUSETTS

**Prepared for:**

Windover Development
15 Rantoul
Beverly, Massachusetts 01915

**Prepared by:**

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MERIDIAN ASSOCIATES

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## Stormwater Management Standards

### Project Narrative:

The subject property consists of two existing lots totaling approximately 1.96± acres of land located in Beverly, Massachusetts. The property is roughly bounded by the MBTA commuter railway to the west, Elliott Street (Rte. 62) to the south and Rantoul Street (Rte. 1A) to the east. The parcels are identified as Map 20 Lot 107 and Map 20 Lot 108 by the City Assessor Department with property addresses of 480 and 482 Rantoul Street, respectively. The parcels are primarily located within the Central Business (CC) zoning district, with the exception of a small area on the westerly side of Lot 107 that is within the General Industrial (IG) zoning district. The project is located in a heavily developed area of the City with both commercial and residential properties nearby.

A small isolated wetland area is located in the south end of the project property which is to remain and will not be disturbed. There is an existing 42 inch diameter storm drain and four associated drain manhole structures within the site. The 42 inch pipe enters the property at the northeast corner and runs for approximately 420± feet northerly, southwesterly and then southeasterly, ultimately leaving the property at the southern end of the site. A portion of the property (482 Rantoul St. lot) was previously occupied by a commercial use (restaurant) that has since been demolished along with the appurtenant paved parking areas associated with the former structure. Currently that portion of the lot is cleared and used as a construction staging area for work being done nearby by others. The remaining portions of the property consist of a graded gravel area along the west side of the site, abutting the railroad and a commercial condominium complex, and a small area of overgrown natural vegetation consisting of small trees, grass, brush and weeds adjacent to the isolated wetland area.

The topography of the site ranges from elevation 25 (NAVD 88) at the northeast corner of the property to elevation 12 at the southerly end of the property (internal to the site is a slope along the edge of historical filling with a top elevation of approximately 23± to a bottom of slope at elevation 17±).

The applicant is proposing the construction of a 5 story, 90-unit residential building with approximately 1,900 square feet of retail use on the first floor and associated parking and utilities. Vehicular access to the site will be provided from Rantoul Street via a one way in driveway located to the south of the proposed building and the exit will be a one way driveway out to the north of the building. All proposed work will be done in previously disturbed areas.

The following are the DEP Stormwater Management Standards as addressed by the proposed site design.

**Standard 1: No new stormwater conveyances may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.**

Existing topography directs stormwater from the property to two of the onsite drainage structures associated with the existing 42-inch diameter drain which carries stormwater off the site to the south. A portion of the site also discharges southerly, but via overland flow.

The proposed conditions have been designed to mimic the existing drainage patterns and provide a reduction in the rate and volume of stormwater that is directed to the existing 42 inch drain pipe. The runoff from the developed, impervious areas of the project will be collected by deep sump hooded catch basins, for pretreatment, then directed to two subsurface infiltration systems. The subsurface systems will overflow to a proposed connection to an existing drain manhole structure on the 42-inch drain. The uncaptured areas will consist of pervious, grassed graded slopes which will discharge via overland flow. A small area of the proposed building's roof is proposed to discharge via a pipe, along with some of the uncaptured grassed slope areas noted above via overland flow, to the existing isolated wetland. In addition, a small area in the front of the proposed building consisting of approximately 1,158 square feet will discharge to Rantoul Street, with negligible impact.

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

For the purpose of analyzing pre and post development stormwater peak rates of runoff, 2 design points have been selected based on existing topographic conditions. Each design point in the existing conditions has a corresponding design point in the proposed conditions. Comparison values for pre and post development stormwater peak rates are given for the two design points only. The first point is a sum of the discharge from the site which flows to and into the existing 42-inch drain. The second point is a sum of the piped flow and the overland flow which both ultimately discharge southerly

The storm events that were used to calculate peak runoff rates for pre and post construction conditions are compiled from the Soil Conservation Service Technical Report No. 55 and the U.S. Department of Commerce Technical Paper No. 40. The calculations show that the peak rates of runoff for the 2, 10, and 100 year events, post development, have been matched or reduced to the pre development condition.

The hydrologic calculations were performed using HydroCAD and are included in this report in the section titled "Hydrologic Calculations".

**Proposed Design Points and Subcatchment Areas**

Design Point "DP1" corresponds to the calculated runoff to the existing 42-inch drainage system. In the existing condition, the contributing areas to the Design Point consist of sub catchment areas 1 and 2 which flow into the drain at the northern end of the site, this includes a small portion of offsite area. Subcatchment area 4 also flows into the drain but at the southerly end of the site.

Design Point "DP2" corresponds to the overland flow from sub catchment area 3.

In the developed condition, Design Point "DP1" corresponds to the calculated runoff to the existing 42-inch drainage system. In the developed condition, the contributing areas to the Design Point consist of sub catchment area 2 (with onsite and a small portion of offsite area) which flows into the drain at the northern end of the site as well as sub catchment area 1, the majority of the developed site, which flows into the drain at the southerly end of the site via a proposed drain connection downstream of the detention/infiltration system.

Design Point "DP2" corresponds to the overland flow from sub catchment area 3.

As was noted above a very small area of the site, in front of the building, flows to Rantoul Street but with negligible impact.

**Design Point "DP1"**

| Storm Event | Existing Conditions (Pre) Peak Flow (CFS) | Proposed Conditions (Post) Peak Flow (CFS) |
|---|---|---|
| 2-Year (3.1 in.) | 2.1 | 0.3 |
| 10-Year (4.6 in.) | 3.9 | 1.5 |
| 100-Year (7.0 in.) | 7.0 | 4.6 |

**Design Point "DP2"**

| Storm Event | Existing Conditions (Pre) Peak Flow (CFS) | Proposed Conditions (Post) Peak Flow (CFS) |
|---|---|---|
| 2-Year (3.1 in.) | 1.9 | 0.6 |
| 10-Year (4.6 in.) | 3.5 | 1.1 |
| 100-Year (7.0 in.) | 6.1 | 2.2 |

The tables above outline the results of the hydrologic models. As required by Standard #2, the proposed BMP's adequately attenuate for potential increase in peak rate of stormwater runoff.

**Standard 3: Recharge - Loss of annual recharge to groundwater shall be eliminated or minimized...at a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This standard is met when the stormwater management system is designed to infiltrate the required recharge volume in accordance with the Mass Stormwater Handbook.**

Loss of annual recharge to groundwater has been minimized through the use of stormwater Best Management Practices (BMP's), two (2) subsurface infiltration structures, and a proposed operation and maintenance program are proposed for this project. Based on soil maps provided by U.S. Department of Agriculture Soil Conservation Service per their Web Soil Survey Website, the entire site falls within a soil type classified as Urban Land (soil map unit 602). This soil type is not assigned to a hydrologic soil group (HSG). Based upon the soil testing done at the site, lot is in fill over sand and gravel at depth, and due to the densely developed nature of the area, an HSG soil type of HSG C, for pre and post developed conditions, was selected.

Utilizing the current regulations, the proposed project will meet this standard as per the following calculation:

Rv = Fx
Rv = Required Recharge Volume
F = Target Depth Factor associated with hydrologic soil groups located in table 2.3.2 in Volume 3 of the Stormwater Management Handbook
x = Total impervious area proposed

Total Impervious area onsite: 64,336 square feet (sf).
Required recharge volume depth factor for C type soils: 0.25 inches
Therefore Rv = (64,336 sf)(0.25 inches/12 inches per foot)
Rv = 1,340 cubic feet cf

Approximately 3,900 sf of the proposed building roof is discharging to the wetland area therefore, the total impervious area captured = 64,336-3,900 =

60,436 sf which is 93.9% of the total impervious area and exceeds the minimum of 65% required by the standard. The adjusted, required Rv = 1,340/0.939 = 1,427 cf.

The proposed subsurface infiltration structure onsite provides a total recharge storage volume under the outlet elevation (17.65) of 2,181 cf and the roof infiltration unit provides a total recharge volume of 1,331 cf. The sum =3,512 cf which exceeds the required total of 1,427 cf.

**Standard 4: Water Quality – Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). The standard is met with pollution prevention plans, stormwater BMP's sized to capture required water quality volume, and pretreatment measures.**

As discussed above, there are no untreated stormwater discharges from the proposed project. The stormwater management system has been designed to remove a minimum of 80% of the average annual post-construction load of Total Suspended Solids (TSS). A TSS Removal Calculation Worksheet is included in this report. These percentages have been achieved by the use of deep sump catch basins, and a subsurface infiltration system.

The Stormwater Management Handbook assigns TSS removal percentages to each treatment BMP. Each treatment BMP is sized to capture the required water quality volume as calculated in accordance with the Handbook in order to achieve the assigned TSS removal rates.

General Equation from Stormwater Management Handbook

Vwq = (Dwq)(A)
Vwq = required water quality volume
Dwq = water quality depth (1" for critical areas, 0.5" for non-critical areas)
A = impervious area

The following are treatment sizing calculations for portions of the treatment train based on the 0.5" for non-critical areas.

Constructed Subsurface Infiltration System

Tributary impervious area = 52,078 sf

Vwq = (52,078)(0.5"/12) = 2,170 cf

Volume provided below the invert = 2,181 cf which exceeds the required volume.

Constructed Roof Infiltration System

Tributary impervious area = 8,358 sf

Vwq = (8,358)(0.5"/12) = 348 cf

Volume provided = 1,331 cf which exceeds the required volume.

Because a small portion of the roof is directed to the wetland and is treated with a deep sump and hooded manhole structure, check average removal rate:
Subsurface infiltration system removes 85% (tributary area = 52,078 sf)
Roof infiltration system removes 80% (tributary area = 8,358 sf
Roof to wetland removes 25%-sum & hood (tributary area = 3,900 sf)
Total impervious area = 64,336 sf)

Weighted removal:
0.85(52,078/64,336) + 0.80(8,358/64,336) + 0.25(3,900/64,336) = 80.7% which exceeds the standard

A post construction operation and maintenance plan is included as part of this report. Suitable practices for source control and long term pollution prevention have been identified and shall be implemented as discussed.

The utilization of pretreatment and treatment BMP's combined with the operation and maintenance plan provides compliance with this standard.

**Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPLs) – Source control and pollution prevention shall be implemented in accordance with the Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.**

Stormwater Standard 5 is not applicable to this project. The proposed development will not subject the site to higher potential pollutant loads as defined in the Massachusetts Department of Environmental protection Wetlands and Water Quality Regulations.

LUHPPLs are identified in 310 CMR 22.20B(2) and C(2)(a)-(k) and (m) and CMR 22.21(2)(a)(1)-(8) and (b)(1)-(6), areas within a site that are the location of activities that are subject to an individual National Pollutant Discharge Elimination System (NPDES) permit or the NPDES Multi-sector General Permit; auto fueling facilities, exterior fleet storage areas, exterior vehicle service and equipment cleaning areas; marinas and boatyards; parking lots with high-intensity-use; confined disposal facilities and disposal sites.

**Standard 6: Critical Areas – Stormwater discharges to critical areas require the use of specific source control and pollution prevention measures and specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas.**

Stormwater Standard 6 is not applicable to this project given that proposed stormwater does not discharge to a critical area. Critical areas being Outstanding Resource Waters and Special Resource Waters as designated in 314 CMR 4.0, recharge areas for public water supplies as defined in 310 CMR 22.02, bathing beaches as defined in 105 CMR 445.000, cold-water fisheries and shellfish growing areas as defined in 314 CMR 9.02 and 310 CMR 10.04.

**Standard 7: Redevelopments – A redevelopment project is required to meet Standards 1-6 only to the maximum extent practicable. Remaining standards shall be met as well as the project shall improve the existing conditions.**

Stormwater Standard 7 is not applicable to this project. Within the Stormwater Management Handbook (volume 1 chapter 1 page 20), the definition of a redevelopment project includes, "development, rehabilitation, expansion and phased projects on previously developed sites, provided the redevelopment results in no net increase in impervious area".

This project will not result in a reduction of impervious area in the proposed conditions.

**Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan shall be implemented.**

An *Inspection and Maintenance Program for a Proposed Stormwater Management System* is included with this report. The erosion and sediment control section of the program details the construction period operation and maintenance plan and sequencing for pollution prevention measures and erosion and sedimentation controls. Locations of erosion control measures for the project are depicted on the site plan set accompanying this report.

**Standard 9: A long term Operation and Maintenance Plan shall be implemented.**

An *Inspection and Maintenance Program for a Proposed Stormwater Management System* is included with this report. The long term operation and maintenance section of the program provides details and the schedule for routine and non-routine maintenance tasks to be implemented at the completion of the project.

**Standard 10: Prohibition of Illicit Discharges – Illicit discharges to the stormwater management system are prohibited.**

Illicit discharges to the stormwater management system are discharges that are not entirely comprised of stormwater. Discharges to the stormwater management system from the following activities or facilities are permissible: Firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water

sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents. All other illicit discharges are prohibited.

There are no known illicit discharges anticipated through the completion of this project. During construction and post construction procedures are provided to dissipate the potential for illicit discharges to the drainage system. Post construction preventions of illicit discharges are described in the Inspection and Maintenance Plan under the Good Housekeeping Practices section of the report.

## `DRAWDOWN CALCULATIONS

Per the Massachusetts Stormwater Management Handbook, Recharge Volumes shall drawdown within 72 hours. Since the fill soils on site will be removed within the area of the infiltration systems and replaced with clean sand fill to the native sand and gravel soils below, a Rawls for sand is used for this calculation. Utilizing calculations method provided in the handbook, the following illustrates drawdown times for the proposed infiltration structures:

***General Formula:***

$$T_{DR} = \frac{required storage volume *}{(RawlsRate)(BottomSurfaceAreaofSystem)}$$

(*Required storage volume is equal to the larger of the required recharge/treatment volumes calculated from the previous page).

***Subsurface Infiltration Structure:***

Volume to Treat = 2,121 CF (Impervious Area directed to structure x 0.5" Water Quality Storm Event) (51,635 SF x 0.5"/12 = 2,121 CF)

$$T_{DR} = \frac{2170}{\left(\frac{8in/hr}{12in/ft}\right)(4885SF)} = 0.7\ HRS$$

$0.7\ HRS < 72\ HRS$

* Rawls rate for sand (8 in/hr.) has been utilized given onsite soil testing and proposed replacement of fill with clean sand.

***Roof Infiltration Structure:***

Volume to Treat 334 CF (Impervious Area directed to structure x 0.5" Water Quality Storm Event) (8,024 SF x 0.5"/12 = 334 CF)

$$T_{DR} = \frac{348CF}{\left(\frac{8in/hr}{12in/ft}\right)(1010SF)} = 0.5\ HRS$$

$0.5\ HRS < 72\ HRS$

* Rawls rate for sand (8 in/hr.) has been utilized given onsite soil testing and proposed replacement of fill with clean sand.

INSTRUCTIONS:
1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structureal BMP Table
2. The calcualtions must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

**Location:** 480 - 482 rantoul St. Beverly, MA

**Train 1:** paved parking and portion of roof

## TSS Removal Calculation Worksheet

| A BMP | B TSS Removal Rate | C Starting TSS Load* | D Amount Removed (B*C) | E Remaining Load (C-D) |
|---|---|---|---|---|
| Deep Sump Catch Basins | 25% | 1.00 | 0.25 | 0.75 |
| Subsurface Infiltration Structure | 80% | 0.75 | 0.60 | 0.15 |
| | | | | |
| | | | | |
| | | | | |

**Total TSS Removal =** 85.0%

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

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

** See portion of STEP Fact Sheet for removal rate

Project: 5804
Prepared By: Meridian Associates, Inc.
Date: 3/25/2016

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

INSTRUCTIONS:
1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structureal BMP Table
2. The calcualtions must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

**Location:** 480 - 482 rantoul St. Beverly, MA

**Train 2:** portion of roof to wetland

## TSS Removal Calculation Worksheet

| A BMP | B TSS Removal Rate | C Starting TSS Load* | D Amount Removed (B*C) | E Remaining Load (C-D) |
|---|---|---|---|---|
| Deep Sump Catch Basins | 25% | 1.00 | 0.25 | 0.75 |
| | | 0.75 | 0.00 | 0.75 |
| | | | | |
| | | | | |
| | | | | |

**Total TSS Removal =** 25.0%

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

Project: 5804
Prepared By: Meridian Associates, Inc.
Date: 3/25/2016

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

** See portion of STEP Fact Sheet for removal rate

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

INSTRUCTIONS:
1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structureal BMP Table
2. The calcualtions must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

**Location:** 480 - 482 rantoul St. Beverly, MA

**Train 3:** portion of roof to infiltration

## TSS Removal Calculation Worksheet

| A BMP | B TSS Removal Rate | C Starting TSS Load* | D Amount Removed (B*C) | E Remaining Load (C-D) |
|---|---|---|---|---|
| Subsurface Infiltration System | 80% | 1.00 | 0.80 | 0.20 |
| | | 0.20 | 0.00 | 0.20 |
| | | | | |
| | | | | |
| | | | | |

**Total TSS Removal =** 80.0%

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

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

** See portion of STEP Fact Sheet for removal rate

Project: 5804
Prepared By: Meridian Associates, Inc.
Date: 3/25/2016

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

N

NORTH MERIDIAN BASED UPON THE NORTH AMERICAN DATUM OF 1983 (NAD83) AS DERIVED BY GPS OBSERVATIONS

MA1

NOW OR FORMERLY
KOSMOS RESIDENCE REALTY TRUST

NOW OR FORMERLY
WILLARD W. BRITTEN JR.

1-STORY CONCRETE BLOCK BUILDING

NOW OR FORMERLY
MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

CHAIN LINK FENCE (TYP)

L=2350'

EVIDENCE OF HISTORIC GRADING

MONITORING WELL (TYP)

TP 1 eshwt 10.9±

TP 2 eshwt 12.3±

TP 3 eshwt 12.7±

TP 4 eshwt 12.5±

TP 5 eshwt 12.4±

GRAVEL

TREELINE (TYP)

travel path (typ.)

OHW TO ABUTTERS HOUSE CORNER

WOOD FENCE

5' CONCRETE SIDEWALK

8"CLAY

SMH RIM=26.1

SMH RIM=25.5

DMH RIM=25.2

DMH RIM=14.5 INV=8.5±

UPN882

RANTOUL STREET

MYRTLE ST. (PUBLIC)

BIT. CONCRETE SIDEWALK

EXISTING 1-STORY STEEL FRAMED BUILDING

2-1/2 STORY WOOD BUILDING

NOW OR FORMERLY
UTILITY PARK CONDOMINIUMS

NOW OR FORMERLY
STEVEN M. SCIALDONE

ZONE IG

ZONE CC

DP1

DP2

WF A1 WF A2 WF A3 WF A4 WF A5 WF A6 WF A7 WF A8 WF A9 WF A10 WF A11 WF A12 WF A13

GRAPHIC SCALE
SCALE: 1"=20'

FEET 20 0 10 20 40 80

METERS 0 5 10 20 30

REVISIONS

| NO. | DATE | DESCRIPTION | BY | CHK'D |
|---|---|---|---|---|
| | | | | |

DWG. No. 5804_CONCEPT SK1
(XREF: 5804_REC)

# 480-482 RANTOUL STREET

## PRE-DEVELOPMENT WATERSHED PLAN

LOCATED IN

**BEVERLY, MASSACHUSETTS**

(ESSEX COUNTY)

PREPARED FOR

WINDOVER DEVELOPMENT

SCALE: 1"= 20' DATE: MARCH 25, 2016

MERIDIAN ASSOCIATES

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SHEET No. 1 OF 2 PROJECT No. 5804

N

NORTH MERIDIAN BASED UPON THE NORTH AMERICAN DATUM OF 1983 (NAD83) AS DERIVED BY GPS OBSERVATIONS

MA1

CHAIN LINK FENCE (TYP.)

EXISTING 1-STORY STEEL FRAMED BUILDING

1-STORY CONCRETE BLOCK BUILDING

2-1/2 STORY WOOD BUILDING

WOOD FENCE

RANTOUL STREET (PUBLIC - 66' WIDE)

MYRTLE ST. (PUBLIC)

DP1

DP2

1

2

3

4

R1

R2

WF A1

WF A2

WF A3

WF A4

WF A5

WF A6

WF A7

WF A8

WF A9

WF A10

WF A11

WF A12

WF A13

GRAPHIC SCALE
SCALE: 1"=20'

FEET 20 0 10 20 40 80

METERS 0 5 10 20 30

REVISIONS

| NO. | DATE | DESCRIPTION | BY | CHK'D |
|---|---|---|---|---|

DWG. No. 5804_CONCEPT SK1
(XREF: 5804_REC)

480-482 RANTOUL STREET

POST-DEVELOPMENT WATERSHED PLAN
LOCATED IN
**BEVERLY, MASSACHUSETTS**
(ESSEX COUNTY)

PREPARED FOR
WINDOVER DEVELOPMENT

SCALE: 1"= 20' DATE: MARCH 25, 2016

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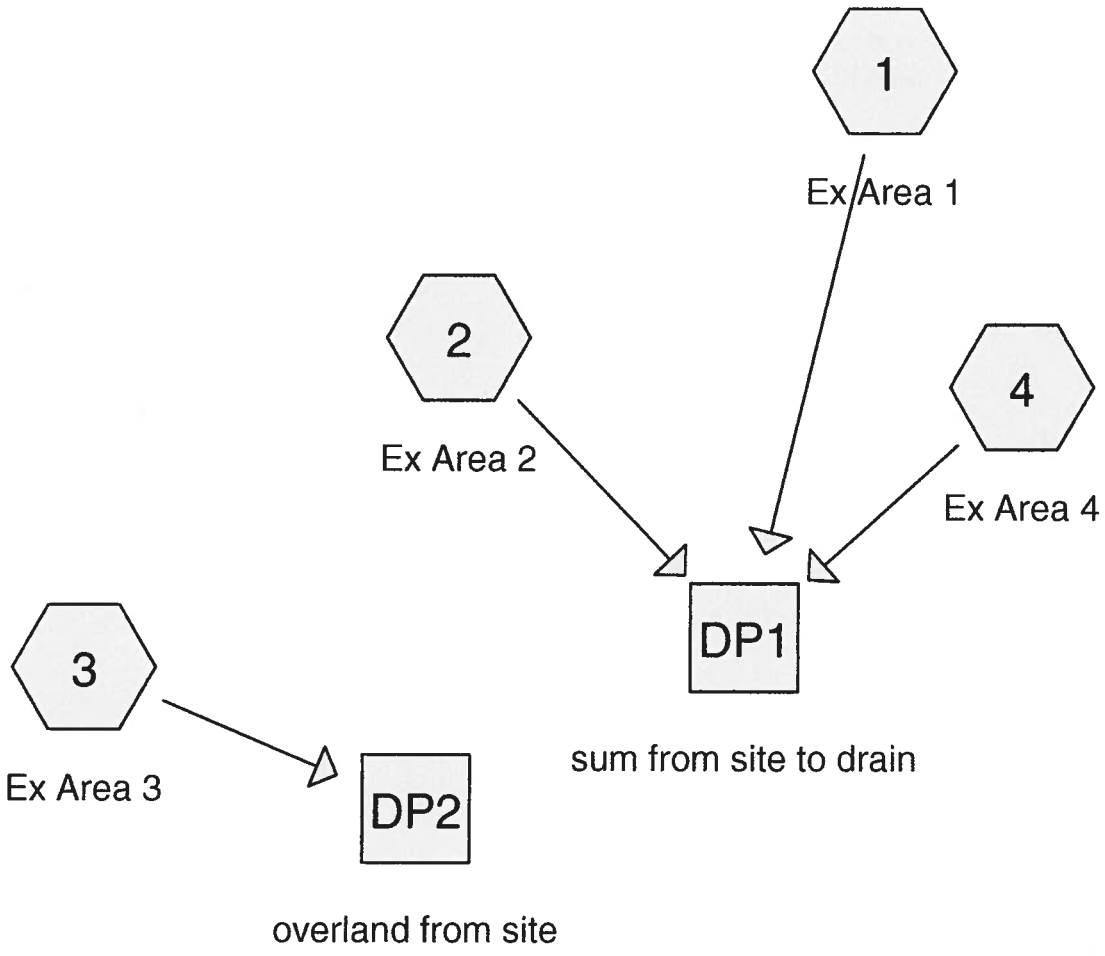
SHEET No. 1 OF 2 PROJECT No. 5804

# *HYDROLOGIC CALCULATIONS*

# PRE DEVELOPMENT CONDITIONS




Subcat Reach Pond Link

**Routing Diagram for 5804-Pre**
Prepared by {enter your company name here}, Printed 3/28/2016
HydroCAD® 10.00 s/n 00814 © 2011 HydroCAD Software Solutions LLC

## Summary for Subcatchment 1: Ex Area 1

Note: Calculated Tc: 50' sheet flow (fallow) at s=0.006= 3.8 minutes + 66' unpaved at s=0.044= 0.3 minutes + 44' unpaved at s=0.18= 0.1 minutes. Calculated = 4.2 minutes, use 5 minutes

Runoff = 0.65 cfs @ 12.08 hrs, Volume= 0.045 af, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 3,032 | 98 | Paved, building parking, HSG C (offsite) |
| * | 2,242 | 65 | Brush, grass, weeds Good, HSG C |
| * | 8,032 | 87 | Dirt, gravel, HSG C |
| | 13,306 | 86 | Weighted Average |
| | 10,274 | | 77.21% Pervious Area |
| | 3,032 | | 22.79% Impervious Area |

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

## Summary for Subcatchment 2: Ex Area 2

Note: Calculated Tc: 50' sheet flow (fallow) at s=0.042 = 1.8 minutes + 76' unpaved at s=0.024 = 0.5 minutes. Calculated = 2.3 minutes, use 5 minutes

Runoff = 0.47 cfs @ 12.08 hrs, Volume= 0.032 af, Depth= 1.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 9,162 | 87 | Dirt, gravel, HSG C |
| * | 538 | 65 | Brush, grass, weeds Good, HSG C |
| | 9,700 | 86 | Weighted Average |
| | 9,700 | | 100.00% Pervious Area |

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

## Summary for Subcatchment 3: Ex Area 3

Note: Calculated Tc: 50' sheet flow (fallow) at s=0.022= 2.3 minutes + 165' unpaved at s=0.02= 1.2 minutes +175' unpaved at s=0.05= 0.8 minutes. Calculated = 4.3 minutes, use 5 minutes

Runoff = 1.88 cfs @ 12.08 hrs, Volume= 0.130 af, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 2,239 | 98 | Paved parking, HSG C |
| * | 33,016 | 87 | Dirt, gravel, HSG C |
| * | 9,135 | 65 | Brush, grass, weeds Good, HSG C |
| | 44,390 | 83 | Weighted Average |
| | 42,151 | | 94.96% Pervious Area |
| | 2,239 | | 5.04% Impervious Area |

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

## Summary for Subcatchment 4: Ex Area 4

Note: Calculated Tc: 50' sheet flow (fallow) at s=0.022= 2.3 minutes + 114' unpaved at s=0.088= 0.4 minutes + 62' unpaved at s=0.044 = 0.1 minutes. Calculated = 3 minutes, use 5 minutes

Runoff = 0.99 cfs @ 12.08 hrs, Volume= 0.069 af, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 18,759 | 87 | Dirt, gravel, HSG C |
| * | 10,025 | 65 | Brush, grass, weeds Good, HSG C |
| | 28,784 | 79 | Weighted Average |
| | 28,784 | | 100.00% Pervious Area |

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

## Summary for Reach DP1: sum from site to drain

Inflow Area = 1.189 ac, 5.85% Impervious, Inflow Depth = 1.48" for 2-Yr event
Inflow = 2.11 cfs @ 12.08 hrs, Volume= 0.146 af
Outflow = 2.11 cfs @ 12.08 hrs, Volume= 0.146 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

## Summary for Reach DP2: overland from site

Inflow Area = 1.019 ac, 5.04% Impervious, Inflow Depth = 1.53" for 2-Yr event
Inflow = 1.88 cfs @ 12.08 hrs, Volume= 0.130 af
Outflow = 1.88 cfs @ 12.08 hrs, Volume= 0.130 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

## Summary for Subcatchment 1: Ex Area 1

Note: Calculated Tc: 50' sheet flow (fallow) at s=0.006= 3.8 minutes + 66' unpaved at s=0.044= 0.3 minutes + 44' unpaved at s=0.18= 0.1 minutes. Calculated = 4.2 minutes, use 5 minutes

Runoff = 1.13 cfs @ 12.07 hrs, Volume= 0.079 af, Depth= 3.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.60"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 3,032 | 98 | Paved, building parking, HSG C (offsite) |
| * | 2,242 | 65 | Brush, grass, weeds Good, HSG C |
| * | 8,032 | 87 | Dirt, gravel, HSG C |
| | 13,306 | 86 | Weighted Average |
| | 10,274 | | 77.21% Pervious Area |
| | 3,032 | | 22.79% Impervious Area |

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

## Summary for Subcatchment 2: Ex Area 2

Note: Calculated Tc: 50' sheet flow (fallow) at s=0.042 = 1.8 minutes + 76' unpaved at s=0.024 = 0.5 minutes. Calculated = 2.3 minutes, use 5 minutes

Runoff = 0.83 cfs @ 12.07 hrs, Volume= 0.057 af, Depth= 3.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.60"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 9,162 | 87 | Dirt, gravel, HSG C |
| * | 538 | 65 | Brush, grass, weeds Good, HSG C |
| | 9,700 | 86 | Weighted Average |
| | 9,700 | | 100.00% Pervious Area |

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

## Summary for Subcatchment 3: Ex Area 3

Note: Calculated Tc: 50' sheet flow (fallow) at s=0.022= 2.3 minutes + 165' unpaved at s=0.02= 1.2 minutes +175' unpaved at s=0.05= 0.8 minutes. Calculated = 4.3 minutes, use 5 minutes

Runoff = 3.47 cfs @ 12.07 hrs, Volume= 0.239 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.60"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 2,239 | 98 | Paved parking, HSG C |
| * | 33,016 | 87 | Dirt, gravel, HSG C |
| * | 9,135 | 65 | Brush, grass, weeds Good, HSG C |
| | 44,390 | 83 | Weighted Average |
| | 42,151 | | 94.96% Pervious Area |
| | 2,239 | | 5.04% Impervious Area |

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

## Summary for Subcatchment 4: Ex Area 4

Note: Calculated Tc: 50' sheet flow (fallow) at s=0.022= 2.3 minutes + 114' unpaved at s=0.088= 0.4 minutes + 62' unpaved at s=0.044 = 0.1 minutes. Calculated = 3 minutes, use 5 minutes

Runoff = 1.97 cfs @ 12.08 hrs, Volume= 0.135 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.60"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 18,759 | 87 | Dirt, gravel, HSG C |
| * | 10,025 | 65 | Brush, grass, weeds Good, HSG C |
| | 28,784 | 79 | Weighted Average |
| | 28,784 | | 100.00% Pervious Area |

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

## Summary for Reach DP1: sum from site to drain

Inflow Area = 1.189 ac, 5.85% Impervious, Inflow Depth = 2.74" for 10-Yr event
Inflow = 3.93 cfs @ 12.07 hrs, Volume= 0.272 af
Outflow = 3.93 cfs @ 12.07 hrs, Volume= 0.272 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

## Summary for Reach DP2: overland from site

Inflow Area = 1.019 ac, 5.04% Impervious, Inflow Depth = 2.81" for 10-Yr event
Inflow = 3.47 cfs @ 12.07 hrs, Volume= 0.239 af
Outflow = 3.47 cfs @ 12.07 hrs, Volume= 0.239 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

## Summary for Subcatchment 1: Ex Area 1

Note: Calculated Tc: 50' sheet flow (fallow) at s=0.006= 3.8 minutes + 66' unpaved at s=0.044= 0.3 minutes + 44' unpaved at s=0.18= 0.1 minutes. Calculated = 4.2 minutes, use 5 minutes

Runoff = 1.92 cfs @ 12.07 hrs, Volume= 0.137 af, Depth= 5.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.00"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 3,032 | 98 | Paved, building parking, HSG C (offsite) |
| * | 2,242 | 65 | Brush, grass, weeds Good, HSG C |
| * | 8,032 | 87 | Dirt, gravel, HSG C |
| | 13,306 | 86 | Weighted Average |
| | 10,274 | | 77.21% Pervious Area |
| | 3,032 | | 22.79% Impervious Area |

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

## Summary for Subcatchment 2: Ex Area 2

Note: Calculated Tc: 50' sheet flow (fallow) at s=0.042 = 1.8 minutes + 76' unpaved at s=0.024 = 0.5 minutes. Calculated = 2.3 minutes, use 5 minutes

Runoff = 1.40 cfs @ 12.07 hrs, Volume= 0.100 af, Depth= 5.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.00"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 9,162 | 87 | Dirt, gravel, HSG C |
| * | 538 | 65 | Brush, grass, weeds Good, HSG C |
| | 9,700 | 86 | Weighted Average |
| | 9,700 | | 100.00% Pervious Area |

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

## Summary for Subcatchment 3: Ex Area 3

Note: Calculated Tc: 50' sheet flow (fallow) at s=0.022= 2.3 minutes + 165' unpaved at s=0.02= 1.2 minutes +175' unpaved at s=0.05= 0.8 minutes. Calculated = 4.3 minutes, use 5 minutes

Runoff = 6.09 cfs @ 12.07 hrs, Volume= 0.427 af, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.00"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 2,239 | 98 | Paved parking, HSG C |
| * | 33,016 | 87 | Dirt, gravel, HSG C |
| * | 9,135 | 65 | Brush, grass, weeds Good, HSG C |
| | 44,390 | 83 | Weighted Average |
| | 42,151 | | 94.96% Pervious Area |
| | 2,239 | | 5.04% Impervious Area |

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

## Summary for Subcatchment 4: Ex Area 4

Note: Calculated Tc: 50' sheet flow (fallow) at s=0.022= 2.3 minutes + 114' unpaved at s=0.088= 0.4 minutes + 62' unpaved at s=0.044 = 0.1 minutes. Calculated = 3 minutes, use 5 minutes

Runoff = 3.64 cfs @ 12.07 hrs, Volume= 0.252 af, Depth= 4.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.00"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 18,759 | 87 | Dirt, gravel, HSG C |
| * | 10,025 | 65 | Brush, grass, weeds Good, HSG C |
| | 28,784 | 79 | Weighted Average |
| | 28,784 | | 100.00% Pervious Area |

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

## Summary for Reach DP1: sum from site to drain

Inflow Area = 1.189 ac, 5.85% Impervious, Inflow Depth = 4.93" for 100-Yr event
Inflow = 6.96 cfs @ 12.07 hrs, Volume= 0.489 af
Outflow = 6.96 cfs @ 12.07 hrs, Volume= 0.489 af, Atten= 0%, Lag= 0.0 min

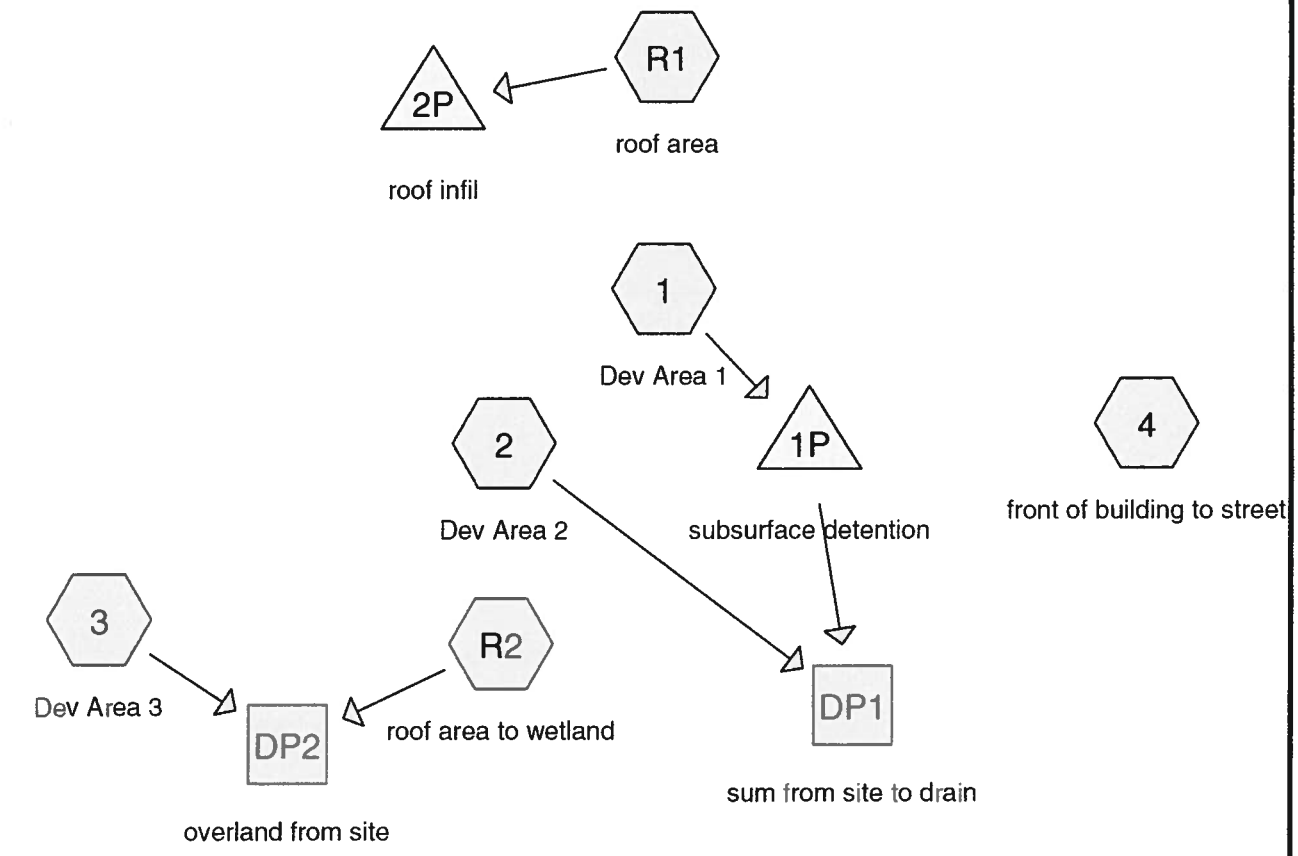
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

## Summary for Reach DP2: overland from site

Inflow Area = 1.019 ac, 5.04% Impervious, Inflow Depth = 5.03" for 100-Yr event
Inflow = 6.09 cfs @ 12.07 hrs, Volume= 0.427 af
Outflow = 6.09 cfs @ 12.07 hrs, Volume= 0.427 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

# POST DEVELOPMENT CONDITIONS




Subcat Reach Pond Link

**Routing Diagram for 5804-Post**

Prepared by {enter your company name here}, Printed 3/28/2016

## Summary for Subcatchment 1: Dev Area 1

Runoff = 3.90 cfs @ 12.07 hrs, Volume= 0.284 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.10"

| Area (sf) | CN | Description |
|---|---|---|
| 45,555 | 98 | Paved parking, HSG C |
| 6,126 | 74 | >75% Grass cover, Good, HSG C |
| 6,523 | 98 | Roofs, HSG C |
| 58,204 | 95 | Weighted Average |
| 6,126 | | 10.53% Pervious Area |
| 52,078 | | 89.47% Impervious Area |

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

## Summary for Subcatchment 2: Dev Area 2

Runoff = 0.32 cfs @ 12.08 hrs, Volume= 0.023 af, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 2,512 | 98 | Roofs, HSG C |
| * | 2,243 | 65 | Brush, grass, weeds Good, HSG C |
| | 5,173 | 74 | >75% Grass cover, Good, HSG C |
| | 9,928 | 78 | Weighted Average |
| | 7,416 | | 74.70% Pervious Area |
| | 2,512 | | 25.30% Impervious Area |

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

## Summary for Subcatchment 3: Dev Area 3

Runoff = 0.30 cfs @ 12.09 hrs, Volume= 0.023 af, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 7,232 | 74 | >75% Grass cover, Good, HSG C |
| * | 900 | 98 | Paved parking (existing), HSG C |
| * | 6,500 | 65 | Brush, grass, weeds Good, HSG C |
| | 14,632 | 71 | Weighted Average |
| | 13,732 | | 93.85% Pervious Area |
| | 900 | | 6.15% Impervious Area |

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

## Summary for Subcatchment 4: front of building to street

Runoff = 0.08 cfs @ 12.07 hrs, Volume= 0.006 af, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.10"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 1,158 | 98 | assume all paved(conservative) |
| | 1,158 | | 100.00% Impervious Area |

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

## Summary for Subcatchment R1: roof area

Runoff = 0.60 cfs @ 12.07 hrs, Volume= 0.046 af, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.10"

| Area (sf) | CN | Description |
|---|---|---|
| 8,358 | 98 | Roofs, HSG C |
| 8,358 | | 100.00% Impervious Area |

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

## Summary for Subcatchment R2: roof area to wetland

Runoff = 0.28 cfs @ 12.07 hrs, Volume= 0.021 af, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.10"

| Area (sf) | CN | Description |
|---|---|---|
| 3,900 | 98 | Roofs, HSG C |
| 3,900 | | 100.00% Impervious Area |

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

## Summary for Reach DP1: sum from site to drain

Inflow Area = 1.564 ac, 80.12% Impervious, Inflow Depth = 0.18" for 2-Yr event
Inflow = 0.32 cfs @ 12.08 hrs, Volume= 0.023 af
Outflow = 0.32 cfs @ 12.08 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

## Summary for Reach DP2: overland from site

Inflow Area = 0.425 ac, 25.90% Impervious, Inflow Depth = 1.25" for 2-Yr event
Inflow = 0.58 cfs @ 12.08 hrs, Volume= 0.044 af
Outflow = 0.58 cfs @ 12.08 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

## Summary for Pond 1P: subsurface detention

Inflow Area = 1.336 ac, 89.47% Impervious, Inflow Depth = 2.55" for 2-Yr event
Inflow = 3.90 cfs @ 12.07 hrs, Volume= 0.284 af
Outflow = 0.97 cfs @ 12.44 hrs, Volume= 0.284 af, Atten= 75%, Lag= 21.9 min
Discarded = 0.94 cfs @ 11.76 hrs, Volume= 0.283 af
Primary = 0.03 cfs @ 12.44 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Peak Elev= 17.74' @ 12.44 hrs Surf.Area= 4,885 sf Storage= 2,492 cf

Plug-Flow detention time= 13.0 min calculated for 0.283 af (100% of inflow)
Center-of-Mass det. time= 13.0 min ( 794.0 - 781.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1A | 16.80' | 3,273 cf | **108.17'W x 45.16'L x 2.50'H Field A**<br>12,212 cf Overall - 2,859 cf Embedded = 9,352 cf x 35.0% Voids |
| #2A | 17.30' | 2,859 cf | **StormTech SC-310** x 192 Inside #1<br>Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf<br>Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 2.07 sf x 32 rows |
| | | 6,133 cf | Total Available Storage |

Storage Group A created with Chamber Wizard

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 16.80' | **8.270 in/hr Exfiltration over Horizontal area** |
| #2 | Primary | 17.65' | **12.0" Round Culvert** L= 6.0' Ke= 0.500<br>Inlet / Outlet Invert= 17.65' / 16.90' S= 0.1250 '/' Cc= 0.900<br>n= 0.012, Flow Area= 0.79 sf |

**Discarded OutFlow** Max=0.94 cfs @ 11.76 hrs HW=16.83' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.94 cfs)

**Primary OutFlow** Max=0.03 cfs @ 12.44 hrs HW=17.74' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 0.03 cfs @ 1.00 fps)

## Stage-Area-Storage for Pond 1P: subsurface detention

| Elevation (feet) | Horizontal (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Horizontal (sq-ft) | Storage (cubic-feet) |
|---|---|---|---|---|---|
| 16.80 | **4,885** | 0 | 17.32 | 4,885 | 932 |
| 16.81 | 4,885 | 17 | 17.33 | 4,885 | 971 |
| 16.82 | 4,885 | 34 | 17.34 | 4,885 | 1,010 |
| 16.83 | 4,885 | 51 | 17.35 | 4,885 | 1,048 |
| 16.84 | 4,885 | 68 | 17.36 | 4,885 | 1,087 |
| 16.85 | 4,885 | 85 | 17.37 | 4,885 | 1,125 |
| 16.86 | 4,885 | 103 | 17.38 | 4,885 | 1,164 |
| 16.87 | 4,885 | 120 | 17.39 | 4,885 | 1,202 |
| 16.88 | 4,885 | 137 | 17.40 | 4,885 | 1,241 |
| 16.89 | 4,885 | 154 | 17.41 | 4,885 | 1,279 |
| 16.90 | 4,885 | 171 | 17.42 | 4,885 | 1,318 |
| 16.91 | 4,885 | 188 | 17.43 | 4,885 | 1,356 |
| 16.92 | 4,885 | 205 | 17.44 | 4,885 | 1,394 |
| 16.93 | 4,885 | 222 | 17.45 | 4,885 | 1,432 |
| 16.94 | 4,885 | 239 | 17.46 | 4,885 | 1,471 |
| 16.95 | 4,885 | 256 | 17.47 | 4,885 | 1,509 |
| 16.96 | 4,885 | 274 | 17.48 | 4,885 | 1,547 |
| 16.97 | 4,885 | 291 | 17.49 | 4,885 | 1,584 |
| 16.98 | 4,885 | 308 | 17.50 | 4,885 | 1,622 |
| 16.99 | 4,885 | 325 | 17.51 | 4,885 | 1,660 |
| 17.00 | 4,885 | 342 | 17.52 | 4,885 | 1,698 |
| 17.01 | 4,885 | 359 | 17.53 | 4,885 | 1,735 |
| 17.02 | 4,885 | 376 | 17.54 | 4,885 | 1,773 |
| 17.03 | 4,885 | 393 | 17.55 | 4,885 | 1,811 |
| 17.04 | 4,885 | 410 | 17.56 | 4,885 | 1,848 |
| 17.05 | 4,885 | 427 | 17.57 | 4,885 | 1,885 |
| 17.06 | 4,885 | 445 | 17.58 | 4,885 | 1,922 |
| 17.07 | 4,885 | 462 | 17.59 | 4,885 | 1,960 |
| 17.08 | 4,885 | 479 | 17.60 | 4,885 | 1,997 |
| 17.09 | 4,885 | 496 | 17.61 | 4,885 | 2,034 |
| 17.10 | 4,885 | 513 | 17.62 | 4,885 | 2,071 |
| 17.11 | 4,885 | 530 | 17.63 | 4,885 | 2,107 |
| 17.12 | 4,885 | 547 | 17.64 | 4,885 | 2,144 |
| 17.13 | 4,885 | 564 | 17.65 | 4,885 | 2,181 |
| 17.14 | 4,885 | 581 | 17.66 | 4,885 | 2,217 |
| 17.15 | 4,885 | 598 | 17.67 | 4,885 | 2,254 |
| 17.16 | 4,885 | 615 | 17.68 | 4,885 | 2,290 |
| 17.17 | 4,885 | 633 | 17.69 | 4,885 | 2,326 |
| 17.18 | 4,885 | 650 | 17.70 | 4,885 | 2,363 |
| 17.19 | 4,885 | 667 | 17.71 | 4,885 | 2,399 |
| 17.20 | 4,885 | 684 | 17.72 | 4,885 | 2,435 |
| 17.21 | 4,885 | 701 | 17.73 | 4,885 | 2,470 |
| 17.22 | 4,885 | 718 | 17.74 | 4,885 | 2,506 |
| 17.23 | 4,885 | 735 | 17.75 | 4,885 | 2,542 |
| 17.24 | 4,885 | 752 | 17.76 | 4,885 | 2,577 |
| 17.25 | 4,885 | 769 | 17.77 | 4,885 | 2,613 |
| 17.26 | 4,885 | 786 | 17.78 | 4,885 | 2,648 |
| 17.27 | 4,885 | 804 | 17.79 | 4,885 | 2,683 |
| 17.28 | 4,885 | 821 | 17.80 | 4,885 | 2,718 |
| 17.29 | 4,885 | 838 | 17.81 | 4,885 | 2,753 |
| 17.30 | 4,885 | 855 | 17.82 | 4,885 | 2,788 |
| 17.31 | 4,885 | 894 | 17.83 | 4,885 | 2,823 |

## Stage-Area-Storage for Pond 1P: subsurface detention (continued)

| Elevation (feet) | Horizontal (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Horizontal (sq-ft) | Storage (cubic-feet) |
|---|---|---|---|---|---|
| 17.84 | 4,885 | 2,858 | 18.36 | 4,885 | 4,444 |
| 17.85 | 4,885 | 2,892 | 18.37 | 4,885 | 4,468 |
| 17.86 | 4,885 | 2,927 | 18.38 | 4,885 | 4,492 |
| 17.87 | 4,885 | 2,961 | 18.39 | 4,885 | 4,515 |
| 17.88 | 4,885 | 2,995 | 18.40 | 4,885 | 4,538 |
| 17.89 | 4,885 | 3,029 | 18.41 | 4,885 | 4,560 |
| 17.90 | 4,885 | 3,063 | 18.42 | 4,885 | 4,582 |
| 17.91 | 4,885 | 3,097 | 18.43 | 4,885 | 4,604 |
| 17.92 | 4,885 | 3,131 | 18.44 | 4,885 | 4,626 |
| 17.93 | 4,885 | 3,164 | 18.45 | 4,885 | 4,647 |
| 17.94 | 4,885 | 3,198 | 18.46 | 4,885 | 4,667 |
| 17.95 | 4,885 | 3,231 | 18.47 | 4,885 | 4,688 |
| 17.96 | 4,885 | 3,264 | 18.48 | 4,885 | 4,708 |
| 17.97 | 4,885 | 3,298 | 18.49 | 4,885 | 4,728 |
| 17.98 | 4,885 | 3,331 | 18.50 | 4,885 | 4,747 |
| 17.99 | 4,885 | 3,363 | 18.51 | 4,885 | 4,767 |
| 18.00 | 4,885 | 3,396 | 18.52 | 4,885 | 4,786 |
| 18.01 | 4,885 | 3,429 | 18.53 | 4,885 | 4,806 |
| 18.02 | 4,885 | 3,461 | 18.54 | 4,885 | 4,825 |
| 18.03 | 4,885 | 3,493 | 18.55 | 4,885 | 4,843 |
| 18.04 | 4,885 | 3,525 | 18.56 | 4,885 | 4,862 |
| 18.05 | 4,885 | 3,557 | 18.57 | 4,885 | 4,880 |
| 18.06 | 4,885 | 3,589 | 18.58 | 4,885 | 4,899 |
| 18.07 | 4,885 | 3,620 | 18.59 | 4,885 | 4,917 |
| 18.08 | 4,885 | 3,652 | 18.60 | 4,885 | 4,935 |
| 18.09 | 4,885 | 3,683 | 18.61 | 4,885 | 4,952 |
| 18.10 | 4,885 | 3,714 | 18.62 | 4,885 | 4,970 |
| 18.11 | 4,885 | 3,745 | 18.63 | 4,885 | 4,987 |
| 18.12 | 4,885 | 3,775 | 18.64 | 4,885 | 5,004 |
| 18.13 | 4,885 | 3,806 | 18.65 | 4,885 | 5,021 |
| 18.14 | 4,885 | 3,836 | 18.66 | 4,885 | 5,039 |
| 18.15 | 4,885 | 3,866 | 18.67 | 4,885 | 5,056 |
| 18.16 | 4,885 | 3,896 | 18.68 | 4,885 | 5,073 |
| 18.17 | 4,885 | 3,926 | 18.69 | 4,885 | 5,090 |
| 18.18 | 4,885 | 3,955 | 18.70 | 4,885 | 5,107 |
| 18.19 | 4,885 | 3,985 | 18.71 | 4,885 | 5,124 |
| 18.20 | 4,885 | 4,014 | 18.72 | 4,885 | 5,141 |
| 18.21 | 4,885 | 4,043 | 18.73 | 4,885 | 5,158 |
| 18.22 | 4,885 | 4,071 | 18.74 | 4,885 | 5,175 |
| 18.23 | 4,885 | 4,100 | 18.75 | 4,885 | 5,192 |
| 18.24 | 4,885 | 4,128 | 18.76 | 4,885 | 5,210 |
| 18.25 | 4,885 | 4,156 | 18.77 | 4,885 | 5,227 |
| 18.26 | 4,885 | 4,184 | 18.78 | 4,885 | 5,244 |
| 18.27 | 4,885 | 4,211 | 18.79 | 4,885 | 5,261 |
| 18.28 | 4,885 | 4,238 | 18.80 | 4,885 | 5,278 |
| 18.29 | 4,885 | 4,265 | 18.81 | 4,885 | 5,295 |
| 18.30 | 4,885 | 4,292 | 18.82 | 4,885 | 5,312 |
| 18.31 | 4,885 | 4,318 | 18.83 | 4,885 | 5,329 |
| 18.32 | 4,885 | 4,344 | 18.84 | 4,885 | 5,346 |
| 18.33 | 4,885 | 4,370 | 18.85 | 4,885 | 5,363 |
| 18.34 | 4,885 | 4,395 | 18.86 | 4,885 | 5,380 |
| 18.35 | 4,885 | 4,420 | 18.87 | 4,885 | 5,398 |

## Stage-Area-Storage for Pond 1P: subsurface detention (continued)

| Elevation (feet) | Horizontal (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 18.88 | 4,885 | 5,415 |
| 18.89 | 4,885 | 5,432 |
| 18.90 | 4,885 | 5,449 |
| 18.91 | 4,885 | 5,466 |
| 18.92 | 4,885 | 5,483 |
| 18.93 | 4,885 | 5,500 |
| 18.94 | 4,885 | 5,517 |
| 18.95 | 4,885 | 5,534 |
| 18.96 | 4,885 | 5,551 |
| 18.97 | 4,885 | 5,569 |
| 18.98 | 4,885 | 5,586 |
| 18.99 | 4,885 | 5,603 |
| 19.00 | 4,885 | 5,620 |
| 19.01 | 4,885 | 5,637 |
| 19.02 | 4,885 | 5,654 |
| 19.03 | 4,885 | 5,671 |
| 19.04 | 4,885 | 5,688 |
| 19.05 | 4,885 | 5,705 |
| 19.06 | 4,885 | 5,722 |
| 19.07 | 4,885 | 5,740 |
| 19.08 | 4,885 | 5,757 |
| 19.09 | 4,885 | 5,774 |
| 19.10 | 4,885 | 5,791 |
| 19.11 | 4,885 | 5,808 |
| 19.12 | 4,885 | 5,825 |
| 19.13 | 4,885 | 5,842 |
| 19.14 | 4,885 | 5,859 |
| 19.15 | 4,885 | 5,876 |
| 19.16 | 4,885 | 5,893 |
| 19.17 | 4,885 | 5,910 |
| 19.18 | 4,885 | 5,928 |
| 19.19 | 4,885 | 5,945 |
| 19.20 | 4,885 | 5,962 |
| 19.21 | 4,885 | 5,979 |
| 19.22 | 4,885 | 5,996 |
| 19.23 | 4,885 | 6,013 |
| 19.24 | 4,885 | 6,030 |
| 19.25 | 4,885 | 6,047 |
| 19.26 | 4,885 | 6,064 |
| 19.27 | 4,885 | 6,081 |
| 19.28 | 4,885 | 6,099 |
| 19.29 | 4,885 | 6,116 |
| 19.30 | 4,885 | **6,133** |

## Summary for Pond 2P: roof infil

Inflow Area = 0.192 ac,100.00% Impervious, Inflow Depth = 2.87" for 2-Yr event
Inflow = 0.60 cfs @ 12.07 hrs, Volume= 0.046 af
Outflow = 0.19 cfs @ 11.84 hrs, Volume= 0.046 af, Atten= 68%, Lag= 0.0 min
Discarded = 0.19 cfs @ 11.84 hrs, Volume= 0.046 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Peak Elev= 17.39' @ 12.34 hrs Surf.Area= 1,011 sf Storage= 275 cf

Plug-Flow detention time= 6.2 min calculated for 0.046 af (100% of inflow)
Center-of-Mass det. time= 6.2 min ( 762.3 - 756.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1A | 16.80' | 797 cf | **11.50'W x 87.88'L x 2.50'H Field A**<br>2,527 cf Overall - 533 cf Embedded = 1,993 cf x 40.0% Voids |
| #2A | 17.30' | 533 cf | **StormTech SC-310** x 36 Inside #1<br>Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf<br>Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 2.07 sf x 3 rows |
| | | 1,331 cf | Total Available Storage |

Storage Group A created with Chamber Wizard

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 16.80' | **8.270 in/hr Exfiltration over Surface area** |

**Discarded OutFlow** Max=0.19 cfs @ 11.84 hrs HW=16.83' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.19 cfs)

## Stage-Area-Storage for Pond 2P: roof infil

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|---|---|---|
| 16.80 | **1,011** | 0 | 17.32 | 1,011 | 218 |
| 16.81 | 1,011 | 4 | 17.33 | 1,011 | 225 |
| 16.82 | 1,011 | 8 | 17.34 | 1,011 | 233 |
| 16.83 | 1,011 | 12 | 17.35 | 1,011 | 241 |
| 16.84 | 1,011 | 16 | 17.36 | 1,011 | 249 |
| 16.85 | 1,011 | 20 | 17.37 | 1,011 | 256 |
| 16.86 | 1,011 | 24 | 17.38 | 1,011 | 264 |
| 16.87 | 1,011 | 28 | 17.39 | 1,011 | 272 |
| 16.88 | 1,011 | 32 | 17.40 | 1,011 | 280 |
| 16.89 | 1,011 | 36 | 17.41 | 1,011 | 287 |
| 16.90 | 1,011 | 40 | 17.42 | 1,011 | 295 |
| 16.91 | 1,011 | 44 | 17.43 | 1,011 | 303 |
| 16.92 | 1,011 | 49 | 17.44 | 1,011 | 310 |
| 16.93 | 1,011 | 53 | 17.45 | 1,011 | 318 |
| 16.94 | 1,011 | 57 | 17.46 | 1,011 | 326 |
| 16.95 | 1,011 | 61 | 17.47 | 1,011 | 333 |
| 16.96 | 1,011 | 65 | 17.48 | 1,011 | 341 |
| 16.97 | 1,011 | 69 | 17.49 | 1,011 | 349 |
| 16.98 | 1,011 | 73 | 17.50 | 1,011 | 356 |
| 16.99 | 1,011 | 77 | 17.51 | 1,011 | 364 |
| 17.00 | 1,011 | 81 | 17.52 | 1,011 | 371 |
| 17.01 | 1,011 | 85 | 17.53 | 1,011 | 379 |
| 17.02 | 1,011 | 89 | 17.54 | 1,011 | 387 |
| 17.03 | 1,011 | 93 | 17.55 | 1,011 | 394 |
| 17.04 | 1,011 | 97 | 17.56 | 1,011 | 402 |
| 17.05 | 1,011 | 101 | 17.57 | 1,011 | 409 |
| 17.06 | 1,011 | 105 | 17.58 | 1,011 | 417 |
| 17.07 | 1,011 | 109 | 17.59 | 1,011 | 424 |
| 17.08 | 1,011 | 113 | 17.60 | 1,011 | 432 |
| 17.09 | 1,011 | 117 | 17.61 | 1,011 | 439 |
| 17.10 | 1,011 | 121 | 17.62 | 1,011 | 447 |
| 17.11 | 1,011 | 125 | 17.63 | 1,011 | 454 |
| 17.12 | 1,011 | 129 | 17.64 | 1,011 | 461 |
| 17.13 | 1,011 | 133 | 17.65 | 1,011 | 469 |
| 17.14 | 1,011 | 137 | 17.66 | 1,011 | 476 |
| 17.15 | 1,011 | 141 | 17.67 | 1,011 | 484 |
| 17.16 | 1,011 | 146 | 17.68 | 1,011 | 491 |
| 17.17 | 1,011 | 150 | 17.69 | 1,011 | 498 |
| 17.18 | 1,011 | 154 | 17.70 | 1,011 | 506 |
| 17.19 | 1,011 | 158 | 17.71 | 1,011 | 513 |
| 17.20 | 1,011 | 162 | 17.72 | 1,011 | 520 |
| 17.21 | 1,011 | 166 | 17.73 | 1,011 | 528 |
| 17.22 | 1,011 | 170 | 17.74 | 1,011 | 535 |
| 17.23 | 1,011 | 174 | 17.75 | 1,011 | 542 |
| 17.24 | 1,011 | 178 | 17.76 | 1,011 | 549 |
| 17.25 | 1,011 | 182 | 17.77 | 1,011 | 556 |
| 17.26 | 1,011 | 186 | 17.78 | 1,011 | 564 |
| 17.27 | 1,011 | 190 | 17.79 | 1,011 | 571 |
| 17.28 | 1,011 | 194 | 17.80 | 1,011 | 578 |
| 17.29 | 1,011 | 198 | 17.81 | 1,011 | 585 |
| 17.30 | 1,011 | 202 | 17.82 | 1,011 | 592 |
| 17.31 | 1,011 | 210 | 17.83 | 1,011 | 599 |

## Stage-Area-Storage for Pond 2P: roof infil (continued)

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 17.84 | 1,011 | 606 |
| 17.85 | 1,011 | 613 |
| 17.86 | 1,011 | 620 |
| 17.87 | 1,011 | 627 |
| 17.88 | 1,011 | 634 |
| 17.89 | 1,011 | 641 |
| 17.90 | 1,011 | 648 |
| 17.91 | 1,011 | 655 |
| 17.92 | 1,011 | 662 |
| 17.93 | 1,011 | 669 |
| 17.94 | 1,011 | 676 |
| 17.95 | 1,011 | 683 |
| 17.96 | 1,011 | 690 |
| 17.97 | 1,011 | 696 |
| 17.98 | 1,011 | 703 |
| 17.99 | 1,011 | 710 |
| 18.00 | 1,011 | 717 |
| 18.01 | 1,011 | 723 |
| 18.02 | 1,011 | 730 |
| 18.03 | 1,011 | 737 |
| 18.04 | 1,011 | 743 |
| 18.05 | 1,011 | 750 |
| 18.06 | 1,011 | 756 |
| 18.07 | 1,011 | 763 |
| 18.08 | 1,011 | 769 |
| 18.09 | 1,011 | 776 |
| 18.10 | 1,011 | 782 |
| 18.11 | 1,011 | 789 |
| 18.12 | 1,011 | 795 |
| 18.13 | 1,011 | 801 |
| 18.14 | 1,011 | 808 |
| 18.15 | 1,011 | 814 |
| 18.16 | 1,011 | 820 |
| 18.17 | 1,011 | 827 |
| 18.18 | 1,011 | 833 |
| 18.19 | 1,011 | 839 |
| 18.20 | 1,011 | 845 |
| 18.21 | 1,011 | 851 |
| 18.22 | 1,011 | 857 |
| 18.23 | 1,011 | 863 |
| 18.24 | 1,011 | 869 |
| 18.25 | 1,011 | 875 |
| 18.26 | 1,011 | 881 |
| 18.27 | 1,011 | 887 |
| 18.28 | 1,011 | 892 |
| 18.29 | 1,011 | 898 |
| 18.30 | 1,011 | 904 |
| 18.31 | 1,011 | 909 |
| 18.32 | 1,011 | 915 |
| 18.33 | 1,011 | 921 |
| 18.34 | 1,011 | 926 |
| 18.35 | 1,011 | 931 |
| 18.36 | 1,011 | 937 |
| 18.37 | 1,011 | 942 |
| 18.38 | 1,011 | 947 |
| 18.39 | 1,011 | 952 |
| 18.40 | 1,011 | 957 |
| 18.41 | 1,011 | 962 |
| 18.42 | 1,011 | 967 |
| 18.43 | 1,011 | 972 |
| 18.44 | 1,011 | 977 |
| 18.45 | 1,011 | 981 |
| 18.46 | 1,011 | 986 |
| 18.47 | 1,011 | 991 |
| 18.48 | 1,011 | 995 |
| 18.49 | 1,011 | 1,000 |
| 18.50 | 1,011 | 1,004 |
| 18.51 | 1,011 | 1,009 |
| 18.52 | 1,011 | 1,013 |
| 18.53 | 1,011 | 1,018 |
| 18.54 | 1,011 | 1,022 |
| 18.55 | 1,011 | 1,026 |
| 18.56 | 1,011 | 1,031 |
| 18.57 | 1,011 | 1,035 |
| 18.58 | 1,011 | 1,039 |
| 18.59 | 1,011 | 1,043 |
| 18.60 | 1,011 | 1,047 |
| 18.61 | 1,011 | 1,052 |
| 18.62 | 1,011 | 1,056 |
| 18.63 | 1,011 | 1,060 |
| 18.64 | 1,011 | 1,064 |
| 18.65 | 1,011 | 1,068 |
| 18.66 | 1,011 | 1,072 |
| 18.67 | 1,011 | 1,076 |
| 18.68 | 1,011 | 1,080 |
| 18.69 | 1,011 | 1,084 |
| 18.70 | 1,011 | 1,088 |
| 18.71 | 1,011 | 1,092 |
| 18.72 | 1,011 | 1,096 |
| 18.73 | 1,011 | 1,100 |
| 18.74 | 1,011 | 1,104 |
| 18.75 | 1,011 | 1,108 |
| 18.76 | 1,011 | 1,112 |
| 18.77 | 1,011 | 1,116 |
| 18.78 | 1,011 | 1,120 |
| 18.79 | 1,011 | 1,124 |
| 18.80 | 1,011 | 1,129 |
| 18.81 | 1,011 | 1,133 |
| 18.82 | 1,011 | 1,137 |
| 18.83 | 1,011 | 1,141 |
| 18.84 | 1,011 | 1,145 |
| 18.85 | 1,011 | 1,149 |
| 18.86 | 1,011 | 1,153 |
| 18.87 | 1,011 | 1,157 |

## Stage-Area-Storage for Pond 2P: roof infil (continued)

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 18.88 | 1,011 | 1,161 |
| 18.89 | 1,011 | 1,165 |
| 18.90 | 1,011 | 1,169 |
| 18.91 | 1,011 | 1,173 |
| 18.92 | 1,011 | 1,177 |
| 18.93 | 1,011 | 1,181 |
| 18.94 | 1,011 | 1,185 |
| 18.95 | 1,011 | 1,189 |
| 18.96 | 1,011 | 1,193 |
| 18.97 | 1,011 | 1,197 |
| 18.98 | 1,011 | 1,201 |
| 18.99 | 1,011 | 1,205 |
| 19.00 | 1,011 | 1,209 |
| 19.01 | 1,011 | 1,213 |
| 19.02 | 1,011 | 1,217 |
| 19.03 | 1,011 | 1,222 |
| 19.04 | 1,011 | 1,226 |
| 19.05 | 1,011 | 1,230 |
| 19.06 | 1,011 | 1,234 |
| 19.07 | 1,011 | 1,238 |
| 19.08 | 1,011 | 1,242 |
| 19.09 | 1,011 | 1,246 |
| 19.10 | 1,011 | 1,250 |
| 19.11 | 1,011 | 1,254 |
| 19.12 | 1,011 | 1,258 |
| 19.13 | 1,011 | 1,262 |
| 19.14 | 1,011 | 1,266 |
| 19.15 | 1,011 | 1,270 |
| 19.16 | 1,011 | 1,274 |
| 19.17 | 1,011 | 1,278 |
| 19.18 | 1,011 | 1,282 |
| 19.19 | 1,011 | 1,286 |
| 19.20 | 1,011 | 1,290 |
| 19.21 | 1,011 | 1,294 |
| 19.22 | 1,011 | 1,298 |
| 19.23 | 1,011 | 1,302 |
| 19.24 | 1,011 | 1,306 |
| 19.25 | 1,011 | 1,310 |
| 19.26 | 1,011 | 1,314 |
| 19.27 | 1,011 | 1,319 |
| 19.28 | 1,011 | 1,323 |
| 19.29 | 1,011 | 1,327 |
| 19.30 | 1,011 | **1,331** |

## Summary for Subcatchment 1: Dev Area 1

Runoff = 6.01 cfs @ 12.07 hrs, Volume= 0.448 af, Depth= 4.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.60"

| Area (sf) | CN | Description |
|---|---|---|
| 45,555 | 98 | Paved parking, HSG C |
| 6,126 | 74 | >75% Grass cover, Good, HSG C |
| 6,523 | 98 | Roofs, HSG C |
| 58,204 | 95 | Weighted Average |
| 6,126 | | 10.53% Pervious Area |
| 52,078 | | 89.47% Impervious Area |

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

## Summary for Subcatchment 2: Dev Area 2

Runoff = 0.66 cfs @ 12.08 hrs, Volume= 0.045 af, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.60"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 2,512 | 98 | Roofs, HSG C |
| * | 2,243 | 65 | Brush, grass, weeds Good, HSG C |
| | 5,173 | 74 | >75% Grass cover, Good, HSG C |
| | 9,928 | 78 | Weighted Average |
| | 7,416 | | 74.70% Pervious Area |
| | 2,512 | | 25.30% Impervious Area |

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

## Summary for Subcatchment 3: Dev Area 3

Runoff = 0.73 cfs @ 12.08 hrs, Volume= 0.051 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.60"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 7,232 | 74 | >75% Grass cover, Good, HSG C |
| * | 900 | 98 | Paved parking (existing), HSG C |
| * | 6,500 | 65 | Brush, grass, weeds Good, HSG C |
| | 14,632 | 71 | Weighted Average |
| | 13,732 | | 93.85% Pervious Area |
| | 900 | | 6.15% Impervious Area |

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

## Summary for Subcatchment 4: front of building to street

Runoff = 0.12 cfs @ 12.07 hrs, Volume= 0.010 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.60"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 1,158 | 98 | assume all paved(conservative) |
| | 1,158 | | 100.00% Impervious Area |

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

## Summary for Subcatchment R1: roof area

Runoff = 0.89 cfs @ 12.07 hrs, Volume= 0.070 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.60"

| Area (sf) | CN | Description |
|---|---|---|
| 8,358 | 98 | Roofs, HSG C |
| 8,358 | | 100.00% Impervious Area |

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

## Summary for Subcatchment R2: roof area to wetland

Runoff = 0.42 cfs @ 12.07 hrs, Volume= 0.033 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.60"

| Area (sf) | CN | Description |
|---|---|---|
| 3,900 | 98 | Roofs, HSG C |
| 3,900 | | 100.00% Impervious Area |

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

## Summary for Reach DP1: sum from site to drain

Inflow Area = 1.564 ac, 80.12% Impervious, Inflow Depth = 0.73" for 10-Yr event
Inflow = 1.50 cfs @ 12.29 hrs, Volume= 0.095 af
Outflow = 1.50 cfs @ 12.29 hrs, Volume= 0.095 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

## Summary for Reach DP2: overland from site

Inflow Area = 0.425 ac, 25.90% Impervious, Inflow Depth = 2.35" for 10-Yr event
Inflow = 1.14 cfs @ 12.08 hrs, Volume= 0.083 af
Outflow = 1.14 cfs @ 12.08 hrs, Volume= 0.083 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

## Summary for Pond 1P: subsurface detention

| | | | | |
|---|---|---|---|---|
| Inflow Area = | 1.336 ac, 89.47% Impervious, | Inflow Depth = | 4.02" | for 10-Yr event |
| Inflow = | 6.01 cfs @ 12.07 hrs, | Volume= | 0.448 af | |
| Outflow = | 2.16 cfs @ 12.31 hrs, | Volume= | 0.448 af, | Atten= 64%, Lag= 14.2 min |
| Discarded = | 0.94 cfs @ 11.64 hrs, | Volume= | 0.398 af | |
| Primary = | 1.23 cfs @ 12.31 hrs, | Volume= | 0.050 af | |

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Peak Elev= 18.23' @ 12.31 hrs Surf.Area= 4,885 sf Storage= 4,101 cf

Plug-Flow detention time= 16.7 min calculated for 0.448 af (100% of inflow)
Center-of-Mass det. time= 16.7 min ( 786.3 - 769.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1A | 16.80' | 3,273 cf | **108.17'W x 45.16'L x 2.50'H Field A**<br>12,212 cf Overall - 2,859 cf Embedded = 9,352 cf x 35.0% Voids |
| #2A | 17.30' | 2,859 cf | **StormTech SC-310** x 192 Inside #1<br>Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf<br>Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 2.07 sf x 32 rows |
| | | 6,133 cf | Total Available Storage |

Storage Group A created with Chamber Wizard

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 16.80' | **8.270 in/hr Exfiltration over Horizontal area** |
| #2 | Primary | 17.65' | **12.0" Round Culvert** L= 6.0' Ke= 0.500<br>Inlet / Outlet Invert= 17.65' / 16.90' S= 0.1250 '/' Cc= 0.900<br>n= 0.012, Flow Area= 0.79 sf |

**Discarded OutFlow** Max=0.94 cfs @ 11.64 hrs HW=16.83' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.94 cfs)

**Primary OutFlow** Max=1.22 cfs @ 12.31 hrs HW=18.23' (Free Discharge)
↑**2=Culvert** (Inlet Controls 1.22 cfs @ 2.59 fps)

## Stage-Area-Storage for Pond 1P: subsurface detention

| Elevation (feet) | Horizontal (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Horizontal (sq-ft) | Storage (cubic-feet) |
|---|---|---|---|---|---|
| 16.80 | **4,885** | 0 | 17.32 | 4,885 | 932 |
| 16.81 | 4,885 | 17 | 17.33 | 4,885 | 971 |
| 16.82 | 4,885 | 34 | 17.34 | 4,885 | 1,010 |
| 16.83 | 4,885 | 51 | 17.35 | 4,885 | 1,048 |
| 16.84 | 4,885 | 68 | 17.36 | 4,885 | 1,087 |
| 16.85 | 4,885 | 85 | 17.37 | 4,885 | 1,125 |
| 16.86 | 4,885 | 103 | 17.38 | 4,885 | 1,164 |
| 16.87 | 4,885 | 120 | 17.39 | 4,885 | 1,202 |
| 16.88 | 4,885 | 137 | 17.40 | 4,885 | 1,241 |
| 16.89 | 4,885 | 154 | 17.41 | 4,885 | 1,279 |
| 16.90 | 4,885 | 171 | 17.42 | 4,885 | 1,318 |
| 16.91 | 4,885 | 188 | 17.43 | 4,885 | 1,356 |
| 16.92 | 4,885 | 205 | 17.44 | 4,885 | 1,394 |
| 16.93 | 4,885 | 222 | 17.45 | 4,885 | 1,432 |
| 16.94 | 4,885 | 239 | 17.46 | 4,885 | 1,471 |
| 16.95 | 4,885 | 256 | 17.47 | 4,885 | 1,509 |
| 16.96 | 4,885 | 274 | 17.48 | 4,885 | 1,547 |
| 16.97 | 4,885 | 291 | 17.49 | 4,885 | 1,584 |
| 16.98 | 4,885 | 308 | 17.50 | 4,885 | 1,622 |
| 16.99 | 4,885 | 325 | 17.51 | 4,885 | 1,660 |
| 17.00 | 4,885 | 342 | 17.52 | 4,885 | 1,698 |
| 17.01 | 4,885 | 359 | 17.53 | 4,885 | 1,735 |
| 17.02 | 4,885 | 376 | 17.54 | 4,885 | 1,773 |
| 17.03 | 4,885 | 393 | 17.55 | 4,885 | 1,811 |
| 17.04 | 4,885 | 410 | 17.56 | 4,885 | 1,848 |
| 17.05 | 4,885 | 427 | 17.57 | 4,885 | 1,885 |
| 17.06 | 4,885 | 445 | 17.58 | 4,885 | 1,922 |
| 17.07 | 4,885 | 462 | 17.59 | 4,885 | 1,960 |
| 17.08 | 4,885 | 479 | 17.60 | 4,885 | 1,997 |
| 17.09 | 4,885 | 496 | 17.61 | 4,885 | 2,034 |
| 17.10 | 4,885 | 513 | 17.62 | 4,885 | 2,071 |
| 17.11 | 4,885 | 530 | 17.63 | 4,885 | 2,107 |
| 17.12 | 4,885 | 547 | 17.64 | 4,885 | 2,144 |
| 17.13 | 4,885 | 564 | 17.65 | 4,885 | 2,181 |
| 17.14 | 4,885 | 581 | 17.66 | 4,885 | 2,217 |
| 17.15 | 4,885 | 598 | 17.67 | 4,885 | 2,254 |
| 17.16 | 4,885 | 615 | 17.68 | 4,885 | 2,290 |
| 17.17 | 4,885 | 633 | 17.69 | 4,885 | 2,326 |
| 17.18 | 4,885 | 650 | 17.70 | 4,885 | 2,363 |
| 17.19 | 4,885 | 667 | 17.71 | 4,885 | 2,399 |
| 17.20 | 4,885 | 684 | 17.72 | 4,885 | 2,435 |
| 17.21 | 4,885 | 701 | 17.73 | 4,885 | 2,470 |
| 17.22 | 4,885 | 718 | 17.74 | 4,885 | 2,506 |
| 17.23 | 4,885 | 735 | 17.75 | 4,885 | 2,542 |
| 17.24 | 4,885 | 752 | 17.76 | 4,885 | 2,577 |
| 17.25 | 4,885 | 769 | 17.77 | 4,885 | 2,613 |
| 17.26 | 4,885 | 786 | 17.78 | 4,885 | 2,648 |
| 17.27 | 4,885 | 804 | 17.79 | 4,885 | 2,683 |
| 17.28 | 4,885 | 821 | 17.80 | 4,885 | 2,718 |
| 17.29 | 4,885 | 838 | 17.81 | 4,885 | 2,753 |
| 17.30 | 4,885 | 855 | 17.82 | 4,885 | 2,788 |
| 17.31 | 4,885 | 894 | 17.83 | 4,885 | 2,823 |

## Stage-Area-Storage for Pond 1P: subsurface detention (continued)

| Elevation (feet) | Horizontal (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Horizontal (sq-ft) | Storage (cubic-feet) |
|---|---|---|---|---|---|
| 17.84 | 4,885 | 2,858 | 18.36 | 4,885 | 4,444 |
| 17.85 | 4,885 | 2,892 | 18.37 | 4,885 | 4,468 |
| 17.86 | 4,885 | 2,927 | 18.38 | 4,885 | 4,492 |
| 17.87 | 4,885 | 2,961 | 18.39 | 4,885 | 4,515 |
| 17.88 | 4,885 | 2,995 | 18.40 | 4,885 | 4,538 |
| 17.89 | 4,885 | 3,029 | 18.41 | 4,885 | 4,560 |
| 17.90 | 4,885 | 3,063 | 18.42 | 4,885 | 4,582 |
| 17.91 | 4,885 | 3,097 | 18.43 | 4,885 | 4,604 |
| 17.92 | 4,885 | 3,131 | 18.44 | 4,885 | 4,626 |
| 17.93 | 4,885 | 3,164 | 18.45 | 4,885 | 4,647 |
| 17.94 | 4,885 | 3,198 | 18.46 | 4,885 | 4,667 |
| 17.95 | 4,885 | 3,231 | 18.47 | 4,885 | 4,688 |
| 17.96 | 4,885 | 3,264 | 18.48 | 4,885 | 4,708 |
| 17.97 | 4,885 | 3,298 | 18.49 | 4,885 | 4,728 |
| 17.98 | 4,885 | 3,331 | 18.50 | 4,885 | 4,747 |
| 17.99 | 4,885 | 3,363 | 18.51 | 4,885 | 4,767 |
| 18.00 | 4,885 | 3,396 | 18.52 | 4,885 | 4,786 |
| 18.01 | 4,885 | 3,429 | 18.53 | 4,885 | 4,806 |
| 18.02 | 4,885 | 3,461 | 18.54 | 4,885 | 4,825 |
| 18.03 | 4,885 | 3,493 | 18.55 | 4,885 | 4,843 |
| 18.04 | 4,885 | 3,525 | 18.56 | 4,885 | 4,862 |
| 18.05 | 4,885 | 3,557 | 18.57 | 4,885 | 4,880 |
| 18.06 | 4,885 | 3,589 | 18.58 | 4,885 | 4,899 |
| 18.07 | 4,885 | 3,620 | 18.59 | 4,885 | 4,917 |
| 18.08 | 4,885 | 3,652 | 18.60 | 4,885 | 4,935 |
| 18.09 | 4,885 | 3,683 | 18.61 | 4,885 | 4,952 |
| 18.10 | 4,885 | 3,714 | 18.62 | 4,885 | 4,970 |
| 18.11 | 4,885 | 3,745 | 18.63 | 4,885 | 4,987 |
| 18.12 | 4,885 | 3,775 | 18.64 | 4,885 | 5,004 |
| 18.13 | 4,885 | 3,806 | 18.65 | 4,885 | 5,021 |
| 18.14 | 4,885 | 3,836 | 18.66 | 4,885 | 5,039 |
| 18.15 | 4,885 | 3,866 | 18.67 | 4,885 | 5,056 |
| 18.16 | 4,885 | 3,896 | 18.68 | 4,885 | 5,073 |
| 18.17 | 4,885 | 3,926 | 18.69 | 4,885 | 5,090 |
| 18.18 | 4,885 | 3,955 | 18.70 | 4,885 | 5,107 |
| 18.19 | 4,885 | 3,985 | 18.71 | 4,885 | 5,124 |
| 18.20 | 4,885 | 4,014 | 18.72 | 4,885 | 5,141 |
| 18.21 | 4,885 | 4,043 | 18.73 | 4,885 | 5,158 |
| 18.22 | 4,885 | 4,071 | 18.74 | 4,885 | 5,175 |
| 18.23 | 4,885 | 4,100 | 18.75 | 4,885 | 5,192 |
| 18.24 | 4,885 | 4,128 | 18.76 | 4,885 | 5,210 |
| 18.25 | 4,885 | 4,156 | 18.77 | 4,885 | 5,227 |
| 18.26 | 4,885 | 4,184 | 18.78 | 4,885 | 5,244 |
| 18.27 | 4,885 | 4,211 | 18.79 | 4,885 | 5,261 |
| 18.28 | 4,885 | 4,238 | 18.80 | 4,885 | 5,278 |
| 18.29 | 4,885 | 4,265 | 18.81 | 4,885 | 5,295 |
| 18.30 | 4,885 | 4,292 | 18.82 | 4,885 | 5,312 |
| 18.31 | 4,885 | 4,318 | 18.83 | 4,885 | 5,329 |
| 18.32 | 4,885 | 4,344 | 18.84 | 4,885 | 5,346 |
| 18.33 | 4,885 | 4,370 | 18.85 | 4,885 | 5,363 |
| 18.34 | 4,885 | 4,395 | 18.86 | 4,885 | 5,380 |
| 18.35 | 4,885 | 4,420 | 18.87 | 4,885 | 5,398 |

## Stage-Area-Storage for Pond 1P: subsurface detention (continued)

| Elevation (feet) | Horizontal (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 18.88 | 4,885 | 5,415 |
| 18.89 | 4,885 | 5,432 |
| 18.90 | 4,885 | 5,449 |
| 18.91 | 4,885 | 5,466 |
| 18.92 | 4,885 | 5,483 |
| 18.93 | 4,885 | 5,500 |
| 18.94 | 4,885 | 5,517 |
| 18.95 | 4,885 | 5,534 |
| 18.96 | 4,885 | 5,551 |
| 18.97 | 4,885 | 5,569 |
| 18.98 | 4,885 | 5,586 |
| 18.99 | 4,885 | 5,603 |
| 19.00 | 4,885 | 5,620 |
| 19.01 | 4,885 | 5,637 |
| 19.02 | 4,885 | 5,654 |
| 19.03 | 4,885 | 5,671 |
| 19.04 | 4,885 | 5,688 |
| 19.05 | 4,885 | 5,705 |
| 19.06 | 4,885 | 5,722 |
| 19.07 | 4,885 | 5,740 |
| 19.08 | 4,885 | 5,757 |
| 19.09 | 4,885 | 5,774 |
| 19.10 | 4,885 | 5,791 |
| 19.11 | 4,885 | 5,808 |
| 19.12 | 4,885 | 5,825 |
| 19.13 | 4,885 | 5,842 |
| 19.14 | 4,885 | 5,859 |
| 19.15 | 4,885 | 5,876 |
| 19.16 | 4,885 | 5,893 |
| 19.17 | 4,885 | 5,910 |
| 19.18 | 4,885 | 5,928 |
| 19.19 | 4,885 | 5,945 |
| 19.20 | 4,885 | 5,962 |
| 19.21 | 4,885 | 5,979 |
| 19.22 | 4,885 | 5,996 |
| 19.23 | 4,885 | 6,013 |
| 19.24 | 4,885 | 6,030 |
| 19.25 | 4,885 | 6,047 |
| 19.26 | 4,885 | 6,064 |
| 19.27 | 4,885 | 6,081 |
| 19.28 | 4,885 | 6,099 |
| 19.29 | 4,885 | 6,116 |
| 19.30 | 4,885 | **6,133** |

## Summary for Pond 2P: roof infil

Inflow Area = 0.192 ac,100.00% Impervious, Inflow Depth = 4.36" for 10-Yr event
Inflow = 0.89 cfs @ 12.07 hrs, Volume= 0.070 af
Outflow = 0.19 cfs @ 11.72 hrs, Volume= 0.070 af, Atten= 78%, Lag= 0.0 min
Discarded = 0.19 cfs @ 11.72 hrs, Volume= 0.070 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Peak Elev= 17.87' @ 12.46 hrs Surf.Area= 1,011 sf Storage= 630 cf

Plug-Flow detention time= 15.4 min calculated for 0.070 af (100% of inflow)
Center-of-Mass det. time= 15.4 min ( 763.9 - 748.5 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1A | 16.80' | 797 cf | **11.50'W x 87.88'L x 2.50'H Field A**<br>2,527 cf Overall - 533 cf Embedded = 1,993 cf x 40.0% Voids |
| #2A | 17.30' | 533 cf | **StormTech SC-310** x 36 Inside #1<br>Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf<br>Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 2.07 sf x 3 rows |
| | | 1,331 cf | Total Available Storage |

Storage Group A created with Chamber Wizard

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 16.80' | **8.270 in/hr Exfiltration over Surface area** |

**Discarded OutFlow** Max=0.19 cfs @ 11.72 hrs HW=16.83' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.19 cfs)

## Stage-Area-Storage for Pond 2P: roof infil

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|---|---|---|
| 16.80 | **1,011** | 0 | 17.32 | 1,011 | 218 |
| 16.81 | 1,011 | 4 | 17.33 | 1,011 | 225 |
| 16.82 | 1,011 | 8 | 17.34 | 1,011 | 233 |
| 16.83 | 1,011 | 12 | 17.35 | 1,011 | 241 |
| 16.84 | 1,011 | 16 | 17.36 | 1,011 | 249 |
| 16.85 | 1,011 | 20 | 17.37 | 1,011 | 256 |
| 16.86 | 1,011 | 24 | 17.38 | 1,011 | 264 |
| 16.87 | 1,011 | 28 | 17.39 | 1,011 | 272 |
| 16.88 | 1,011 | 32 | 17.40 | 1,011 | 280 |
| 16.89 | 1,011 | 36 | 17.41 | 1,011 | 287 |
| 16.90 | 1,011 | 40 | 17.42 | 1,011 | 295 |
| 16.91 | 1,011 | 44 | 17.43 | 1,011 | 303 |
| 16.92 | 1,011 | 49 | 17.44 | 1,011 | 310 |
| 16.93 | 1,011 | 53 | 17.45 | 1,011 | 318 |
| 16.94 | 1,011 | 57 | 17.46 | 1,011 | 326 |
| 16.95 | 1,011 | 61 | 17.47 | 1,011 | 333 |
| 16.96 | 1,011 | 65 | 17.48 | 1,011 | 341 |
| 16.97 | 1,011 | 69 | 17.49 | 1,011 | 349 |
| 16.98 | 1,011 | 73 | 17.50 | 1,011 | 356 |
| 16.99 | 1,011 | 77 | 17.51 | 1,011 | 364 |
| 17.00 | 1,011 | 81 | 17.52 | 1,011 | 371 |
| 17.01 | 1,011 | 85 | 17.53 | 1,011 | 379 |
| 17.02 | 1,011 | 89 | 17.54 | 1,011 | 387 |
| 17.03 | 1,011 | 93 | 17.55 | 1,011 | 394 |
| 17.04 | 1,011 | 97 | 17.56 | 1,011 | 402 |
| 17.05 | 1,011 | 101 | 17.57 | 1,011 | 409 |
| 17.06 | 1,011 | 105 | 17.58 | 1,011 | 417 |
| 17.07 | 1,011 | 109 | 17.59 | 1,011 | 424 |
| 17.08 | 1,011 | 113 | 17.60 | 1,011 | 432 |
| 17.09 | 1,011 | 117 | 17.61 | 1,011 | 439 |
| 17.10 | 1,011 | 121 | 17.62 | 1,011 | 447 |
| 17.11 | 1,011 | 125 | 17.63 | 1,011 | 454 |
| 17.12 | 1,011 | 129 | 17.64 | 1,011 | 461 |
| 17.13 | 1,011 | 133 | 17.65 | 1,011 | 469 |
| 17.14 | 1,011 | 137 | 17.66 | 1,011 | 476 |
| 17.15 | 1,011 | 141 | 17.67 | 1,011 | 484 |
| 17.16 | 1,011 | 146 | 17.68 | 1,011 | 491 |
| 17.17 | 1,011 | 150 | 17.69 | 1,011 | 498 |
| 17.18 | 1,011 | 154 | 17.70 | 1,011 | 506 |
| 17.19 | 1,011 | 158 | 17.71 | 1,011 | 513 |
| 17.20 | 1,011 | 162 | 17.72 | 1,011 | 520 |
| 17.21 | 1,011 | 166 | 17.73 | 1,011 | 528 |
| 17.22 | 1,011 | 170 | 17.74 | 1,011 | 535 |
| 17.23 | 1,011 | 174 | 17.75 | 1,011 | 542 |
| 17.24 | 1,011 | 178 | 17.76 | 1,011 | 549 |
| 17.25 | 1,011 | 182 | 17.77 | 1,011 | 556 |
| 17.26 | 1,011 | 186 | 17.78 | 1,011 | 564 |
| 17.27 | 1,011 | 190 | 17.79 | 1,011 | 571 |
| 17.28 | 1,011 | 194 | 17.80 | 1,011 | 578 |
| 17.29 | 1,011 | 198 | 17.81 | 1,011 | 585 |
| 17.30 | 1,011 | 202 | 17.82 | 1,011 | 592 |
| 17.31 | 1,011 | 210 | 17.83 | 1,011 | 599 |

## Stage-Area-Storage for Pond 2P: roof infil (continued)

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|---|---|---|
| 17.84 | 1,011 | 606 | 18.36 | 1,011 | 937 |
| 17.85 | 1,011 | 613 | 18.37 | 1,011 | 942 |
| 17.86 | 1,011 | 620 | 18.38 | 1,011 | 947 |
| 17.87 | 1,011 | 627 | 18.39 | 1,011 | 952 |
| 17.88 | 1,011 | 634 | 18.40 | 1,011 | 957 |
| 17.89 | 1,011 | 641 | 18.41 | 1,011 | 962 |
| 17.90 | 1,011 | 648 | 18.42 | 1,011 | 967 |
| 17.91 | 1,011 | 655 | 18.43 | 1,011 | 972 |
| 17.92 | 1,011 | 662 | 18.44 | 1,011 | 977 |
| 17.93 | 1,011 | 669 | 18.45 | 1,011 | 981 |
| 17.94 | 1,011 | 676 | 18.46 | 1,011 | 986 |
| 17.95 | 1,011 | 683 | 18.47 | 1,011 | 991 |
| 17.96 | 1,011 | 690 | 18.48 | 1,011 | 995 |
| 17.97 | 1,011 | 696 | 18.49 | 1,011 | 1,000 |
| 17.98 | 1,011 | 703 | 18.50 | 1,011 | 1,004 |
| 17.99 | 1,011 | 710 | 18.51 | 1,011 | 1,009 |
| 18.00 | 1,011 | 717 | 18.52 | 1,011 | 1,013 |
| 18.01 | 1,011 | 723 | 18.53 | 1,011 | 1,018 |
| 18.02 | 1,011 | 730 | 18.54 | 1,011 | 1,022 |
| 18.03 | 1,011 | 737 | 18.55 | 1,011 | 1,026 |
| 18.04 | 1,011 | 743 | 18.56 | 1,011 | 1,031 |
| 18.05 | 1,011 | 750 | 18.57 | 1,011 | 1,035 |
| 18.06 | 1,011 | 756 | 18.58 | 1,011 | 1,039 |
| 18.07 | 1,011 | 763 | 18.59 | 1,011 | 1,043 |
| 18.08 | 1,011 | 769 | 18.60 | 1,011 | 1,047 |
| 18.09 | 1,011 | 776 | 18.61 | 1,011 | 1,052 |
| 18.10 | 1,011 | 782 | 18.62 | 1,011 | 1,056 |
| 18.11 | 1,011 | 789 | 18.63 | 1,011 | 1,060 |
| 18.12 | 1,011 | 795 | 18.64 | 1,011 | 1,064 |
| 18.13 | 1,011 | 801 | 18.65 | 1,011 | 1,068 |
| 18.14 | 1,011 | 808 | 18.66 | 1,011 | 1,072 |
| 18.15 | 1,011 | 814 | 18.67 | 1,011 | 1,076 |
| 18.16 | 1,011 | 820 | 18.68 | 1,011 | 1,080 |
| 18.17 | 1,011 | 827 | 18.69 | 1,011 | 1,084 |
| 18.18 | 1,011 | 833 | 18.70 | 1,011 | 1,088 |
| 18.19 | 1,011 | 839 | 18.71 | 1,011 | 1,092 |
| 18.20 | 1,011 | 845 | 18.72 | 1,011 | 1,096 |
| 18.21 | 1,011 | 851 | 18.73 | 1,011 | 1,100 |
| 18.22 | 1,011 | 857 | 18.74 | 1,011 | 1,104 |
| 18.23 | 1,011 | 863 | 18.75 | 1,011 | 1,108 |
| 18.24 | 1,011 | 869 | 18.76 | 1,011 | 1,112 |
| 18.25 | 1,011 | 875 | 18.77 | 1,011 | 1,116 |
| 18.26 | 1,011 | 881 | 18.78 | 1,011 | 1,120 |
| 18.27 | 1,011 | 887 | 18.79 | 1,011 | 1,124 |
| 18.28 | 1,011 | 892 | 18.80 | 1,011 | 1,129 |
| 18.29 | 1,011 | 898 | 18.81 | 1,011 | 1,133 |
| 18.30 | 1,011 | 904 | 18.82 | 1,011 | 1,137 |
| 18.31 | 1,011 | 909 | 18.83 | 1,011 | 1,141 |
| 18.32 | 1,011 | 915 | 18.84 | 1,011 | 1,145 |
| 18.33 | 1,011 | 921 | 18.85 | 1,011 | 1,149 |
| 18.34 | 1,011 | 926 | 18.86 | 1,011 | 1,153 |
| 18.35 | 1,011 | 931 | 18.87 | 1,011 | 1,157 |

## Stage-Area-Storage for Pond 2P: roof infil (continued)

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 18.88 | 1,011 | 1,161 |
| 18.89 | 1,011 | 1,165 |
| 18.90 | 1,011 | 1,169 |
| 18.91 | 1,011 | 1,173 |
| 18.92 | 1,011 | 1,177 |
| 18.93 | 1,011 | 1,181 |
| 18.94 | 1,011 | 1,185 |
| 18.95 | 1,011 | 1,189 |
| 18.96 | 1,011 | 1,193 |
| 18.97 | 1,011 | 1,197 |
| 18.98 | 1,011 | 1,201 |
| 18.99 | 1,011 | 1,205 |
| 19.00 | 1,011 | 1,209 |
| 19.01 | 1,011 | 1,213 |
| 19.02 | 1,011 | 1,217 |
| 19.03 | 1,011 | 1,222 |
| 19.04 | 1,011 | 1,226 |
| 19.05 | 1,011 | 1,230 |
| 19.06 | 1,011 | 1,234 |
| 19.07 | 1,011 | 1,238 |
| 19.08 | 1,011 | 1,242 |
| 19.09 | 1,011 | 1,246 |
| 19.10 | 1,011 | 1,250 |
| 19.11 | 1,011 | 1,254 |
| 19.12 | 1,011 | 1,258 |
| 19.13 | 1,011 | 1,262 |
| 19.14 | 1,011 | 1,266 |
| 19.15 | 1,011 | 1,270 |
| 19.16 | 1,011 | 1,274 |
| 19.17 | 1,011 | 1,278 |
| 19.18 | 1,011 | 1,282 |
| 19.19 | 1,011 | 1,286 |
| 19.20 | 1,011 | 1,290 |
| 19.21 | 1,011 | 1,294 |
| 19.22 | 1,011 | 1,298 |
| 19.23 | 1,011 | 1,302 |
| 19.24 | 1,011 | 1,306 |
| 19.25 | 1,011 | 1,310 |
| 19.26 | 1,011 | 1,314 |
| 19.27 | 1,011 | 1,319 |
| 19.28 | 1,011 | 1,323 |
| 19.29 | 1,011 | 1,327 |
| 19.30 | 1,011 | **1,331** |

## Summary for Subcatchment 1: Dev Area 1

Runoff = 9.33 cfs @ 12.07 hrs, Volume= 0.713 af, Depth= 6.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.00"

| Area (sf) | CN | Description |
|---|---|---|
| 45,555 | 98 | Paved parking, HSG C |
| 6,126 | 74 | >75% Grass cover, Good, HSG C |
| 6,523 | 98 | Roofs, HSG C |
| 58,204 | 95 | Weighted Average |
| 6,126 | | 10.53% Pervious Area |
| 52,078 | | 89.47% Impervious Area |

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

## Summary for Subcatchment 2: Dev Area 2

Runoff = 1.23 cfs @ 12.07 hrs, Volume= 0.085 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.00"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 2,512 | 98 | Roofs, HSG C |
| * | 2,243 | 65 | Brush, grass, weeds Good, HSG C |
| | 5,173 | 74 | >75% Grass cover, Good, HSG C |
| | 9,928 | 78 | Weighted Average |
| | 7,416 | | 74.70% Pervious Area |
| | 2,512 | | 25.30% Impervious Area |

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

## Summary for Subcatchment 3: Dev Area 3

Runoff = 1.52 cfs @ 12.08 hrs, Volume= 0.104 af, Depth= 3.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.00"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 7,232 | 74 | >75% Grass cover, Good, HSG C |
| * | 900 | 98 | Paved parking (existing), HSG C |
| * | 6,500 | 65 | Brush, grass, weeds Good, HSG C |
| | 14,632 | 71 | Weighted Average |
| | 13,732 | | 93.85% Pervious Area |
| | 900 | | 6.15% Impervious Area |

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

## Summary for Subcatchment 4: front of building to street

Runoff = 0.19 cfs @ 12.07 hrs, Volume= 0.015 af, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.00"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 1,158 | 98 | assume all paved(conservative) |
| | 1,158 | | 100.00% Impervious Area |

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

## Summary for Subcatchment R1: roof area

Runoff = 1.36 cfs @ 12.07 hrs, Volume= 0.108 af, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.00"

| Area (sf) | CN | Description |
|---|---|---|
| 8,358 | 98 | Roofs, HSG C |
| 8,358 | | 100.00% Impervious Area |

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

## Summary for Subcatchment R2: roof area to wetland

Runoff = 0.63 cfs @ 12.07 hrs, Volume= 0.050 af, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.00"

| Area (sf) | CN | Description |
|---|---|---|
| 3,900 | 98 | Roofs, HSG C |
| 3,900 | | 100.00% Impervious Area |

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

## Summary for Reach DP1: sum from site to drain

Inflow Area = 1.564 ac, 80.12% Impervious, Inflow Depth = 1.92" for 100-Yr event
Inflow = 4.55 cfs @ 12.15 hrs, Volume= 0.250 af
Outflow = 4.55 cfs @ 12.15 hrs, Volume= 0.250 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

## Summary for Reach DP2: overland from site

Inflow Area = 0.425 ac, 25.90% Impervious, Inflow Depth = 4.36" for 100-Yr event
Inflow = 2.15 cfs @ 12.07 hrs, Volume= 0.155 af
Outflow = 2.15 cfs @ 12.07 hrs, Volume= 0.155 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

## Summary for Pond 1P: subsurface detention

Inflow Area = 1.336 ac, 89.47% Impervious, Inflow Depth = 6.41" for 100-Yr event
Inflow = 9.33 cfs @ 12.07 hrs, Volume= 0.713 af
Outflow = 4.75 cfs @ 12.19 hrs, Volume= 0.713 af, Atten= 49%, Lag= 7.4 min
Discarded = 0.94 cfs @ 11.44 hrs, Volume= 0.548 af
Primary = 3.82 cfs @ 12.19 hrs, Volume= 0.165 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Peak Elev= 19.17' @ 12.19 hrs Surf.Area= 4,885 sf Storage= 5,908 cf

Plug-Flow detention time= 16.1 min calculated for 0.713 af (100% of inflow)
Center-of-Mass det. time= 16.1 min ( 775.2 - 759.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1A | 16.80' | 3,273 cf | **108.17'W x 45.16'L x 2.50'H Field A**<br>12,212 cf Overall - 2,859 cf Embedded = 9,352 cf x 35.0% Voids |
| #2A | 17.30' | 2,859 cf | **StormTech SC-310** x 192 Inside #1<br>Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf<br>Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap<br>Row Length Adjustment= +0.44' x 2.07 sf x 32 rows |
| | | 6,133 cf | Total Available Storage |

Storage Group A created with Chamber Wizard

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 16.80' | **8.270 in/hr Exfiltration over Horizontal area** |
| #2 | Primary | 17.65' | **12.0" Round Culvert** L= 6.0' Ke= 0.500<br>Inlet / Outlet Invert= 17.65' / 16.90' S= 0.1250 '/' Cc= 0.900<br>n= 0.012, Flow Area= 0.79 sf |

**Discarded OutFlow** Max=0.94 cfs @ 11.44 hrs HW=16.83' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.94 cfs)

**Primary OutFlow** Max=3.81 cfs @ 12.19 hrs HW=19.17' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 3.81 cfs @ 4.86 fps)

## Stage-Area-Storage for Pond 1P: subsurface detention

| Elevation (feet) | Horizontal (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 16.80 | **4,885** | 0 |
| 16.81 | 4,885 | 17 |
| 16.82 | 4,885 | 34 |
| 16.83 | 4,885 | 51 |
| 16.84 | 4,885 | 68 |
| 16.85 | 4,885 | 85 |
| 16.86 | 4,885 | 103 |
| 16.87 | 4,885 | 120 |
| 16.88 | 4,885 | 137 |
| 16.89 | 4,885 | 154 |
| 16.90 | 4,885 | 171 |
| 16.91 | 4,885 | 188 |
| 16.92 | 4,885 | 205 |
| 16.93 | 4,885 | 222 |
| 16.94 | 4,885 | 239 |
| 16.95 | 4,885 | 256 |
| 16.96 | 4,885 | 274 |
| 16.97 | 4,885 | 291 |
| 16.98 | 4,885 | 308 |
| 16.99 | 4,885 | 325 |
| 17.00 | 4,885 | 342 |
| 17.01 | 4,885 | 359 |
| 17.02 | 4,885 | 376 |
| 17.03 | 4,885 | 393 |
| 17.04 | 4,885 | 410 |
| 17.05 | 4,885 | 427 |
| 17.06 | 4,885 | 445 |
| 17.07 | 4,885 | 462 |
| 17.08 | 4,885 | 479 |
| 17.09 | 4,885 | 496 |
| 17.10 | 4,885 | 513 |
| 17.11 | 4,885 | 530 |
| 17.12 | 4,885 | 547 |
| 17.13 | 4,885 | 564 |
| 17.14 | 4,885 | 581 |
| 17.15 | 4,885 | 598 |
| 17.16 | 4,885 | 615 |
| 17.17 | 4,885 | 633 |
| 17.18 | 4,885 | 650 |
| 17.19 | 4,885 | 667 |
| 17.20 | 4,885 | 684 |
| 17.21 | 4,885 | 701 |
| 17.22 | 4,885 | 718 |
| 17.23 | 4,885 | 735 |
| 17.24 | 4,885 | 752 |
| 17.25 | 4,885 | 769 |
| 17.26 | 4,885 | 786 |
| 17.27 | 4,885 | 804 |
| 17.28 | 4,885 | 821 |
| 17.29 | 4,885 | 838 |
| 17.30 | 4,885 | 855 |
| 17.31 | 4,885 | 894 |
| 17.32 | 4,885 | 932 |
| 17.33 | 4,885 | 971 |
| 17.34 | 4,885 | 1,010 |
| 17.35 | 4,885 | 1,048 |
| 17.36 | 4,885 | 1,087 |
| 17.37 | 4,885 | 1,125 |
| 17.38 | 4,885 | 1,164 |
| 17.39 | 4,885 | 1,202 |
| 17.40 | 4,885 | 1,241 |
| 17.41 | 4,885 | 1,279 |
| 17.42 | 4,885 | 1,318 |
| 17.43 | 4,885 | 1,356 |
| 17.44 | 4,885 | 1,394 |
| 17.45 | 4,885 | 1,432 |
| 17.46 | 4,885 | 1,471 |
| 17.47 | 4,885 | 1,509 |
| 17.48 | 4,885 | 1,547 |
| 17.49 | 4,885 | 1,584 |
| 17.50 | 4,885 | 1,622 |
| 17.51 | 4,885 | 1,660 |
| 17.52 | 4,885 | 1,698 |
| 17.53 | 4,885 | 1,735 |
| 17.54 | 4,885 | 1,773 |
| 17.55 | 4,885 | 1,811 |
| 17.56 | 4,885 | 1,848 |
| 17.57 | 4,885 | 1,885 |
| 17.58 | 4,885 | 1,922 |
| 17.59 | 4,885 | 1,960 |
| 17.60 | 4,885 | 1,997 |
| 17.61 | 4,885 | 2,034 |
| 17.62 | 4,885 | 2,071 |
| 17.63 | 4,885 | 2,107 |
| 17.64 | 4,885 | 2,144 |
| 17.65 | 4,885 | 2,181 |
| 17.66 | 4,885 | 2,217 |
| 17.67 | 4,885 | 2,254 |
| 17.68 | 4,885 | 2,290 |
| 17.69 | 4,885 | 2,326 |
| 17.70 | 4,885 | 2,363 |
| 17.71 | 4,885 | 2,399 |
| 17.72 | 4,885 | 2,435 |
| 17.73 | 4,885 | 2,470 |
| 17.74 | 4,885 | 2,506 |
| 17.75 | 4,885 | 2,542 |
| 17.76 | 4,885 | 2,577 |
| 17.77 | 4,885 | 2,613 |
| 17.78 | 4,885 | 2,648 |
| 17.79 | 4,885 | 2,683 |
| 17.80 | 4,885 | 2,718 |
| 17.81 | 4,885 | 2,753 |
| 17.82 | 4,885 | 2,788 |
| 17.83 | 4,885 | 2,823 |

## Stage-Area-Storage for Pond 1P: subsurface detention (continued)

| Elevation (feet) | Horizontal (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 17.84 | 4,885 | 2,858 |
| 17.85 | 4,885 | 2,892 |
| 17.86 | 4,885 | 2,927 |
| 17.87 | 4,885 | 2,961 |
| 17.88 | 4,885 | 2,995 |
| 17.89 | 4,885 | 3,029 |
| 17.90 | 4,885 | 3,063 |
| 17.91 | 4,885 | 3,097 |
| 17.92 | 4,885 | 3,131 |
| 17.93 | 4,885 | 3,164 |
| 17.94 | 4,885 | 3,198 |
| 17.95 | 4,885 | 3,231 |
| 17.96 | 4,885 | 3,264 |
| 17.97 | 4,885 | 3,298 |
| 17.98 | 4,885 | 3,331 |
| 17.99 | 4,885 | 3,363 |
| 18.00 | 4,885 | 3,396 |
| 18.01 | 4,885 | 3,429 |
| 18.02 | 4,885 | 3,461 |
| 18.03 | 4,885 | 3,493 |
| 18.04 | 4,885 | 3,525 |
| 18.05 | 4,885 | 3,557 |
| 18.06 | 4,885 | 3,589 |
| 18.07 | 4,885 | 3,620 |
| 18.08 | 4,885 | 3,652 |
| 18.09 | 4,885 | 3,683 |
| 18.10 | 4,885 | 3,714 |
| 18.11 | 4,885 | 3,745 |
| 18.12 | 4,885 | 3,775 |
| 18.13 | 4,885 | 3,806 |
| 18.14 | 4,885 | 3,836 |
| 18.15 | 4,885 | 3,866 |
| 18.16 | 4,885 | 3,896 |
| 18.17 | 4,885 | 3,926 |
| 18.18 | 4,885 | 3,955 |
| 18.19 | 4,885 | 3,985 |
| 18.20 | 4,885 | 4,014 |
| 18.21 | 4,885 | 4,043 |
| 18.22 | 4,885 | 4,071 |
| 18.23 | 4,885 | 4,100 |
| 18.24 | 4,885 | 4,128 |
| 18.25 | 4,885 | 4,156 |
| 18.26 | 4,885 | 4,184 |
| 18.27 | 4,885 | 4,211 |
| 18.28 | 4,885 | 4,238 |
| 18.29 | 4,885 | 4,265 |
| 18.30 | 4,885 | 4,292 |
| 18.31 | 4,885 | 4,318 |
| 18.32 | 4,885 | 4,344 |
| 18.33 | 4,885 | 4,370 |
| 18.34 | 4,885 | 4,395 |
| 18.35 | 4,885 | 4,420 |
| 18.36 | 4,885 | 4,444 |
| 18.37 | 4,885 | 4,468 |
| 18.38 | 4,885 | 4,492 |
| 18.39 | 4,885 | 4,515 |
| 18.40 | 4,885 | 4,538 |
| 18.41 | 4,885 | 4,560 |
| 18.42 | 4,885 | 4,582 |
| 18.43 | 4,885 | 4,604 |
| 18.44 | 4,885 | 4,626 |
| 18.45 | 4,885 | 4,647 |
| 18.46 | 4,885 | 4,667 |
| 18.47 | 4,885 | 4,688 |
| 18.48 | 4,885 | 4,708 |
| 18.49 | 4,885 | 4,728 |
| 18.50 | 4,885 | 4,747 |
| 18.51 | 4,885 | 4,767 |
| 18.52 | 4,885 | 4,786 |
| 18.53 | 4,885 | 4,806 |
| 18.54 | 4,885 | 4,825 |
| 18.55 | 4,885 | 4,843 |
| 18.56 | 4,885 | 4,862 |
| 18.57 | 4,885 | 4,880 |
| 18.58 | 4,885 | 4,899 |
| 18.59 | 4,885 | 4,917 |
| 18.60 | 4,885 | 4,935 |
| 18.61 | 4,885 | 4,952 |
| 18.62 | 4,885 | 4,970 |
| 18.63 | 4,885 | 4,987 |
| 18.64 | 4,885 | 5,004 |
| 18.65 | 4,885 | 5,021 |
| 18.66 | 4,885 | 5,039 |
| 18.67 | 4,885 | 5,056 |
| 18.68 | 4,885 | 5,073 |
| 18.69 | 4,885 | 5,090 |
| 18.70 | 4,885 | 5,107 |
| 18.71 | 4,885 | 5,124 |
| 18.72 | 4,885 | 5,141 |
| 18.73 | 4,885 | 5,158 |
| 18.74 | 4,885 | 5,175 |
| 18.75 | 4,885 | 5,192 |
| 18.76 | 4,885 | 5,210 |
| 18.77 | 4,885 | 5,227 |
| 18.78 | 4,885 | 5,244 |
| 18.79 | 4,885 | 5,261 |
| 18.80 | 4,885 | 5,278 |
| 18.81 | 4,885 | 5,295 |
| 18.82 | 4,885 | 5,312 |
| 18.83 | 4,885 | 5,329 |
| 18.84 | 4,885 | 5,346 |
| 18.85 | 4,885 | 5,363 |
| 18.86 | 4,885 | 5,380 |
| 18.87 | 4,885 | 5,398 |

## Stage-Area-Storage for Pond 1P: subsurface detention (continued)

| Elevation (feet) | Horizontal (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 18.88 | 4,885 | 5,415 |
| 18.89 | 4,885 | 5,432 |
| 18.90 | 4,885 | 5,449 |
| 18.91 | 4,885 | 5,466 |
| 18.92 | 4,885 | 5,483 |
| 18.93 | 4,885 | 5,500 |
| 18.94 | 4,885 | 5,517 |
| 18.95 | 4,885 | 5,534 |
| 18.96 | 4,885 | 5,551 |
| 18.97 | 4,885 | 5,569 |
| 18.98 | 4,885 | 5,586 |
| 18.99 | 4,885 | 5,603 |
| 19.00 | 4,885 | 5,620 |
| 19.01 | 4,885 | 5,637 |
| 19.02 | 4,885 | 5,654 |
| 19.03 | 4,885 | 5,671 |
| 19.04 | 4,885 | 5,688 |
| 19.05 | 4,885 | 5,705 |
| 19.06 | 4,885 | 5,722 |
| 19.07 | 4,885 | 5,740 |
| 19.08 | 4,885 | 5,757 |
| 19.09 | 4,885 | 5,774 |
| 19.10 | 4,885 | 5,791 |
| 19.11 | 4,885 | 5,808 |
| 19.12 | 4,885 | 5,825 |
| 19.13 | 4,885 | 5,842 |
| 19.14 | 4,885 | 5,859 |
| 19.15 | 4,885 | 5,876 |
| 19.16 | 4,885 | 5,893 |
| 19.17 | 4,885 | 5,910 |
| 19.18 | 4,885 | 5,928 |
| 19.19 | 4,885 | 5,945 |
| 19.20 | 4,885 | 5,962 |
| 19.21 | 4,885 | 5,979 |
| 19.22 | 4,885 | 5,996 |
| 19.23 | 4,885 | 6,013 |
| 19.24 | 4,885 | 6,030 |
| 19.25 | 4,885 | 6,047 |
| 19.26 | 4,885 | 6,064 |
| 19.27 | 4,885 | 6,081 |
| 19.28 | 4,885 | 6,099 |
| 19.29 | 4,885 | 6,116 |
| 19.30 | 4,885 | **6,133** |

## Summary for Pond 2P: roof infil

Inflow Area = 0.192 ac,100.00% Impervious, Inflow Depth = 6.76" for 100-Yr event
Inflow = 1.36 cfs @ 12.07 hrs, Volume= 0.108 af
Outflow = 0.19 cfs @ 11.62 hrs, Volume= 0.108 af, Atten= 86%, Lag= 0.0 min
Discarded = 0.19 cfs @ 11.62 hrs, Volume= 0.108 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs
Peak Elev= 19.16' @ 12.55 hrs Surf.Area= 1,011 sf Storage= 1,274 cf

Plug-Flow detention time= 36.3 min calculated for 0.108 af (100% of inflow)
Center-of-Mass det. time= 36.3 min ( 778.3 - 742.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1A | 16.80' | 797 cf | **11.50'W x 87.88'L x 2.50'H Field A** |
| | | | 2,527 cf Overall - 533 cf Embedded = 1,993 cf x 40.0% Voids |
| #2A | 17.30' | 533 cf | **StormTech SC-310** x 36 Inside #1 |
| | | | Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf |
| | | | Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap |
| | | | Row Length Adjustment= +0.44' x 2.07 sf x 3 rows |
| | | 1,331 cf | Total Available Storage |

Storage Group A created with Chamber Wizard

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 16.80' | **8.270 in/hr Exfiltration over Surface area** |

**Discarded OutFlow** Max=0.19 cfs @ 11.62 hrs HW=16.83' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.19 cfs)

## Stage-Area-Storage for Pond 2P: roof infil

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 16.80 | **1,011** | 0 |
| 16.81 | 1,011 | 4 |
| 16.82 | 1,011 | 8 |
| 16.83 | 1,011 | 12 |
| 16.84 | 1,011 | 16 |
| 16.85 | 1,011 | 20 |
| 16.86 | 1,011 | 24 |
| 16.87 | 1,011 | 28 |
| 16.88 | 1,011 | 32 |
| 16.89 | 1,011 | 36 |
| 16.90 | 1,011 | 40 |
| 16.91 | 1,011 | 44 |
| 16.92 | 1,011 | 49 |
| 16.93 | 1,011 | 53 |
| 16.94 | 1,011 | 57 |
| 16.95 | 1,011 | 61 |
| 16.96 | 1,011 | 65 |
| 16.97 | 1,011 | 69 |
| 16.98 | 1,011 | 73 |
| 16.99 | 1,011 | 77 |
| 17.00 | 1,011 | 81 |
| 17.01 | 1,011 | 85 |
| 17.02 | 1,011 | 89 |
| 17.03 | 1,011 | 93 |
| 17.04 | 1,011 | 97 |
| 17.05 | 1,011 | 101 |
| 17.06 | 1,011 | 105 |
| 17.07 | 1,011 | 109 |
| 17.08 | 1,011 | 113 |
| 17.09 | 1,011 | 117 |
| 17.10 | 1,011 | 121 |
| 17.11 | 1,011 | 125 |
| 17.12 | 1,011 | 129 |
| 17.13 | 1,011 | 133 |
| 17.14 | 1,011 | 137 |
| 17.15 | 1,011 | 141 |
| 17.16 | 1,011 | 146 |
| 17.17 | 1,011 | 150 |
| 17.18 | 1,011 | 154 |
| 17.19 | 1,011 | 158 |
| 17.20 | 1,011 | 162 |
| 17.21 | 1,011 | 166 |
| 17.22 | 1,011 | 170 |
| 17.23 | 1,011 | 174 |
| 17.24 | 1,011 | 178 |
| 17.25 | 1,011 | 182 |
| 17.26 | 1,011 | 186 |
| 17.27 | 1,011 | 190 |
| 17.28 | 1,011 | 194 |
| 17.29 | 1,011 | 198 |
| 17.30 | 1,011 | 202 |
| 17.31 | 1,011 | 210 |
| 17.32 | 1,011 | 218 |
| 17.33 | 1,011 | 225 |
| 17.34 | 1,011 | 233 |
| 17.35 | 1,011 | 241 |
| 17.36 | 1,011 | 249 |
| 17.37 | 1,011 | 256 |
| 17.38 | 1,011 | 264 |
| 17.39 | 1,011 | 272 |
| 17.40 | 1,011 | 280 |
| 17.41 | 1,011 | 287 |
| 17.42 | 1,011 | 295 |
| 17.43 | 1,011 | 303 |
| 17.44 | 1,011 | 310 |
| 17.45 | 1,011 | 318 |
| 17.46 | 1,011 | 326 |
| 17.47 | 1,011 | 333 |
| 17.48 | 1,011 | 341 |
| 17.49 | 1,011 | 349 |
| 17.50 | 1,011 | 356 |
| 17.51 | 1,011 | 364 |
| 17.52 | 1,011 | 371 |
| 17.53 | 1,011 | 379 |
| 17.54 | 1,011 | 387 |
| 17.55 | 1,011 | 394 |
| 17.56 | 1,011 | 402 |
| 17.57 | 1,011 | 409 |
| 17.58 | 1,011 | 417 |
| 17.59 | 1,011 | 424 |
| 17.60 | 1,011 | 432 |
| 17.61 | 1,011 | 439 |
| 17.62 | 1,011 | 447 |
| 17.63 | 1,011 | 454 |
| 17.64 | 1,011 | 461 |
| 17.65 | 1,011 | 469 |
| 17.66 | 1,011 | 476 |
| 17.67 | 1,011 | 484 |
| 17.68 | 1,011 | 491 |
| 17.69 | 1,011 | 498 |
| 17.70 | 1,011 | 506 |
| 17.71 | 1,011 | 513 |
| 17.72 | 1,011 | 520 |
| 17.73 | 1,011 | 528 |
| 17.74 | 1,011 | 535 |
| 17.75 | 1,011 | 542 |
| 17.76 | 1,011 | 549 |
| 17.77 | 1,011 | 556 |
| 17.78 | 1,011 | 564 |
| 17.79 | 1,011 | 571 |
| 17.80 | 1,011 | 578 |
| 17.81 | 1,011 | 585 |
| 17.82 | 1,011 | 592 |
| 17.83 | 1,011 | 599 |

## Stage-Area-Storage for Pond 2P: roof infil (continued)

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) | Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|---|---|---|
| 17.84 | 1,011 | 606 | 18.36 | 1,011 | 937 |
| 17.85 | 1,011 | 613 | 18.37 | 1,011 | 942 |
| 17.86 | 1,011 | 620 | 18.38 | 1,011 | 947 |
| 17.87 | 1,011 | 627 | 18.39 | 1,011 | 952 |
| 17.88 | 1,011 | 634 | 18.40 | 1,011 | 957 |
| 17.89 | 1,011 | 641 | 18.41 | 1,011 | 962 |
| 17.90 | 1,011 | 648 | 18.42 | 1,011 | 967 |
| 17.91 | 1,011 | 655 | 18.43 | 1,011 | 972 |
| 17.92 | 1,011 | 662 | 18.44 | 1,011 | 977 |
| 17.93 | 1,011 | 669 | 18.45 | 1,011 | 981 |
| 17.94 | 1,011 | 676 | 18.46 | 1,011 | 986 |
| 17.95 | 1,011 | 683 | 18.47 | 1,011 | 991 |
| 17.96 | 1,011 | 690 | 18.48 | 1,011 | 995 |
| 17.97 | 1,011 | 696 | 18.49 | 1,011 | 1,000 |
| 17.98 | 1,011 | 703 | 18.50 | 1,011 | 1,004 |
| 17.99 | 1,011 | 710 | 18.51 | 1,011 | 1,009 |
| 18.00 | 1,011 | 717 | 18.52 | 1,011 | 1,013 |
| 18.01 | 1,011 | 723 | 18.53 | 1,011 | 1,018 |
| 18.02 | 1,011 | 730 | 18.54 | 1,011 | 1,022 |
| 18.03 | 1,011 | 737 | 18.55 | 1,011 | 1,026 |
| 18.04 | 1,011 | 743 | 18.56 | 1,011 | 1,031 |
| 18.05 | 1,011 | 750 | 18.57 | 1,011 | 1,035 |
| 18.06 | 1,011 | 756 | 18.58 | 1,011 | 1,039 |
| 18.07 | 1,011 | 763 | 18.59 | 1,011 | 1,043 |
| 18.08 | 1,011 | 769 | 18.60 | 1,011 | 1,047 |
| 18.09 | 1,011 | 776 | 18.61 | 1,011 | 1,052 |
| 18.10 | 1,011 | 782 | 18.62 | 1,011 | 1,056 |
| 18.11 | 1,011 | 789 | 18.63 | 1,011 | 1,060 |
| 18.12 | 1,011 | 795 | 18.64 | 1,011 | 1,064 |
| 18.13 | 1,011 | 801 | 18.65 | 1,011 | 1,068 |
| 18.14 | 1,011 | 808 | 18.66 | 1,011 | 1,072 |
| 18.15 | 1,011 | 814 | 18.67 | 1,011 | 1,076 |
| 18.16 | 1,011 | 820 | 18.68 | 1,011 | 1,080 |
| 18.17 | 1,011 | 827 | 18.69 | 1,011 | 1,084 |
| 18.18 | 1,011 | 833 | 18.70 | 1,011 | 1,088 |
| 18.19 | 1,011 | 839 | 18.71 | 1,011 | 1,092 |
| 18.20 | 1,011 | 845 | 18.72 | 1,011 | 1,096 |
| 18.21 | 1,011 | 851 | 18.73 | 1,011 | 1,100 |
| 18.22 | 1,011 | 857 | 18.74 | 1,011 | 1,104 |
| 18.23 | 1,011 | 863 | 18.75 | 1,011 | 1,108 |
| 18.24 | 1,011 | 869 | 18.76 | 1,011 | 1,112 |
| 18.25 | 1,011 | 875 | 18.77 | 1,011 | 1,116 |
| 18.26 | 1,011 | 881 | 18.78 | 1,011 | 1,120 |
| 18.27 | 1,011 | 887 | 18.79 | 1,011 | 1,124 |
| 18.28 | 1,011 | 892 | 18.80 | 1,011 | 1,129 |
| 18.29 | 1,011 | 898 | 18.81 | 1,011 | 1,133 |
| 18.30 | 1,011 | 904 | 18.82 | 1,011 | 1,137 |
| 18.31 | 1,011 | 909 | 18.83 | 1,011 | 1,141 |
| 18.32 | 1,011 | 915 | 18.84 | 1,011 | 1,145 |
| 18.33 | 1,011 | 921 | 18.85 | 1,011 | 1,149 |
| 18.34 | 1,011 | 926 | 18.86 | 1,011 | 1,153 |
| 18.35 | 1,011 | 931 | 18.87 | 1,011 | 1,157 |

## Stage-Area-Storage for Pond 2P: roof infil (continued)

| Elevation (feet) | Surface (sq-ft) | Storage (cubic-feet) |
|---|---|---|
| 18.88 | 1,011 | 1,161 |
| 18.89 | 1,011 | 1,165 |
| 18.90 | 1,011 | 1,169 |
| 18.91 | 1,011 | 1,173 |
| 18.92 | 1,011 | 1,177 |
| 18.93 | 1,011 | 1,181 |
| 18.94 | 1,011 | 1,185 |
| 18.95 | 1,011 | 1,189 |
| 18.96 | 1,011 | 1,193 |
| 18.97 | 1,011 | 1,197 |
| 18.98 | 1,011 | 1,201 |
| 18.99 | 1,011 | 1,205 |
| 19.00 | 1,011 | 1,209 |
| 19.01 | 1,011 | 1,213 |
| 19.02 | 1,011 | 1,217 |
| 19.03 | 1,011 | 1,222 |
| 19.04 | 1,011 | 1,226 |
| 19.05 | 1,011 | 1,230 |
| 19.06 | 1,011 | 1,234 |
| 19.07 | 1,011 | 1,238 |
| 19.08 | 1,011 | 1,242 |
| 19.09 | 1,011 | 1,246 |
| 19.10 | 1,011 | 1,250 |
| 19.11 | 1,011 | 1,254 |
| 19.12 | 1,011 | 1,258 |
| 19.13 | 1,011 | 1,262 |
| 19.14 | 1,011 | 1,266 |
| 19.15 | 1,011 | 1,270 |
| 19.16 | 1,011 | 1,274 |
| 19.17 | 1,011 | 1,278 |
| 19.18 | 1,011 | 1,282 |
| 19.19 | 1,011 | 1,286 |
| 19.20 | 1,011 | 1,290 |
| 19.21 | 1,011 | 1,294 |
| 19.22 | 1,011 | 1,298 |
| 19.23 | 1,011 | 1,302 |
| 19.24 | 1,011 | 1,306 |
| 19.25 | 1,011 | 1,310 |
| 19.26 | 1,011 | 1,314 |
| 19.27 | 1,011 | 1,319 |
| 19.28 | 1,011 | 1,323 |
| 19.29 | 1,011 | 1,327 |
| 19.30 | 1,011 | **1,331** |

# *CHECKLIST FOR STORMWATER REPORT*

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

# Checklist for Stormwater Report

## A. Introduction

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

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

The Stormwater Report must include:

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

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

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

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

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

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

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

# Checklist for Stormwater Report

## B. Stormwater Checklist and Certification

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

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

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

## Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature

Signature and Date

## Checklist

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

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

# Checklist for Stormwater Report

## Checklist (continued)

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

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

**Standard 1: No New Untreated Discharges**

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

# Checklist 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.

** The calculations utilize the half-inch rule for BMP's (as noted in the treatment calculations provided).

# 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.

# CONSTRUCTION PERIOD POLLUTION PREVENTION AND SEDIMENTATION AND EROSION CONTROL PLAN

*Located at*

## 480-482 RANTOUL STREET
## BEVERLY, MASSACHUSETTS

**Applicant:**

Windover Development
15 Rantoul Street
Beverly, Massachusetts 01915

**Prepared by:**

Meridian Associates, Inc.
500 Cummings Center, Suite 5950
Beverly, Massachusetts 01915
(978) 299-0447

**March 25, 2016**

**Project Name** 480-482 Rantoul Street
Beverly, Massachusetts

**Owners Name:** Rantoul Street, LLC (Map 20, Lot 107)
112 Elliott Street
Beverly, MA 01915
Force Realty, LLC (Map 20, Lot 108)
112 Elliott Street
Beverly, MA 01915

**Applicant Name:** Windover Development
15 Rantoul Street
Beverly, MA 01915

**Party Responsible for Maintenance:** Windover Development
15 Rantoul Street
Beverly, MA 01915

**Project Description:**

The project area is comprised of approximately 1.96± acres located at 480-482 Rantoul Street in Beverly, Massachusetts. The site is bordered by the MBTA commuter rail to the west and by abutting commercial development in the other directions. A small isolated wetland area is located in the south end of the project property which is to remain and not be disturbed. There is an existing 42 inch diameter storm drain, and four associated drain manholes structures, within the site, that enters the property at the northeast corner and runs for approximately 420± feet northerly, southwesterly and then southeasterly, ultimately leaving the property at the southern end of the site.

A portion of the property (482 Rantoul St. lot) was previously occupied by a commercial use (restaurant) that has since been demolished along with the appurtenant paved parking areas associated with the former structure. Currently that portion of the lot is cleared and

used as a construction staging area for work being done nearby by others. The remaining portions of the property consist of a graded gravel area along the west side of the site, abutting the railroad and a commercial condominium complex, and a small area of overgrown natural vegetation consisting of small trees, grass, brush and weeds adjacent to the isolated wetland area.

The applicant is proposing the construction of a 5 story, 90-unit residential building with approximately 1,900 square feet of retail use on the first floor and associated parking and utilities. Vehicular access to the site will be provided from Rantoul Street via a one way in driveway located to the south of the proposed building and the exit will be a one way driveway out to the north of the building. All proposed work will be done in previously disturbed areas.

## Erosion and Sedimentation Control Measures During Construction Activities

### FilterMitt

FilterMitts are proposed to be installed, as shown on the site plan, around the perimeter and up gradient of the wetland area and southeasterly property line. The barriers are burlap fabric mitts filled with compost blends and shall be installed prior to the commencement of any work on-site and in accordance with the design plans. An additional supply of mitts shall be on-site to replace and/or repair FilterMitts that have been disturbed. The lines of mitts shall be inspected and maintained on a weekly basis during construction. Deposited sediments shall be removed when the level of deposition reaches approximately one-half the height of the FilterMitt.

### Storm Drain Inlet Protection

A temporary storm inlet protection filter will be placed around all catchbasin units. The purpose of the filter is to prevent the inflow of sediments into the closed drainage system. The filter shall remain in place during construction until the transport of sediment is no longer visibly apparent. The filter shall be inspected and maintained on a weekly basis and after every storm of 0.25 inches or more of rainfall/precipitation.

**Surface Stabilization**

The surface of all disturbed areas shall be stabilized during and after construction. Temporary measures shall be taken during construction to prevent erosion and siltation. No construction sediment shall be allowed to enter any infiltration system. All disturbed slopes will be stabilized with a permanent vegetative cover. Some or all of the following measures may be utilized on this project as conditions may warrant.

a. Temporary Seeding
b. Temporary Mulching
c. Permanent Seeding
d. Placement of Sod
e. Hydroseeding
f. Placement of Hay
g. Placement of Jute Netting

**Catch basins**

The performance of the catch basins shall be checked weekly and after every major storm event during construction.

**Subsurface Infiltration**

The performance of the subsurface infiltration shall be checked weekly and after every major storm event during construction. No unfiltered construction period runoff should be directed into the subsurface infiltration system under any circumstances.

**STORMWATER MANAGEMENT**
**CONSTRUCTION PHASE**

# INSPECTION SCHEDULE AND EVALUATION CHECKLIST

**PROJECT LOCATION:** 480-482 Rantoul Street, Beverly, Massachusetts

| Inspection Date | Inspector | Area Inspected | Best Management Practice (yes/no) | Required Inspection Frequency if BMP | Comments | Recommendation | Follow-up Inspection Required (yes/no) |
|---|---|---|---|---|---|---|---|
| | | FilterMitt | Yes | Weekly and After Major Storm Events | | | |
| | | Catch basins | Yes | Weekly and After Major Storm Events | | | |
| | | Subsurface Infiltration Structure | Yes | Weekly and After Major Storm Events | | | |
| | | Graded slopes | Yes | Weekly and After Major Storm Events | | | |
| | | Soil Stockpiles | No | Weekly and After Major Storm Events | | | |
| | | Soil tracking onto existing street | Yes | Daily and After Major Storm Events | | | |

(1) Refer to the Massachusetts Stormwater Handbook, Volume Two: Stormwater Technical Handbook (February 2008) for recommendations regarding frequency for inspection and maintenance of specific BMP's.

(2) Inspections to be conducted by a qualified professional such as an environmental scientist or civil engineer.

Limited or no use of sodium chloride salts, fertilizers or pesticides recommended.
Other notes: (Include deviations from: Con. Comm. Order of Conditions, PB Approval, Construction Sequence and Approved Plan)
Stormwater Control Manager: _____

# POST CONSTRUCTION OPERATION AND MAINTENANCE PLAN

*Located at*

## 480–482 RANTOUL STREET
## BEVERLY, MASSACHUSETTS

**Applicant:**

Windover Development
15 Rantoul Street
Beverly, Massachusetts 01915

**Prepared by:**

Meridian Associates, Inc.
500 Cummings Center, Suite 5950
Beverly, Massachusetts 01915
(978) 299-0447

**March 25, 2016**

**Project Name:** 480-482 Rantoul Street
Beverly, Massachusetts

**Owners Name:** Rantoul Street, LLC (Map 20, Lot 107)
112 Elliott Street
Beverly, MA 01915
Force Realty, LLC (Map 20, Lot 108)
112 Elliott Street
Beverly, MA 01915

**Applicant Name:** Windover Development
15 Rantoul Street
Beverly, MA 01915

**Party Responsible for Maintenance:** Windover Development
15 Rantoul Street
Beverly, MA 01915

**Project Description:**

The project area is comprised of approximately 1.96± acres located at 480-482 Rantoul Street in Beverly, Massachusetts. The site is bordered by the MBTA commuter rail to the west and by abutting commercial development in the other directions. A small isolated wetland area is located in the south end of the project property which is to remain and not be disturbed. There is an existing 42 inch diameter storm drain, and four associated drain manholes structures, within the site, that enters the property at the northeast corner and runs for approximately 420± feet northerly, southwesterly and then southeasterly, ultimately leaving the property at the southern end of the site.

A portion of the property (482 Rantoul St. lot) was previously occupied by a commercial use (restaurant) that has since been demolished along with the appurtenant paved parking areas associated with the former structure. Currently that portion of the lot is cleared and

used as a construction staging area for work being done nearby by others. The remaining portions of the property consist of a graded gravel area along the west side of the site, abutting the railroad and a commercial condominium complex, and a small area of overgrown natural vegetation consisting of small trees, grass, brush and weeds adjacent to the isolated wetland area.

The applicant is proposing the construction of a 5 story, 90-unit residential building with approximately 1,900 square feet of retail use on the first floor and associated parking and utilities. Vehicular access to the site will be provided from Rantoul Street via a one way in driveway located to the south of the proposed building and the exit will be a one way driveway out to the north of the building. All proposed work will be done in previously disturbed areas.

## Inspection and Maintenance Measures after Construction

### Erosion Control

Eroded sediments can adversely affect the performance of the stormwater management system. Eroding or barren areas should be immediately re-vegetated.

### Subsurface Infiltration Facilities

The infiltration facilities should be inspected after the first several rainfall events or first few months after construction, after all major storms (3.1" and greater), and on regular bi-annual scheduled dates. Ponded water inside the system (as visible from the observation well) after several days often indicates that the bottom of the system is clogged. Rigorous maintenance of the catch basins will minimize clogging.

### Debris and Litter Removal

Trash may collect in the catch basins, potentially causing clogging of the facilities. All debris and litter shall be removed when necessary, and after each storm event.

### Deep Sump Catchbasins

The catchbasins shall be inspected four (4) times per year, and if necessary, any maintenance shall be performed so that it functions as designed. The catchbasins shall be cleaned twice per year, or when sediment in the bottom of the sump reaches 24 inches below the bottom of the outlet. Inlet and outlet pipes should be checked for clogging. At a minimum, inspection of the catchbasin shall be performed during the last week of April and the first week of October each year.

**Good Housekeeping Practices (in accordance with Standard 10 of the Stormwater Management Handbook to prevent illicit discharges)**

**Provisions for storing paints, cleaners, automotive waste and other potentially hazardous household waste products inside or under cover**

- All materials on site will be stored inside in a neat, orderly, manner in their appropriate containers with the original manufacturer's label.
- Only store enough material necessary. Whenever possible, all of a product shall be used up before disposing of container
- Manufacturer, local, and State recommendations for proper use and disposal shall be followed.

**Vehicle washing controls**

- A commercial car wash shall be used when possible. Car washes treat and/or recycle water.
- Use biodegradable soaps.
- A water hose with a nozzle that automatically turns off when left unattended.

**Requirements for routine inspection and maintenance of stormwater BMPs**

- See Inspection and Maintenance Measures after Construction.

**Spill prevention and response plans**

- Spill Control Practices shall be in conformance with the guidelines set forth in the National Pollutant Discharge Elimination System (NPDES) Stormwater Pollution Prevention Plan (SWPPP)

**Provisions for maintenance of lawns, gardens, and other landscaped areas**

- Grass shall not be cut shorter than 2 to 3 inches and clippings should be left on the lawn as a natural fertilizer.
- Use low volume water approaches such as drip-type or sprinkler systems. Water plants only when needed to enhance root growth and avoid runoff problems.
- The use of mulch shall be utilized where possible. Mulch helps retain water and prevents erosion.

**Requirements for storage and use of fertilizers, herbicides and pesticides**

- Fertilizers used will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.
- Do not fertilize before a rainstorm.
- Consider using organic fertilizers. They release nutrients more slowly.
- Pesticides shall be applied only when necessary and applied only in the minimum amounts recommended by the manufacturer.

**Pet waste management**

- Scoop up and seal pet wastes in a plastic bag. Dispose of properly, in the solid waste.

**Provisions for operation and management of septic systems**

Not Applicable

**Provisions for solid waste management**

- All solid waste shall be disposed of or recycled in accordance with local regulations.

**Snow disposal and plowing plans relative to Wetland Resource Area**

- Snow shall be plowed and stored on permeable surfaces to allow filtration to occur.
- Once snow melts all sand salt and debris shall be extracted from surface and properly disposed of.
- Snow shall not be disposed of in any wetland resource area or waterbody.
- Avoid disposing snow on top of storm drain catch basins.

**Winter Road Salt and/or Sand use and storage restrictions**

- No salt shall be stored in storage piles on site.
- The amount of road salt applied should be regulated to prevent over salting of roadways which increases salt concentration in runoff. Alternative materials, such as sand may be used in especially sensitive areas. If sand is used, it must be swept up to minimize deposition into the catch basins and possible clogging of the subsurface infiltration system.

**Roadway and Parking Lot sweeping schedule**

- Pavement sweeping shall be conducted at a frequency of not less than once per year
- Removal of any accumulated sand, grit, and debris from the driveways and parking areas shall be completed shortly after snow melts for the season.

**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**

Not Applicable

**Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan**

To be determined by the owner.

**List of Emergency contacts for implementing Long-Term Pollution Prevention Plan**

To be determined by the owner.

**STORMWATER MANAGEMENT**
**POST-CONSTRUCTION PHASE**

# INSPECTION SCHEDULE AND EVALUATION CHECKLIST

**PROJECT LOCATION:** 480-482 Rantoul Street, Beverly, Massachusetts

| Inspection Date | Inspector | Area Inspected | Best Management Practice (yes/no) | Required Inspection Frequency if BMP | Comments | Recommendation | Follow-up Inspection Required (yes/no) |
|---|---|---|---|---|---|---|---|
| | | Catchbasin | Yes | 4 Times per year | | | |
| | | Subsurface Infiltration Structure | Yes | Twice a year | | | |
| | | Parking lot sweeping | Yes | Once a year | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

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